DG III

Industry

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PANORAMA of EU INDUSTRY 97

The key to European industry

VOLUME 1

An extensive review of the situation and outlook of the manufacturing and service industries in the European Union

European Commission

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EUROPEAN COMMISSION

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server (http://europa.eu.int)

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All professional associations/organisations known to the Commission which represent industry at the European level were asked to contribute material on their sector. At the end of each monograph, addresses and telephone and fax numbers of the respective professional association concerned are indicated.

The many consultants and associations that contributed to this edition of Panorama are listed in the introduction section of the publication.

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Preface by Martin BANGEMANN

Member of European Commission

The key to Europe's future prosperity lies in our ability to compete in the global marketplace. However, competitiveness is no means in itself. It has to be an effective instrument to lever welfare and quality of life. Competitiveness matters not only for industry. It concerns every citizen of the European Union because productivity employment and welfare are highly interelated and can not be separated.

Monitoring Europe's economic performance reveals that improvements made in the economic environment are not sufficient enough to fight weaknesses in the performance of European industry, the most alarming of which is the continuously rising unemployment rate. Since 1960, the EU has managed to create 10 million new jobs - only half of those in Japan and less than a fifth of those in the United States. Europe continues to lag twenty percent behind the United States in terms of both productivity levels and the employment ratIt also lags behind the Japanese employment rate by a similar margin.

Furthermore, the European Union share in OECD export markets (excluding intra-EU trade) has been declining since 1987, which is essentially due to it's insufficient presence on markets with strong growth rather than to exchange rate or other price developments. Net profit margins and return on investment for enterprises remain inadequate, despite improvement made in 1994. High level of costs of key inputs such as labour; energy, water, communications and transport, and low investment, both tangible and intangible, such as spending on research & development, plants and equipment contributed to EU industry's poor performance.

Therefore, key areas of economic activity have to be improved: particularly the functioning of markets, innovation and investments in intangibles. Together with the Member States, the Commission intends to overcome the restrictions to key product markets, to competitiveness and the Commission will aid development in new economic activities and foster an innovation for enterprise activity.

In a concerted action with the Member States, the Commission proposes to use **benchmarking** as a tool for improving the competitiveness of European industry. While benchmarking on enterprise level remains the primary responsibility of industry itself, the Community can assist by disseminating best practice to SME's.

Benchmarking of sectors will monitor on a continuing basis the ability of European Industries to respond to international competition. Key areas to be benchmarked include price, quality of service and innovatory services provided. Finally, there is a need for benchmarking of framework conditions for industry created by public authorities, including productivity of labour and capital and productivity of growth, job creation and employment rate. Taken together, these benchmarks evaluate an economy's ability to raise living standards.

The Panorama of European Industry provides an excellent reference base on which to build benchmarking. It provides in the most comprehensive way basic facts about a broad range of industries in Europe, its regional distribution and its share in the world economy.

Introduction by Stefano MICOSSI

Director-General for Industry of the European Commission

One major objective of the Commission and in particular DG III is to monitor Europe's competitiveness vis-à-vis its major trading partners, the United-States and Japan in terms of job creation productivity levels, export market shares, profit margins and investment returns.

This edition of the **Panorama of EU Industry**, which presents the recent trends and outlook in close to 200 manufacturing and services sectors in the EU, details the many challenges to which companies and sectors are faced in the increasingly global and competitive world economy. The collection and analysis of data presented in this Panorama reflects the close cooperation between European Commission experts, the authors and an extensive network of trade associations, who contributed statistical data and reports on specific industrial sectors and gave valuable comments on the final drafts.

In many ways, the Panorama of EU Industry constitutes a major first building block in the effort which is being launched to provide information to companies and policy makers for benchmarking. In October 1996, the European Commission approved a Communication proposing benchmarking as a tool to monitor progress on an on-going basis, and to assess the situation against continuously improving best practices world-wide.The set up of a comprehensive information system for benchmarking is, however, an ambitious task, and I am confident that this and future editions of the Panorama of EU Industry will provide a useful contribution to this information system, through a process of continuous improvement.

To better reflect the European economy, this year the Panorama chapters have adopted the NACE Revision 1 nomenclature and include analysis and forecasts of the 15 Members States. Indeed, to better follow future European and global industrial trends, the Panorama introduces new chapters on recycling and the information society, and includes other innovative new industries such as bio-technology and renewable energy, along side the traditionally important European industries and services.

As in earlier editions, the opening section of this year's Panorama comprises analyses of topical issues affecting European industry, notably a discussion of the influence of management practices on firms' competitiveness, an analysis of the financial performance of Europe's programme on EU industry and services, an analysis of trends in (and the role of) intangible assets and a forecast of trends in employment by type of skills due to innovation and changes in the information society.

To reflect the growing interactions between sectors and companies in western and eastern Europe, this edition of the Panorama also extends beyond the EU borders to present a special section on the industrial situation and re-structuring status in Eastern Europe. The results of these analyses, many of which are distilled from studies carried out on behalf of the European Commission, provide important insights on how the relevant public and private sector organisations might refine their operations and procedures to enhance global competitiveness.

After its seventh edition, the Panorama will undergo an in-depth **review**. Over the years the volume - this year it is split in two parts - has grown up to nearly 2000 pages. General issues are united with a sectoral analysis of the industry. In addition, two different versions of a CD ROM are transforming the hard cover volume into an electronic media. The review covers the quality of analysis, the production process, the information collection and the distribution. The outcome might be a Panorama in a different format and I am convinced the product or the products will be better accessible by the readers, raise the analytical quality and render the European Single Market more transparent.

Time frames and statistics

Panorama 1996/97 provides a comprehensive picture of industry and services within the European Union. It is intended for all those requiring an update on the present situation and probable future developments in manufacturing and service industries in the EU.
Panorama opens with a "special features" section, which takes a global approach to a number of horizontal subjects of topical interest. The main part of the book - the industry reviews - provides an economic survey of EU industry and services, tracing the major developments in production, employment, trade and structural change and includes, in most cases, detailed statistical data and forecasts.

Time frame

The industry reviews and forecasts were written during the first and second quarters of 1996. Time series run from 1985 to 1994. Gaps in the data were filled by estimates wherever the necessary supporting information was available, and these estimates are footnoted in the tables.

For the main indicators table 1995 estimates have also been added. Forecasts, if available, were provided up to 1998 for many of the monographs. In such cases the data for 1986-1989 has been omitted from the table.

Industry classification system

The selection and ordering of industries and services included in Panorama is based on the NACE coding system. This system classifies economic activity in terms of the nature of goods and services produced or by the nature of the production process employed. It is arranged on the decimal system and is subdivided into divisions (1-digit codes), classes (2-digit codes), groups (3-digit codes), sub-groups (4-digit codes) and items (5-digit codes). Panorama is primarily focused on the 3-digit level.

More detailed information on the NACE codes is contained in the General Industrial Classification of Economic Activities within the European Community, published by Eurostat (1985 reprint of the 1970 edition). Revisions to the NACE classification have been incorporated in Council Regulations (OJ L293, 24th October 1990 and OJ 696/93, 15th March 1993) and have already started to be used for data collection in some of the Member States. One of the objectives of this revision is a further breakdown of some service and industrial categories. Details of Nace Rev.1 are published by Eurostat (Nace Rev. 1, ISBN 92-826-8767-8). Both these publications are available from the usual outlets for Commission products.

For this edition of Panorama the chapters have been headed by their Nace Rev.1 label, in preparation for the change to Nace Rev.1 data next year. Furthermore, the order of chapters now reflects that of Nace Rev.1 - at least for industry chapters. Nevertheless, until data from the majority of Member States arrives in this format, the data from the structural enquiry is still based on Nace æ70.

Although most chapters are headed by the appropriate NACE code, some do not have a NACE code indicated as the sector represents too small a fraction of the total NACE group. This is particularly common in the service sectors.

Even when a NACE code appears beneath the sector title this should be viewed with caution. In some cases the NACE classification does not exactly coincide with the sector under discussion. Each chapter includes a preliminary section explaining the sectoral coverage of the chapter in question, and indicating the extent to which this deviates from the NACE classification. There are cases where an overlap occurs between sectors and therefore data cannot be cumulated.

Statistical data

The three main sources of data are Eurostat, DEBA GEIE (Data for European Business Analysis, which contributed estimates for recent years) and the professional trade associations. Data sources are indicated for each statistical table. The statistical data in Panorama should be regarded with some caution, particularly for the more recent years where data have often been estimated.

For manufacturing industries most chapters include a summary table containing the main indicators for the industry. These cover apparent consumption (defined as production + extra-EU imports - extra-EU exports), production, extra-EU exports, net exports (the trade balance of the European Union with the rest of the world) and employment.

Data in the tables are in current ECU unless otherwise stated. Indices (reference year: 1990=100) have been calculated for production and trade data making trend changes easier to follow.

In the main indicators and foreign trade tables, Eurostat has made estimates for the EUR15 aggregate. The introduction of the EUR15 aggregate may cause some peculiar effects in time-series. For example, in many sectors the amount of extra-EU trade will be seen to decrease (as the trade between EUR12 and the three new Member States will become intra trade and is no longer recorded). This also explains why apparent consumption may be seen to decrease when the user compares 1995 data for EUR12 and EUR15.

Where forecasts have been made in the main indicators tables for the coming years, they refer to the EUR15 aggregate. Next year data for Austria, Finland and Sweden should be included for all years and all variables. This year, every effort has been made to include data for all EUR12 Member States. Figures for Germany are still on a pre-unification basis, unless otherwise stated. Where data are not available for the EUR12 aggregate, country coverage is clearly indicated in the footnotes appearing below each table.

Production figures for the USA derived from the Federal Administration have also been included, as have Japanese data from MITI. To compare the Panorama of EU Industry with the US Industrial Outlook, Eurostat can provide a table correlating NACE to the US SIC.

Production and employment

Data for production and employment come from annual enquiries conducted by Member States relating to all enterprises with 20 or more employees. The exceptions to this are the United States, Spain and Portugal (until 1989) where the coverage is for firms of all sizes, and Japan where establishments employing 4 or more persons are covered by the enquiry. Figures are generally available at the 3-digit NACE level. The production data exclude VAT, and the employment data relate to persons employed excluding home workers. The definitions are standardised, and so the figures are comparable across industries and countries.

Estimates are not supplied to Eurostat by Member States for the firms not covered by the enquiries, and the figures under-report actual employment and production. Where this is significant, either industry association sources are used or note is made in the commentary. Derived statistics which are calculated from both production and trade statistics will also be affected. Apparent consumption will be understated, and import penetration ratios and export rates will be overstated.

Gaps in Eurostat's data for production and employment sent by the Member States have, where possible, been filled using estimation techniques by DEBA GEIE. Germany provided data up to 1993; Denmark, France, the Netherlands, Portugal, Spain and the United Kingdom up to 1992, Italy up to 1991, Belgium, Ireland and Luxembourg up to 1990. EU totals contain estimates for missing countries. Estimates are derived from short-term indicators such as indices of production, producer prices and employment. Data for 1995 are based on monthly indicators for the majority of the year, but also take into account independent sectoral forecasts. DEBA's estimates are only made for the NACE 2-digit and 3-digit level. Gaps in industry association figures at the 4 or 5-digit level have normally not been filled due to the scarcity of statistics at this level.

Exchange rate conversion and deflators

All data are reported in ECU, and national currencies have been converted at the average exchange rate prevailing for the year in question. The exchange rates used for the conversions are stated in the 'Annex' section at the end of the 'Highlights' chapter. With the large fluctuations seen in currency markets from the end of 1992, the reader should consider such effects on ECU values (especially at an individual country level).

Producer price indices have been used to deflate production data. In the cases where the corresponding NACE 3-digit index has not been available, the NACE 2-digit index has been used. For Portugal, where such indicators are not available, the corresponding retail price indices have been taken.

Trade data

The trade data are reported in terms of EU trade flows with the rest of the world. In most cases, these data are based on Eurostat figures. Export valuations are generally fob (free on board, i.e. excluding freight and insurance costs) whereas import data are c.i.f. (i.e. inclusive of carriage, insurance and freight). Import statistics may generally be regarded as slightly more accurate than export statistics due to greater ease of data collection in the former case.

All trade figures are in current ECU. For comparative purposes, the ratio of exports to imports (X/M) has been calculated for each set of trade data.

Abbreviations

A	Austria
ABS	Anti-lock Braking System
AAGR	Annual Average Growth Rate
AC	Alternate Current
ACP	African, Caribbean and Pacific countries
ASEAN	Association of South East Asian Nations
ASICS	Application Specific Integrated Circuits
ATC	Air Traffic Control
ATM	Automatic Teller Machine
B	Belgium
Benelux	Belgium, Netherlands and Luxembourg
BLEU	Belgo-Luxembourg Economic Union
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CAP	Common Agricultural Policy
CD	Compact Disc
CD-I	Compact Disc-Interactive
CD-ROM	Compact Disc - Read Only Memory
CEC	Commission of the European Communities
CEN	Comité Européen des Normes (European Committee for Standardisation)
CENELEC	Comité Européen des Normes Electroniques (European Electronics Standard Committee)
CFC	Chlorofluorocarbons
CGT	Compensated Gross Tonnes
CGRT	Compensated Gross Registered Tonnes
CH	Switzerland
CHP	Combined Heat and Power
cif	cost, insurance and freight
CIM	Computer Integrated Manufacturing
CIS	Commonwealth of Independent States (former USSR)
CMEA	Council of Mutual Economic Assistance
CMO	Common Market Organisation
CNC	Computerised Numeric Control
COCOM	Coordinating Committee for Multilateral Security Controls
CRS	Computer Reservation System
D	Federal Republic of Germany
DAT	Digital Audio Tape
DC	Direct Current
DCC	Digital Compact Cassette
DG	Directorate-General
DIY	Do-It-Yourself
DK	Denmark
DPP	Direct Product Profitability
DRAM	Dynamic Random-Access Memory
DTP	Desk-Top Publishing
E	Spain
EAF	Electric Arc Furnace
EBRD	European Bank for Reconstruction and Development
EC	European Community (now European Union)
ECSC	European Coal and Steel Community
ECU	European Currency Unit
EDI	Electronic Data Interchange
EDM	Electrical Discharge Manufacturing
EDP	Electronic Data Processing
EEA	European Economic Area
EEIG	European Economic Interest Groupings
EFT	Electronic Funds Transfer
EFTA	European Free Trade Association
EFT-POS	Electronic Funds Transfer at the Point Of Sale
EIB	European Investment Bank
EOS	Economies Of Scale
EOTA	European Organisation for Technical Approvals
EPA	Environmental Protection Agency
EPOS	Electronic Point Of Sale System
ETSI	European Telecommunications Standard Institute
EU	European Union
Eurostat	Statistical Office of the European Communities
F	France
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
FGD	Flue Gas Desulphurisation
FMS	Flexible Manufacturing System
fob	free on board
FTE	Full-Time Equivalent
GATS	General Agreement on Tariffs and Services
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GNP	Gross National Product
GR	Greece
GSM	Global System for Mobile
GSP	Generalised System of Preferences
GVW	Gross Vehicle Weight
GW	Gigawatt
h	hour
HCFC	Hydrochlorofluorocarbons

HDPE	High-Density Polyethylene
HDTV	High Definition Television
HFC	Hydrofluorocarbons
I	Italy
IAEA	International Atomic Energy Agency
IC	Integrated Circuits
ICA	International Coffee Agreement
ICO	International Coffee Organisation
IDN	Integrated Digital Network
IEA	International Energy Agency
IGCC	Integrated Gasification Combined Cycle
IMF	International Monetary Fund
IRL	Ireland
ISDN	Integrated System Digital Network
ISO	International Standards Organisation
IT	Information Technology
JPN	Japan
kW	Kilowatt
L	Luxembourg
LAN	Local Area Network
LCD	Liquid Crystal Display
LDC's	Less Developed Countries
LDPE	Low-Density Polyethylene
LME	London Metals Exchange
LP	Long Playing
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LWR	Light Water Reactor
M&A	Mergers and Acquisitions
MD	Mini Disk
mdf	medium-density fibreboard
MFA	Multi-Fibre Arrangement
MNCs	Multinational Corporations
MSW	Municipal Solid Waste
MW	Megawatt
N	Norway
N/A	Not Available
NACE	General industrial classification of economic activties within the European Community
NAFTA	North American Free Trade Agreement
NATO	North Atlantic Treaty Organisation
NBP	Net Banking Products
NCM	Numerically-Controlled Machinery
NHS	National Health System
NICs	Newly Industrialised Countries
NL	The Netherlands
NVOCC's	Non-Vessel-Owning Common Carriers
OE	Original Equipment
OECD	Organisation for Economic Cooperation and Development
OEM	Original Equipment Manufacturer
OJ	Official Journal of the European Communities
OPEC	Organisation of Petroleum Exporting Countries
OPT	Outward Processing Trade
osb	oriented strand board
OTC	over the counter
P	Portugal
PBX	Private Branch Exchange
PC	Personal Computer
PCI	Pulverised Coal Injection
PPS	Production Planning System
PPP	Purchasing Power Parity
PR	Public Relations
PVC	Polyvinyl Chloride
PWR	Pressurised Water Reactor
QWPDR	Quality Wines Produced in Determined Regions
RAM	Random Access Memory
R&D	Research and Development
R,D&D	Research, Development and Demonstration
S	Sweden
SCMS	Serial Copy Management System
SF	Finland
SHG	Special High Grade
SICAV	deposit certificate
SITC	Standard International Trade Classification
SMEs	Small and Medium-sized Enterprises
SWU	Separative Work Units
TEN	Trans-European Network
TEU	Twenty-foot Equivalent Unit
TGV	Train à Grande Vitesse (High Speed Train)
TJ	Terajoule
toe	tonne of oil equivalent
TPA	Third Party Access
TQM	Total Quality Management
tU	tonne of uranium
TV	Television
TW	Terawatt
UHT	Ultra-High Temperature
UK	United Kingdom
UN	United Nations
USA	United States of America
USD	US Dollar
USSR	Union of Socialist Soviet Republics
VAT	Value-Added Tax
VCR	Video Cassette Recorder
WHO	World Health Organisation
X/M	Exports/Imports ratio

CONTRIBUTORS

The following list provides the names of the trade associations and consultants that contributed to this edition of Panorama. Associations are listed in alphabetical order according to their acronym, together with an indication of the chapter of pertinence. The full address details of the trade associations can be found at the end of their respective monograph. Independent consultants are listed with their full address.

Associations

ACE Association des Compagnies Aériennes de la CE
Chapter 23

ACE Architects' Council of Europe
Chapter 25

ACEA European Automobile Manufacturers Association
Chapter 17

ACEM Association des Constructeurs Européens de Motocycles
Chapter 17

ACI EUROPE Airports Council International / European Region
Chapter 23

AEA Association of European Airlines
Chapter 23

AEC-CEMBUREAU European Cement Association
Chapter 9

AECMA European Association of Aerospace Industries
Chapter 17

AEEBC Association of European Building Surveyors
Chapter 25

AEGFP Association of the European Glass Fibre Producers
Chapter 9

AESGP European Proprietary Medicines Manufacturers' Association
Chapter 7

AFCASOLE Association of Soluble Coffee Manufacturers of the EC
Chapter 3

AIBI Association Internationale de la Boulangerie Industrielle
Chapter 3

AIIC Association Internationale des Interprètes de Conférence
Chapter 25

AIPCEE EU Fish Processors Association
Chapter 3

AIS International Association of the Soap and Detergent Industry
Chapter 7

AITC Association Internationale des Traducteurs de Conférence
Chapter 25

AMDEA Association of Manufactures of Domestic Electrical Appliances
Chapter 13

APAG The European Oleochemicals & Allied Products Group
Chapter 7

APME Association of Plastics Manufacturers in Europe
Chapter 7

APPE Association of Petrochemicals Producers in Europe
Chapter 7

BIBM International Bureau for Precast Concrete
Chapter 9

BIPAR Bureau International des Producteurs d'Assurances et Réassurances
Chapter 24

BIR Bureau of International Recycling
Chapter 19

BLIC Liaison Office of the Rubber Industry of the EC
Chapter 8

CAEF Committee of European Foundry Associations
Chapter 10

CAFIM Confédération des Associations des Facteurs d'Instruments de Musique de la CE
Chapter 18

CAOBISCO Association des Industries de la Chocolaterie Biscuiterie Biscotterie et Confiserie de la CEE
Chapter 3

CAPIEL Comité de Coordination des Associations de Constructeurs d'Appareillage Industriel Electrique du Marché Commun
Chapter 15

CBMC Confederation of Common Market Brewers
Chapter 3

CCBE Council of the Bars and Law Societies of the European Community
Chapter 25

CEA Comité Européen des Assurances
Chapter 24

CEC European Confederation of the Footwear Industry
Chapter 4

CEC European Confederation of the Footwear Indusrty
Chapter 4

CECED European Committee of Manufacturers of Electric Domestic Equipment
Chapter 13

CECIMO Comité Européen de Coopération des Industries de la Machine-Outil
Chapter 13

CECIP European Committee of Weighing Instrument Manufacturers
Chapter 16

CECM European Convention for Constructional Steelwork
Chapter 12

CECSO European Solid Fuels' Association
Chapter 1

CECT Comité Européen de la Chaudronnerie et de la Tuyauterie
Chapter 12

CEEC European Committee of Construction Economists
Chapter 25

CEFIC European Chemical Industry Council
Chapter 7

CEFS Comité Européen des Fabricants de Sucre
Chapter 3

CEHP Comité Européen de l'Hospitalisation Privée
Chapter 28

Cei-Bois European Confederation of Woodworking Industries
Chapter 5

CELCAA Comité Européen de Liaison des Commerces Agro-Alimentaires
Chapter 21

CEMA European Committee of Agricultural Machinery Manufacturers
Chapter 13

CEMATEX European Committee of Textile Machinery Manufacturers
Chapter 13

CEO European Tool Committee
Chapter 12

CEPE European Confederation of Paint Printing Ink and Artists' Colours Manufacturers' Association
Chapter 7

CEPI Confederation of European Paper Industries
Chapter 6

CEPMC Council of European Producers of Material for Construction
Chapter 2

CEPS Confédération Européenne des Producteurs de Spiriteux
Chapter 3

CER Community of European Railways
Chapter 23

CERAME-UNIE Liaison Office of the European Ceramic Industry
Chapter 2,9

CERP European Public Relations Confederation
Chapter 25

CESA Committee of EC Shipbuilders' Associations
Chapter 17

CET Comité Européen de la Trefilerie
Chapter 10

CET/ETC European Tea Committee
Chapter 3

CIAA Confederation of the Food and Drink Industries of the EEC
Chapter 3

CIBJO International Confederation of Jewelry Silverware Diamonds Pearls and Stones
Chapter 18

CIELFFA Comité International d'Etude du Laminage à Froid du Feuillard d'Acier
Chapter 10

CIETT International Confederation of Temporary Work Businesses
Chapter 25

CIPF Comité International du Profilage à Froid
Chapter 10

CIRFS International Rayon and Synthetic Fibres Committee
Chapter 7

CITPA International Confederation of Paper and Board Converters in the EC
Chapter 6

CLEPA Liaison Committee of the Automotive Components and Equipment Industry
Chapter 17

CLGEE Comité de Liaison des Géomètres-Experts Européens
Chapter 25

CLITRAVI Liaison Centre of the Meat Processing Industry in the EC
Chapter 3

CoESS Confédération Européenne des Services de Sécurité
Chapter 25

COLIPA The European Cosmetic Toiletry and Perfumery Association
Chapter 7

COMITE VINS Comité de la Communauté Economique Européenne des Industries et de Commerce des Vins
Chapter 3

COMITEXTIL Coordination Committee for the Textile Industries of the EU
Chapter 4

COTANCE Confederation of National Associations of Tanners and Dressers of the EC
Chapter 4

COTREL Comité des Associations de Constructeurs de Transformateurs du Marché Commun
Chapter 15

CPHE European Watch and Clock Permanent Committee
Chapter 16

CPIV Permanent Committee of the Glass Industries in the European Union
Chapter 9

CPIV Comité Permanent International du Vinaigre
Chapter 3

EAAA European Association of Advertising Agencies
Chapter 25

EACEM European Association of Consumer Electronics Manufacturers
Chapter 14

EAN European Article Numbering Association
Chapter 21

EAT European Advertising Tripartite
Chapter 25

EAZA European Association of Zoos and Aquaria
Chapter 22

EBA European Bright Bar Association
Chapter 10

EBEMA European Bakery Equipement Manufactures Association
Chapter 13

EBMA European Bicycle Manufacturers Association
Chapter 17

ECATRA European Car and Truck Rental Association
Chapter 25

ECLA European Clothing Association
Chapter 4

ECMT European Conference of Ministers of Transport
Chapter 23

ECPA European Crop Protection Association
Chapter 7

ECSA European Community Shipowners' Association
Chapter 23

ECTAA Group of National Travel Agents' and Tour Operators' Associations within the EU
Chapter 22

ECTEL The European Telecommunications and Professional Electronics Industry
Chapter 14

ECWITA European Community Wholesars and International Traders Association
Chapter 21

EDA European Dairy Association
Chapter 3

EDG European Domestic Glass
Chapter 9

EDMA European Direct Marketing Association
Chapter 25

EECA European Electronic Component Manufacturers Association
Chapter 14

EEO The European Express Organisation
Chapter 23

EFCA European Federation of Engineering Consultancy Associations
Chapter 25

EFF European Franchise Federation
Chapter 24

EFFA European Fragrance and Flavour Association
Chapter 7

EFMA European Fertilizer Manufacturers Association
Chapter 7

EFPIA European Federation of Pharmaceuticals Industries' Association
Chapter 7

EFR European Ferrous Recovery and Recycling Federation
Chapter 19

EIC European International Contractors
Chapter 20,26

EIFI European Industrial Fasteners Institute
Chapter 7

EIGA European Industrial Gases Association
Chapter 7

EIIA European Information Industry Association
Chapter 26

EISA European Independent Steelworks Association
Chapter 10

ELC European Lighting Council
Chapter 15

ELCA European Landscape Contractors Association
Chapter 25

EMECA European Major Exhibition Centres Association
Chapter 25

EMA European Meat Association
Chapter 3

EMF European Mortgage Federation
Chapter 24

EMOTA European Mail Order Traders Association
Chapter 25

ENPA European Newspaper Publishers' Association
Chapter 6

EPBA European Portable Battery Association
Chapter 15

EPI European Photographic Chemical Industry
Chapter 7

EPTA European Power Tools Association
Chapter 9

ERA European Regional Airlines Association
Chapter 23

ERMCO European Ready Mixed Concrete Organization
Chapter 9

ESBG European Savings Bank Group
Chapter 24

ESBNA European Secretariat of National Bioindustry Associations
Chapter 7

E.S.O.M.A.R. European Society for Opinion and Marketing Research
Chapter 25

ESPA European Salt Producers' Association
Chapter 2

ESTA European Steel Tubes Association
Chapter 10

ESTA European Security Transport Association
Chapter 25

ETNO European Public Telecommunications Network Operators' Association
Chapter 26

ETOA European Tour Operators Association
Chapter 22

EUCA European Federation of Associations of Coffee Roasters
Chapter 3

EUCHEMAP European Committee of Chemical Plant Manufacturers
Chapter 13

EUMABOIS Comité Européen des Constructeurs de Machines à Bois
Chapter 13

EULA Chapter 2and 9

EuPC European Plastics Converters
Chapter 8

EURA European Renderers Association
Chapter 15

EUREAU European Union of National Associations of Water Suppliers
Chapter 1

Eurelectric European Grouping of the Electricity Supply Industry
Chapter 1

EURISCOAL European Importers and Suppliers of Coal
Chapter 1

Euro-Alliages Comité de Liaison des Industries de Ferro-Alliages
Chapter 10

EURO-ROC European International Federation of Natural Stone Industries
Chapter 2

EUROBAT Association of European Accumulator Manufacturers
Chapter 15

EUROBIT European Association of Manufacturers of Business Machines and Information Technology
Chapter 14 and 26

Eurocommerce The Retail, Wholesale and International Trade Representation to the EU
Chapter 21

EUROFER European Confederation of Iron and Steel Industries
Chapter 2 and 10

EUROFINAS European Federation of Finance House Associations
Chapter 24

EUROFORGE Comité de Liaison des Industries Européennes de l'Estampage et de la Forge
Chapter 12

EUROGAS European Union of the Natural Gas Industry
Chapter 1

EUROGLACES Association of the Ice Cream Industries of the EC
Chapter 3

EUROGYPSUM Association européenne de l'Industrie du Plâtre
Chapter 2 and 9

EUROM European Federation of Precision Mechanical and Optical Industries
Chapter 16

EUROMALT Working Committee of the Malting Industry of the EU
Chapter 3

EUROMAP European Committee of Machinery Manufacturers for the Plastics and Rubber Industries
Chapter 13

Eurométaux Association Européenne des Métaux
Chapter 11

EUROMINES European Association of Mining Industries
Chapter 2

EUROPACABLE European Confederation of Associations of Manufacturers of Insulated Wires and Cables
Chapter 15

Europarks European Federation of Leisure Parks
Chapter 22

EUROPIA European Petroleum Industry Association
Chapter 1

Europlant European Committee of Plantmakers
Chapter 20

EUROPUMP European Committee of Pump Manufacturers
Chapter 13

EUROTRANS European Committee of Associations of Manufacturers of Gears and Transmission Parts
Chapter 13

EUSIDIC The European Association of Information Services
Chapter 26

FAFPAS Fédération des Associations des Fabricants de Produits Alimentaires Surgelés de la CE
Chapter 3

FAIBP Fédération des Associations de l'Industrie des Bouillons et Potages de la CE
Chapter 3

FBE	Fédération Bancaire Européenne Chapter 24
FEACO	Fédération Européenne des Associations de Conseil en Organisation Chapter 25
FEBMA	Federation of European Bearing Manufacturers Association Chapter 13
FEDESA	European Federation of Animal Health Chapter 7
FEDIM	Federation of European Direct Marketing Chapter 25
FEDIOL	EC Seed Crushers' and Oil Processors' Federation Chapter 3
FEDOLIVE	Fédération de l'Industrie de l'Huile d'Olive de la CE Chapter 3
FEE	Fédération des Experts Comptables Européens Chapter 25
FEFAC	European Feed Manufacturers Federation Chapter 15
FEJ	European Federation of Toy Industries Chapter 18
FEM	European Federation of Handling Industries Chapter 13
FEMB	Fédération Européenne du Mobilier de Bureau Chapter 18
FENI	European Federation of Cleaning Industries Chapter 25
FERCO	European Federation of Contract Catering Organisations Chapter 22
FESE	Federation of European Stock Exchanges Chapter 24
FESI	Federation of the European Sporting Goods Industry Chapter 18
FFF	European Franchise Federation Chapter 25
FIABCI	Fédération Internationale des Professions Immobilières Chapter 24
FIBV	Fédération Internationale des Bourses de Valeurs Chapter 24
FIC	Fédération des Industries Chimiques Chapter 7
FIEC	European Construction Industry Federation Chapter 20
FIT	International Federation of Translators Chapter 25
FORATOM	European Atomic Forum Chapter 1
GAM	Groupement des Associations Meunières des Pays de la CE Chapter 3
GEBC	European Association of Cooperative Banks Chapter 24
GECE	European Savings Bank Group Chapter 24
GPCE	Pharmaceutical Group of the EC Chapter 28
HCEC	Hospital Committee of the EC Chapter 28
HOTREC	Confederation of the National Hotel and Restaurant Associations in the EC Chapter 22
IAAPA	International Association of Amusement Parus and Attractions Chapter 22
IATA	International Air Transport Association Chapter 23
IFPI	International Federation of the Phonographic Industry Chapter 27
IFTO	International Federation of Tour Operators Chapter 22
IHA	International Hotel Association Chapter 22
IMA	Industrial Minerals Association Chapter 2
IMACE	Association of the Margarine Industry of the EC Countries Chapter 3
Intergraf	International Confederation for Printing and Allied Industries Chapter 6
IRF	International Road Federation Chapter 23
IRU	International Road Transport Union Chapter 23
LEASEUROPE	European Federation of Leasing Company Associations Chapter 25
LISS	Ligue Internationale des Societés de Surveillance Chapter 25
OEITFL	Association of European Fruit and Vegetable Processing Industries Chapter 3
ORGALIME	Liaison Group of the European Mechanical Electrical Electronic and Metalworking Industries Chapter 12, 13 and 15
PostEurop	Association of European Public Postal Operators Chapter 23
SAGB	Senior Advisory Group Biotechnology Chapter 7
SEFA	European Association of New Steel Drum Manufacturers Chapter 12

SEFEL	European Secretariat of Manufacturers of Light Metal Packaging Chapter 12
TBE	European Tile and Brick Federation Chapter 9
TME	Toy Manufacturers of Europe Chapter 18
UEA	European Furniture Manufacturers Federation Chapter 18
UEEA	Union Européenne des Exploitants d'Abattoirs Chapter 3
UEPA	Union Européenne des Producteurs d'Alcool Chapter 3
UEPG	European Aggregates Association Chapter 2
UITP	International Union of Public Transport Chapter 23
UIC	International Union of Railways Chapter 23
UINF	Union Internationale Navigation Fluviale Chapter 23
UNESDA	Union of EU soft drinks associations Chapter 3
UNIFE	Union of European Railway Industries Chapter 17
UNIPEDE	International Union of Producers and Distributors of Electrical Energy Chapter 1
WFA	World Federation of Advertisers Chapter 25
WTO	World Tourism Organisation Chapter 22

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Special Features

Highlights of EU Industry

THE PERFORMANCE OF THE EUROPEAN ECONOMY

In 1995, the EU-15 generated almost 6 500 billion ECU gross domestic product, which represents 20% more than the USA and 70% more than Japan. The four largest Member States generated almost three-quarters of Europe's GDP, and almost 30% is accounted for by Germany alone.

After moderate growth of 2.5% in 1995, the EU economy saw weaker growth of 1.5% in 1996. Growth rates over the medium term are expected to be modest, at approximately 2.5% per year over the period 1997-1999. Consumer and business confidence remain below the long-term average, but there were signs of improvement in the second half of 1996. Consumer spending has proved resilient in the face of weak income growth. Businesses are still cautious about investment plans, and while plant and equipment spending has turned up it is still low in comparison with the 1990s US investment boom and as compared with historical European experience.

Fiscal policy is being tightened in most EU countries in a bid to meet the Maastricht budget deficit target of 3% by 1997 for entry into the EMU, but the increased credibility of this budgetary consolidation process and the moderate evolution of wages has allowed an easing of monetary policy. The low interest rate profile of many countries reflects continued low inflation, with most economies still below capacity levels.

The EU continues to maintain a positive trade balance, and the international environment remains favourable, underpinning the export performance of EU countries. The US economy is expected to grow at a steady rate close to its potential value without inflationary pressures, whereas the central and eastern European countries should start benefiting from their structural reforms. The Japanese economy should continue to recover, while dynamic Asian countries should maintain high growth rates.

With the increasing globalisation of industry, the ability of the European economy to maximise its performance depends upon how well it can compete on international markets. This article will explain, in the context of a competitiveness framework, how the European economy has recently performed and identify the strongest European sectors.

FACTORS AFFECTING PERFORMANCE

Between 1985 to 1995, the ratio of world exports to GDP has grown from just under 20% to almost 25%, with Western Europe's ratio of exports to GDP is now at 32%. The opening of national economies to world market forces has been a catalyst for restructuring, driven by intense global competition, new technologies, and rapidly changing consumer markets. Increasingly, companies are re-organising production along broader geographical lines to optimise the skilled labour, technology, and markets at each stage of the production process. This has resulted in the emergence of global production networks and increased the speed at which inefficient firms disappear while stimulating the growth of productive firms and new industries.

The material content of products and services now accounts for less of total value added, while scientific knowledge continues to increase rapidly, making technology, skills and products out-of-date within a short time frame. The fundamental global shift from material to knowledge-based comparative advantage means that nowadays static natural assets do less to shape a region's economic performance than do dynamic, purposefully-developed resources such as skilled and adaptable people, accessible technology, available financial capital and advanced physical infrastructure.

Table 1: EU macroeconomic trends (1)

(% annual change)	1985-1990 (2)	1991	1992	1993	1994	1995	1996	1997
GDP at constant market prices	3.3	1.5	1.0	-0.6	2.8	2.5	1.5	2.4
Total number of employed	1.5	-0.1	-1.3	-2.5	-0.5	0.6	0.2	0.6
Deflator of private consumption (3)	4.2	5.6	4.7	4.1	3.2	3.0	2.6	2.4
Gross fixed capital formation at 1990 prices in construction	4.7	-0.3	0.9	-3.3	2.1	1.5	0.9	2.6
Gross fixed capital formation at 1990 prices in equipment	7.0	-0.3	-3.3	-10.8	3.2	6.3	4.0	6.2
Real unit labour costs	-0.7	0.1	-0.2	-1.0	-2.5	-1.4	-0.5	-0.9

(1) Spring 1996 forecasts; EUR15 including former East Germany from 1992 onwards.
(2) Average annual growth rate.
(3) In national currency.
Source: Commission Services (DG II)

Table 2A: Sectoral breakdown of EU exports and imports, 1994

(%)	Share in total manufacturing exports (ratio)	Share in total manufacturing imports (ratio)	Export specialisation (1)	Adjusted cover (2)
Mineral oil refining	2.1	2.2	1.31	0.94
Preliminary processing of metals	5.2	7.9	0.89	0.66
Non-metallic mineral products	2.2	1.2	1.20	1.85
Chemicals and man-made fibres	14.2	10.1	1.11	1.41
Metal articles	3.6	2.8	1.15	1.29
Mechanical engineering	17.5	8.5	1.27	2.07
Office machinery and data processing mach.	3.0	7.0	0.66	0.43
Electrical engineering	12.5	15.3	0.84	0.82
Motor vehicles and parts	9.6	5.9	0.73	1.63
Other means of transport	5.7	5.4	1.11	1.06
Instrument engineering	2.5	3.4	0.88	0.75
Food, drink and tobacco	7.1	6.0	1.11	1.19
Textiles	4.1	5.2	1.17	0.79
Leather and leather goods	0.9	1.1	1.72	0.84
Footwear and clothing	3.1	6.5	1.34	0.48
Timber and wooden furniture	1.6	3.8	0.76	0.41
Paper, printing and publishing	2.6	5.1	0.74	0.52
Rubber and plastics	2.9	2.6	0.95	1.13
Other manufacturing industries	8.3	7.4	1.27	1.13
Total manufacturing	100.0	100.0	1.00	1.00

(1) Share of sector in total EU manufacturing exports divided by the same share calculated for the OECD.
(2) Sectoral cover ratio (i.e. exports divided by imports) adjusted for the overall cover ratio of manufacturing industry.
Source: Eurostat, DEBA GEIE

Table 2B: Sectoral breakdown of USA exports and imports, 1994

(%)	Share in total manufacturing exports (ratio)	Share in total manufacturing imports (ratio)	Export specialisation (1)	Adjusted cover (2)
Mineral oil refining	1.1	2.0	0.70	0.57
Preliminary processing of metals	3.6	5.3	0.62	0.68
Non-metallic mineral products	0.9	1.3	0.51	0.70
Chemicals and man-made fibres	12.7	6.6	0.99	1.91
Metal articles	2.4	2.4	0.75	0.99
Mechanical engineering	14.0	8.7	1.02	1.61
Office machinery and data processing machinery	7.9	8.4	1.72	0.94
Electrical engineering	19.6	17.5	1.32	1.13
Motor vehicles and parts	11.3	17.2	0.85	0.65
Other means of transport	8.2	2.3	1.62	3.55
Instrument engineering	3.2	2.9	1.11	1.10
Food, drink and tobacco	3.6	1.9	0.57	1.87
Textiles	1.7	3.3	0.48	0.51
Leather and leather goods	0.3	0.9	0.49	0.30
Footwear and clothing	1.1	6.7	0.47	0.16
Timber and wooden furniture	1.6	2.9	0.81	0.57
Paper, printing and publishing	3.4	2.4	0.95	1.37
Rubber and plastics	2.6	2.4	0.85	1.11
Other manufacturing industries	6.1	8.1	0.92	0.75
Total manufacturing	100.0	100.0	1.00	1.00

(1) Share of sector in total EU manufacturing exports divided by the same share calculated for the OECD.
(2) Sectoral cover ratio (i.e. exports divided by imports) adjusted for the overall cover ratio of manufacturing industry.
Source: Eurostat, DEBA GEIE

Together, these changes are "tightening" manufacturing functions, R&D, design, component production, assembly, distribution and marketing, to allow manufacturers to utilise just-in-time supply links, and anticipate necessary changes in the marketing and distribution of goods. This creates concentrations of competing, complementary, and interdependent firms across several industries, including component suppliers, service providers, and final product manufacturers.

Given these developments, the following four factors now constitute the basis for a competitive business sector :

- Strong, flexible economic infrastructure provides the foundation for industry to grow and transform over time as the

Table 2C: Sectoral breakdown of Japanese exports and imports, 1994

(%)	Share in total manufacturing exports	Share in total manufacturing imports	Export specialisation (1)	Adjusted cover (2)
	(ratio)	(ratio)		
Mineral oil refining	0.3	0.9	0.21	0.35
Preliminary processing of metals	5.0	9.2	0.86	0.55
Non-metallic mineral products	1.3	1.2	0.71	1.04
Chemicals and man-made fibres	8.1	11.3	0.63	0.71
Metal articles	1.5	1.7	0.47	0.89
Mechanical engineering	15.6	5.2	1.14	3.01
Office machinery and data processing machinery	7.8	5.2	1.69	1.49
Electrical engineering	25.6	14.0	1.72	1.84
Motor vehicles and parts	21.4	4.9	1.63	4.37
Other means of transport	5.1	3.0	0.99	1.69
Instrument engineering	5.2	3.3	1.78	1.55
Food, drink and tobacco	0.3	10.8	0.04	0.02
Textiles	1.6	6.2	0.46	0.26
Leather and leather goods	0.1	1.6	0.15	0.05
Footwear and clothing	0.2	7.5	0.09	0.03
Timber and wooden furniture	0.1	6.7	0.07	0.02
Paper, printing and publishing	0.7	2.4	0.20	0.30
Rubber and plastics	2.2	1.7	0.70	1.26
Other manufacturing industries	3.0	6.4	0.45	0.46
Total manufacturing	100.0	100.0	1.00	1.00

(1) Share of sector in total EU manufacturing exports divided by the same share calculated for the OECD.
(2) Sectoral cover ratio (i.e. exports divided by imports) adjusted for the overall cover ratio of manufacturing industry.
Source: Eurostat, DEBA GEIE

global economic environment changes. Greater competition and smaller public-sector budgets furthermore mean that there is an increasing need for greater public-private collaboration in diagnosing economic needs and developing solutions, as the most effective way to boost economic infrastructure competitiveness.

- The relationships between firms, the core and support industry segments through communication, partnerships and alliances are important in stimulating competition and boosting efficiency and innovation through close cooperation between firms; both of these are important to achieve and sustain comparative advantage in the ever-changing global marketplace.
- To meet changing market conditions, many companies have restructured their internal organisation and introduced flatter, decentralised structures, with continuous improvement, knowledge-based IT systems and quality management. New working practices implemented include greater internal flexibility, multi-skilling, greater use of temporary and part-time workers, increased training and devolved responsibility.
- While managing an efficient and competitive supply structure creates the potential for high performance, business as a whole must be market focused, picking up on the trends in global demand, to ensure that they maximise performance by targeting the promising growth sectors.

The world economy has become a mosaic of economic regions and industries driven by global trade, investment, and technology flows. This trend has produced and will increasingly require new forms of collaboration among the nations and regions involved. Success will be for those who can influence their economic performance by strengthening their base of industrial clusters and economic foundations; with limited natural resources. Japan is a strong example of how this can be achieved.

Many of the determinants of competitiveness in the above framework are discussed in the Panorama horizontal chapters; for example, the next chapters include a discussion of the importance of management practices, the role and level of intangible investments, Europe's export growth markets, the impact of the Internal Market programme, Europe's largest companies, and an analysis of links with and performance of the Central and Eastern European economies. Here, we consider the external environment factors; how the cost, the efficiency and interaction of the factors influence how successfully the economy can generate employment and productivity.

THE ECONOMIC ENVIRONMENT AND FOUNDATIONS

Economic infrastructure can best be defined by the range of inputs to the economy: tax and regulatory system, technology, human resources, financial capital and the physical infrastructure. One of the conditions for competitiveness is that the supply of infrastructure meets the demands of industry.

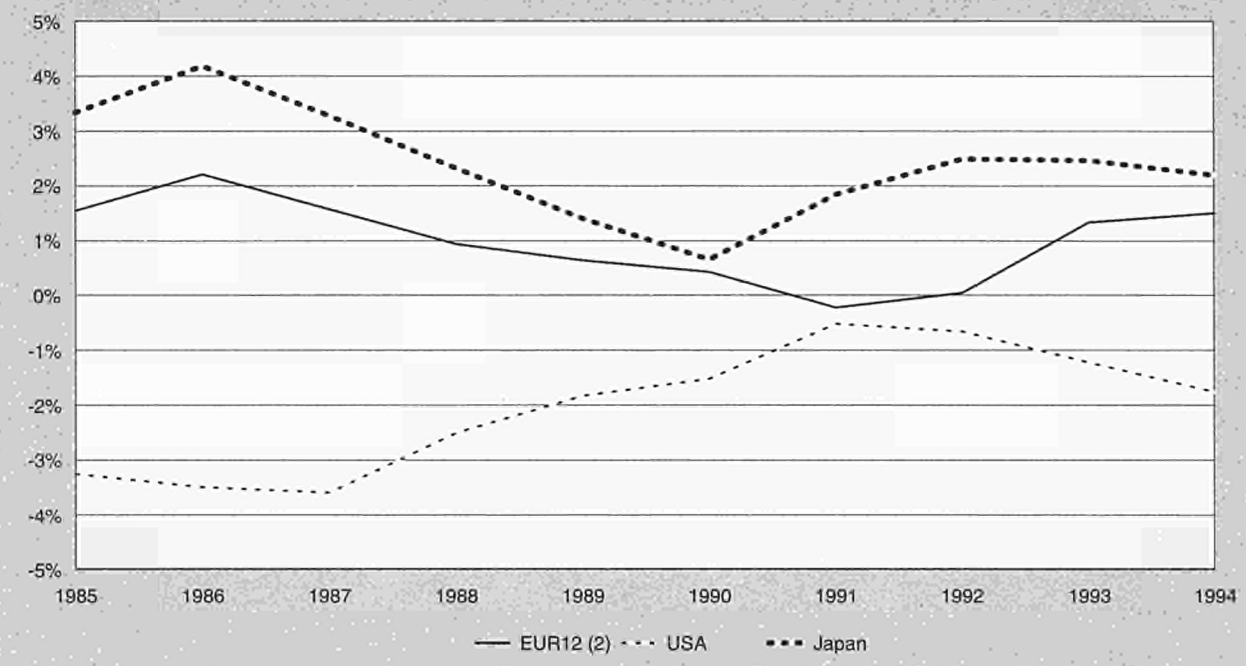
Technology

Technical progress, one of the main sources of long-term productivity growth, is determined by the level and efficiency of intangible investment. The discovery and development states of technological capability can be measured by R&D intensity, the number of registered patents or the rate of innovation.

In Europe, the share of R&D in the total sales of the largest companies is higher than the figure for the US or Japan in a number of key sectors, such as pharmaceuticals or aerospace, but is less than that of its competitors in other important sectors such as computers and office equipment, or electrical engineerin

Meanwhile, total R&D expenditure as a share of GDP in Europe (2% in 1993) is below the US (2.7%) and Japanese (2.9%) levels. This partly reflects the fact that R&D is typically undertaken by the larger firms, and that the industrial structure in Europe is more skewed towards SMEs than towards large industrial giants.

Figure 1: Trade balance - goods and services - EU, USA, Japan (1)



(1) As a share of GDP.
(2) Excluding former East Germany.
Source: Eurostat

Comparison of the share of patent applications by industrial sector confirms the relative dominance of the US and Japan over the EU in many high technology sectors such as electronics or instrument engineering. The two sectors in which the EU is best positioned compared to the US in terms of number of patents are pharmaceuticals and chemicals.

Spending on R&D is, however, only an "input" and not a measure of success. Deployment, the identification, acquisition and adaptation of existing technology are also essential to bring new products to market. Here, many of the emerging Asian countries have been extremely successful thanks to proactive government policies encouraging the deployment and diffusion of technology. In Europe, rigidities in company structures and weak linkages between firms appear to work to impede the development of new products and processes. The EITO, for example, estimates that out of the volume of potential business of 743 billion ECU in Information Technology, only 282 million ECU was realised in 1994. More open and flexible organisational structures are needed thus to boost the European technology performance.

Human resources

In view of the speed of change of technology, organisational production and distribution systems, a well educated workforce, trained on an on-going basis, is especially important. As indicated in the article on Future Trends in employment at sectoral level, the continuing integration of new technologies into economic activities will mean that a higher average skill level will be required in Europe, as technological progress and innovation reinforce the shift away from single function jobs towards multi-skilled, flexible jobs within manufacturing, and a trend away from manufacturing employment into logistics and administrative jobs.

In all EU countries, public expenditure on education is substantial and, at 5% of GDP in 1992, is broadly comparable to that in the USA (5.2%) and higher than that in Japan (3.5%). While inter-country differences in the levels of education and training are difficult to identify due to problems of comparability of statistics, in most EU Member States there is a clear trend in rising qualification levels, particularly in Greece, Spain, Ireland, Italy and Portugal.

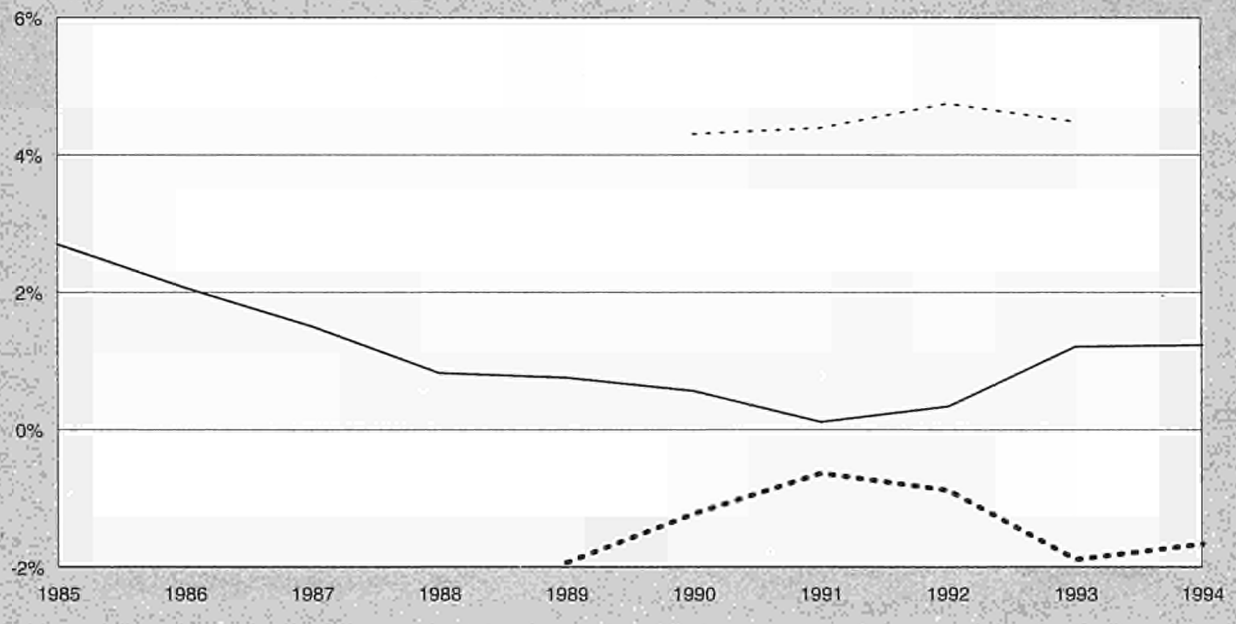
Despite this increase in general levels of educational attainment, skill shortages can still be a problem, arising from the lack of occupational and/or geographical mobility within the EU. This lack of mobility partly reflects cultural factors, but is reinforced by differences in the regularity and fiscal environment across countries. In contrast, in Asia and in Central and Eastern Europe, recent emphasis on the development of human skills is leading to the emergence of a dynamic, well-educated and (comparatively) lower-cost work force that will increasingly challenge the west European work forces.

The Commission's report on European competitiveness advocates validating skills from other Member States. Improving the transparency of qualifications, and benchmarking European vocational qualifications at a high level would enable employers to objectively evaluate the skills of employees and Member States to assess their progress in achieving appropriate skill levels. A process type standard could be comparable to the idea of open product standards.

Financial capital

The accessibility to and competitive cost of capital and finance are essential for the initiation of business, for expansion/modernisation and for restructuring purposes. Within the EU, financial markets are generally very well developed, although the Commission's Competitiveness Report confirms that the cost of capital is higher in Europe than in the United States

Figure 2: Trade balance - manufacturing - EU, USA and Japan (1)



(1) As a share of GDP.
(2) Excluding former East Germany.
Source: Eurostat, DEBA GEIE

and Japan and that the cost of capital is higher for smaller countries.

In particular, Europe is less efficient to mobilise capital to finance the development of SMEs or of innovative technology based firms, and this often results in a loss of opportunity: for example in bio-technology, there has been more rapid development outside Europe, particularly in the USA, with some existing EU businesses relocating to non-EU countries.

In the USA, venture capitalists can pool capital in special fund structures, while in Europe the equivalent fund structures do not exist. There are important legislative gaps, administrative and regulatory barriers and as such many Member States do not have fund structures that suit local and foreign investors. The Investment Services Directive and the creation of pan-European equity markets that seek to attract high-technology companies, like the Nouveau Marché and EASDAQ, can help to resolve the geographical mismatch between investors and investment opportunities and facilitate SMEs' access to financing.

Tax and regulatory system

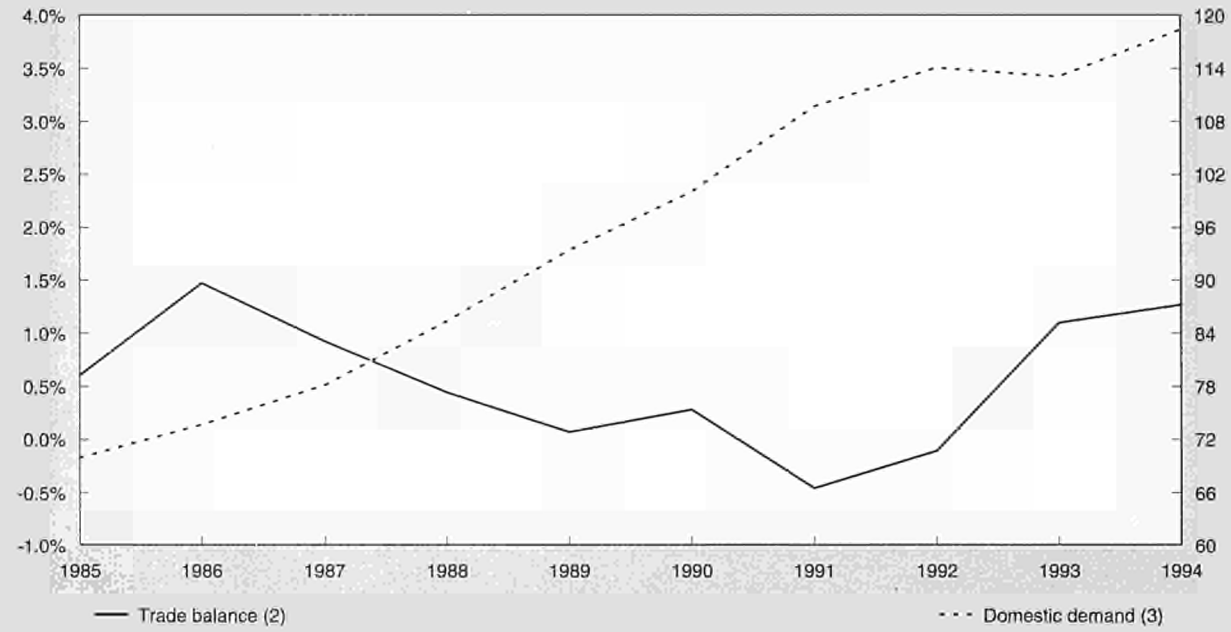
All structural elements that restrict competition in the value-chain (state aids to industrial sectors, market dominance or barriers to entry) increase factor prices, thus limiting the attractiveness of European products in global markets. The lowering of trade barriers between the EU and other countries, and within the EU with the Internal Market Programme, has largely contributed to the globalisation process and presents both new opportunities and challenges for EU companies.

Despite the costs of certification, the development of harmonised standards increases trade possibilities. In the EU, standards harmonisation has allowed firms to grow in size and benefit from economies of scale. In addition, by influencing the rate of development of products in some sectors, for example in the electronics sector, standardisation has led to faster product and application development, hence giving a competitive edge to those companies best at innovating (see the article on the impact of the Internal Market Program on EU industry).

To protect the knowledge base content of products, the Agreement on Trade Related Aspects of Intellectual Property Rights (IPRs) in the framework of the World Trade Organisation allows enterprises to operate on international markets while ensuring that IPRs enjoy equivalent protection in third countries. The parallel development of international licensing rules and competition policy are also crucial to encourage the widespread diffusion of knowledge while avoiding anti-competitive behaviour. The emergence of IT and global communications require harmonised approaches to security, protection of privacy, personal data and use of encryption devices.

Meanwhile, in terms of foreign direct investment and relocation decisions, the regulation of business and equipment operations, land-use, environment, health and safety also dramatically affect the attractiveness of a region. The social insurance system for unemployment compensation and workers' compensation affects companies' costs. All taxes including business, property, operations, corporate income, personal income, use, value-added taxes affect the efficiency and competitiveness of the economic environment in which companies operate. In this respect, high productivity and specialisation are needed to compensate for a relatively highly regulated environment. Evidence of success in some countries indicates that liberalisation especially of business services speeds up the economic transformation by providing incentives to create new markets and processes. For example, in Denmark, the liberalisation of markets and use of new communication services was responsible for 60% of new private sector job creation.

Figure 3: EU trade balance in goods and services and domestic demand (1)



(1) EUR15
(2) As a share of GDP; left scale.
(3) (1990=100)
Source: Eurostat

Physical infrastructure

Physical infrastructure represents the essential 'public good' business support services that firms share but cannot provide for themselves - at least not individually. Transport, telecommunications and energy are the principal types of physical infrastructure networks. The need to develop and extend these networks within the EU and to neighbouring regions has been recognised in the Delors White Paper on "Growth Competitiveness and Employment" in order to facilitate trade and other exchanges, and a number of investment programmes are under way (see in particular in the energy chapter, and in the monographs on telecommunications equipment and services, as well as in the construction chapter).

Increased emphasis on such factors as just-in-time and short production cycles, have increased the reliance on transportation. In some sectors, the share of logistics in the product cost has increased from a few percent to some 40% today. In the EU, although transport networks are well developed in comparison with many regions of the world, deregulation of transport, which is largely underway in the road and air transport sectors, has not yet spread to the other transport segments.

According to the ERT, in certain regions of the EU telecommunication services cost up to 22 times the cost of similar services in the USA. The fragmentation of the EU telecommunications market and uncompetitive pricing due to the presence of a single operator hinders the development of new services. The 'Growth, Competitiveness and Employment' White Paper outlines a programme to upgrade the EU's telecommunication network, which will be needed by EU businesses to remain competitive in the global environment.

Energy costs are presently estimated to represent between 5% and 17% of direct costs in manufacturing industries. Prices in the gas market have fallen in parallel to oil prices but remain on average 30% higher than US prices. The price difference for electricity is at 50%. In June 1996, the Council adopted a common position on the proposal for the internal market for electricity. With security and stability factors ensured, increased levels of competition should drive energy prices down and reduce price disparities between regions and countries.

Summary

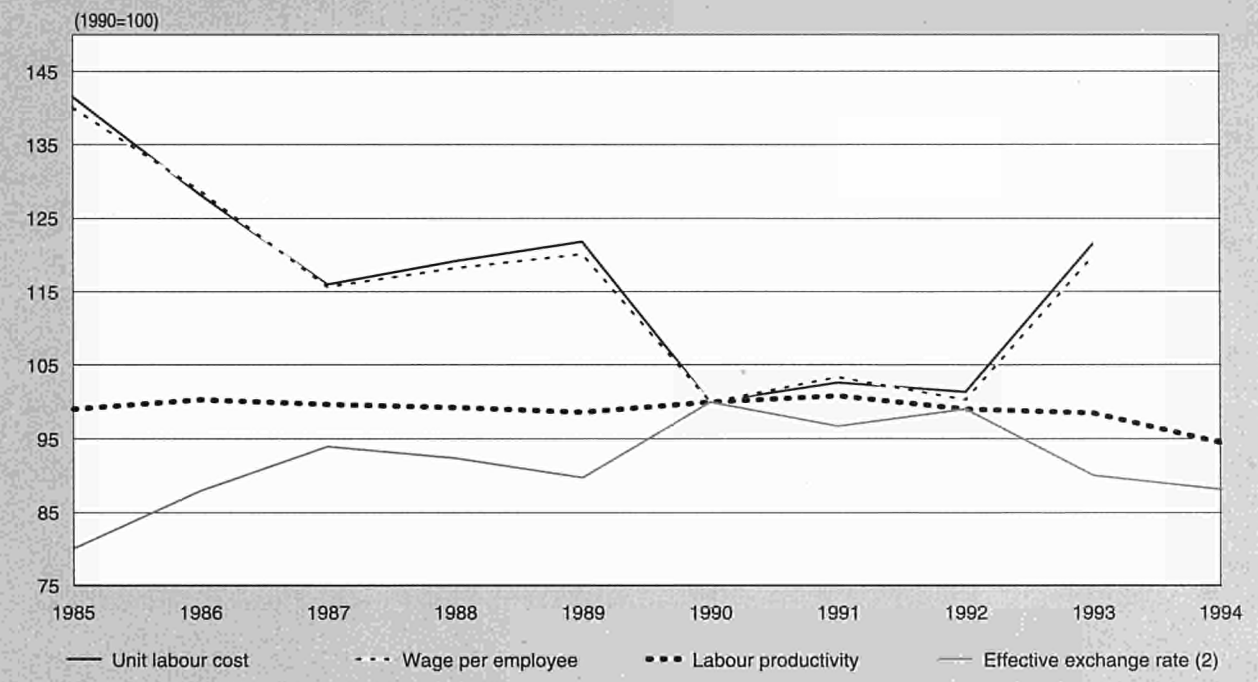
Compared to other regions of the world, the EU still has improvements to make in many areas of price and non-price competitiveness, some of these mainly concerning governments (regulatory environment, infrastructure development, labour market regulations and costs). Through their own strategies companies can, however, also act on some of these factors in order to improve their overall competitive position.

The improvements in competitiveness that can originate from within business are of two types; improved management and organisational structures within the firm, and the building of stronger linkages between firms in order to maximise efficiency and economies of scope, through partnerships and collaboration at pre-competitive levels. The article on the impact of management practices provides evidence of the types of benefits that can be attained competitiveness-wise by improving the company's own organisational structures. Here, we focus more on the kinds of benefits that can be obtained through co-operative processes, or by strengthening linkages between firms throughout the production chain.

RELATIONSHIPS BETWEEN FIRMS

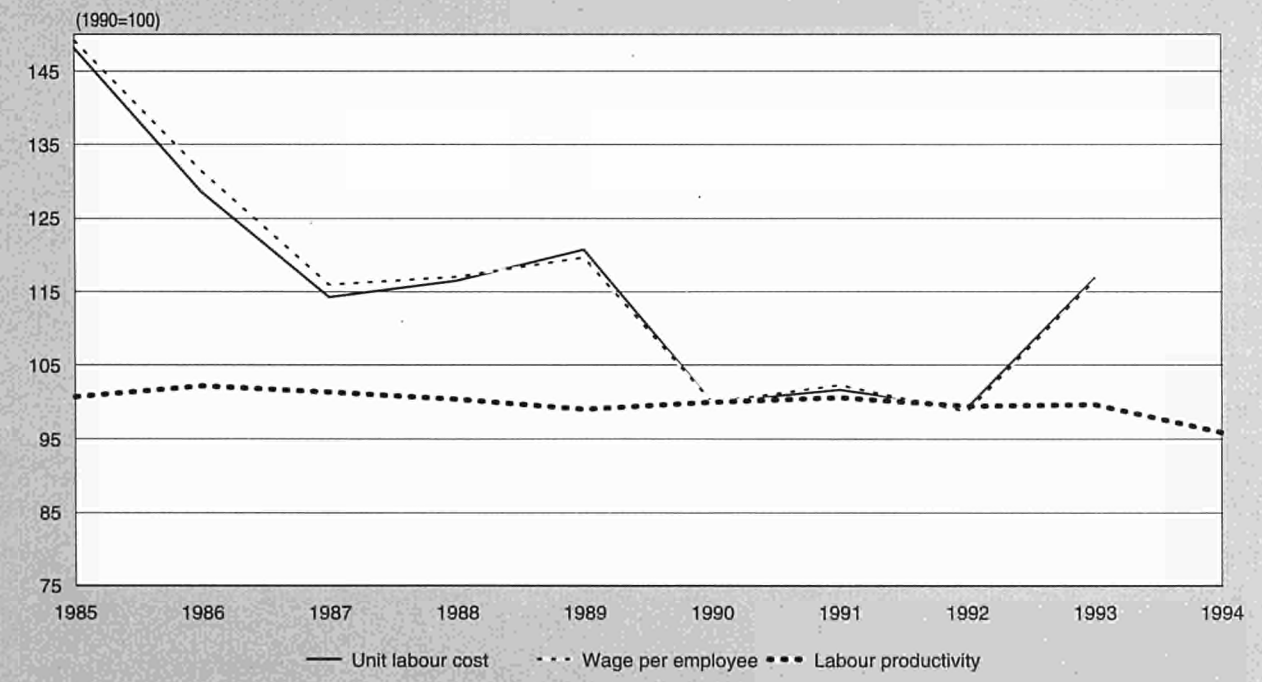
Competitiveness requires both strength and flexibility; as such, the trend amongst business organisations in Europe and worldwide has been for increased specialisation and a tightening

Figure 4A: Indicators of EU cost competitiveness on export markets - manufacturing industry (1)



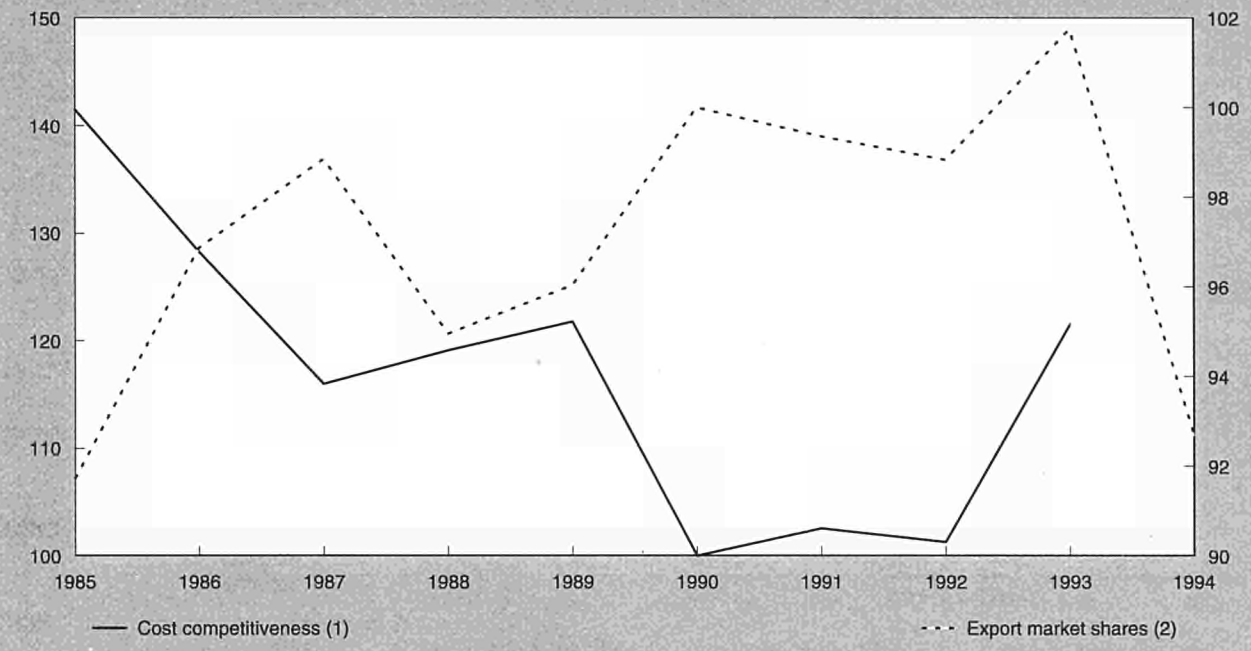
(1) Each indicator measures the improvement deterioration of the corresponding cost item in the EU relative to the USA and Japan.
(2) Weighted sum of the exchange rates of the USA and Japan - an increase indicates an appreciation of the ECU; total economy.
Source: Eurostat

Figure 4B: Indicators of EU cost competitiveness on domestic markets - manufacturing industry (1)



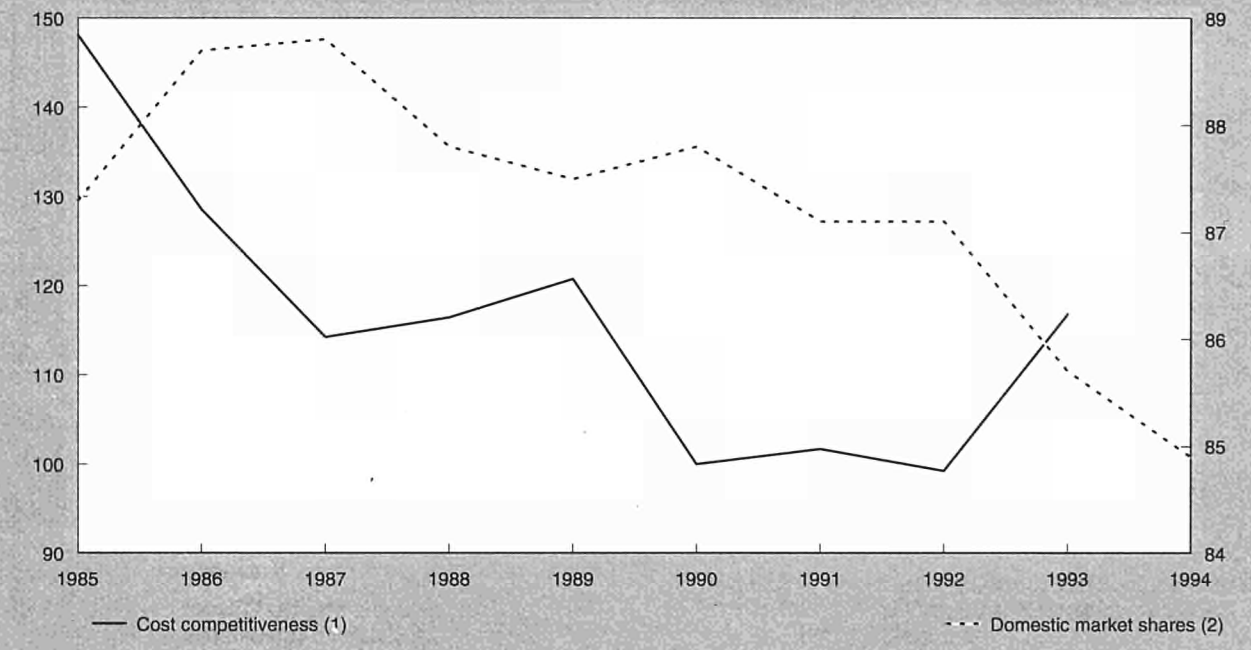
(1) Each indicator measures the improvement deterioration of the corresponding cost item in the EU relative to the USA and Japan.
Source: Eurostat

Figure 6: EU cost competitiveness and market shares on domestic markets - manufacturing industry



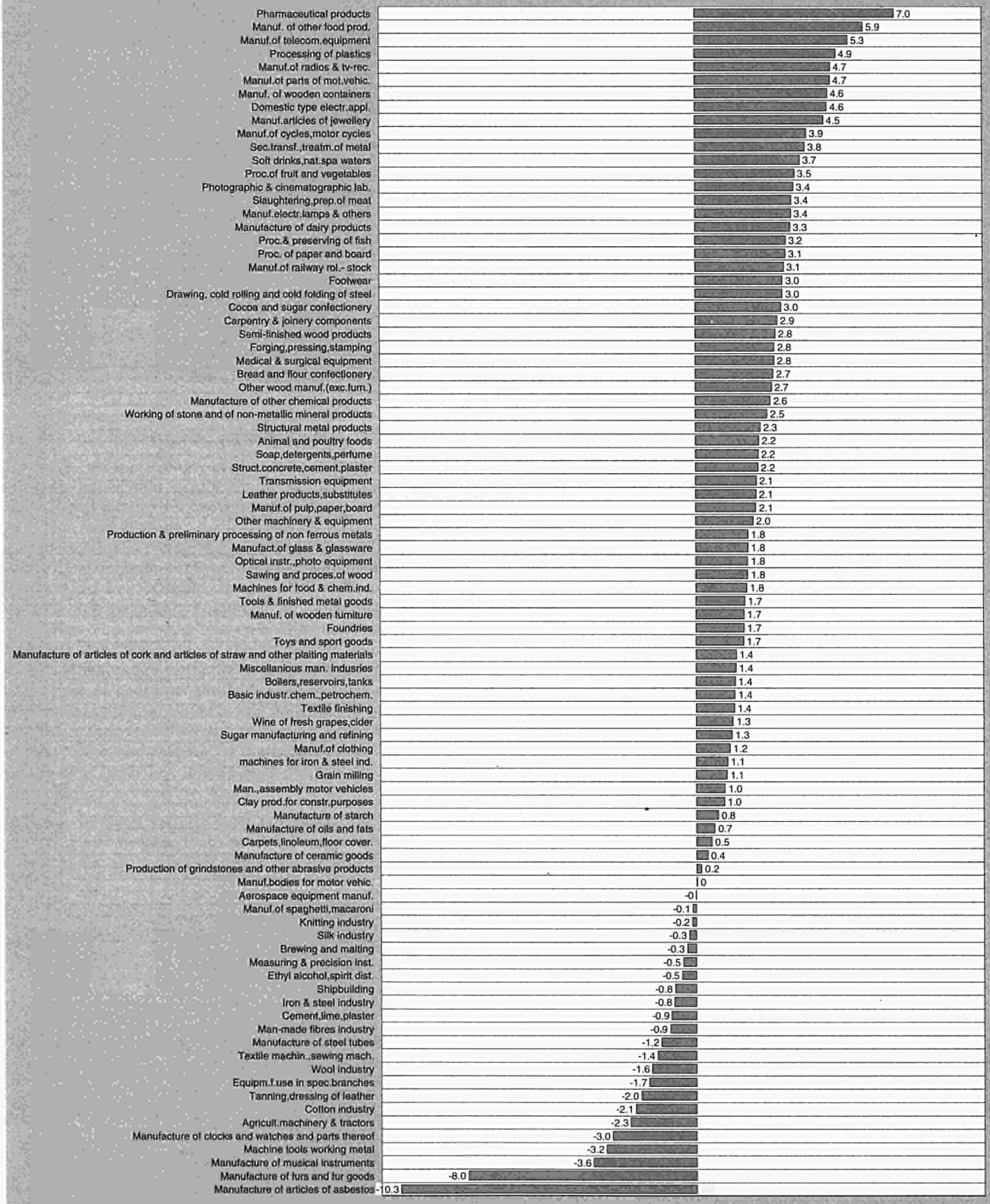
(1) Indicator of unit labour cost competitiveness; left scale.
(2) Indicator of the coverage of EU demand by EU production compared to a similar ratio calculated for the Triad.
Source: Eurostat

Figure 5: EU cost competitiveness and market shares on export markets - manufacturing industry



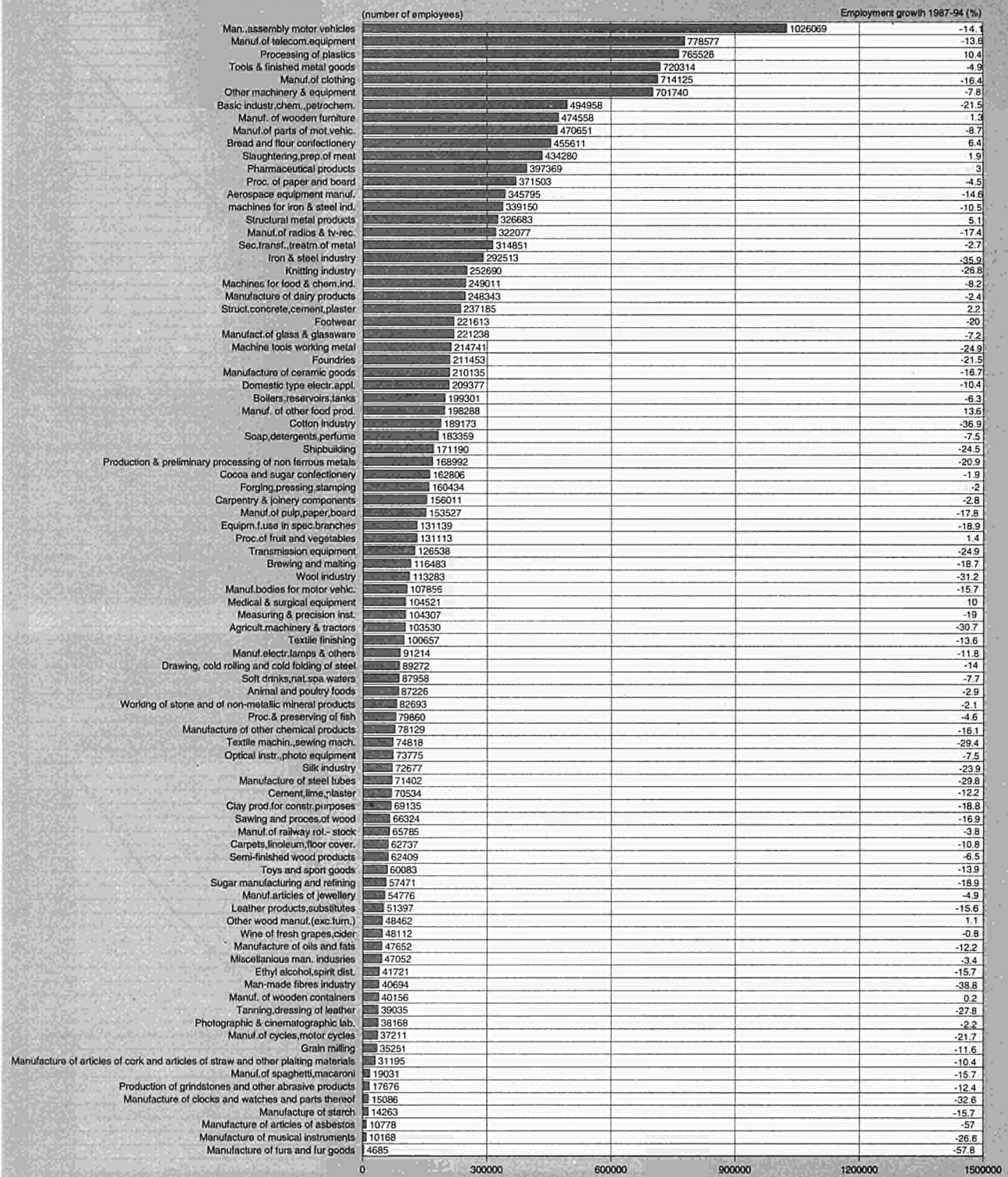
(1) Indicator of unit labour cost competitiveness; left scale.
(2) Indicator of the share of EU exports in OECD exports.
Source: Eurostat

Figure 7: Industrial output growth by sector



(1) Estimated.
Source: DEBA GEIE

Figure 8: Employment in EU industrial sectors



Source: DEBA

Table 3: Sectors of export specialisation, EU, USA, Japan, 1994

EU	USA	Japan
Sectors with a strong specialisation (1)		
Leather and leather goods	Office machinery and data processing machinery	Instrument engineering
	Other means of transport	Electrical engineering
	Office machinery and data processing machinery	
	Motor vehicles and parts	
Sectors with a moderate specialisation (2)		
Footwear and clothing	Electrical engineering	
Mineral oil refining		
Mechanical engineering		
Other manufacturing industries		

(1) Export specialisation ratio higher than 1.5 (see column 3 table 2).
(2) Export specialisation ratio higher than 1.2 (see column 3 table 2).
Source: Eurostat, DEBA GEIE

of the manufacturing process through the development of partnerships and increased interdependence of firms.

Companies are increasingly participating to complex networks organised either on a local scale (clustering) or international scale (global production networks, or GPNs). In sectors such as textiles and clothing, semiconductors, electrical engineering, production is increasingly spread out geographically and across companies through networks of alliances and global partnerships. For example, in the semiconductor sector, as for most high technology equipment sectors such as aerospace or telecom equipment, alliances are increasingly formed at the R&D stage and some at the production and distribution stages. Alliances are furthermore geographically widespread. In the case of consumer products such as food and drink or textiles and clothing, alliances and partnerships are rather developed at the production and marketing stage, as the key is to reduce costs (for example by sharing distribution networks), and in some cases just to gain access to markets distribution networks.

However in many sectors, local proximity remains a key to success, either because firms need to have access to the local resources that are needed for production (fruits and vegetables, or fish, in the case of food processing industries) and because of the need to limit transport costs, or to ensure JIT delivery. For example in the autos industry, increased out-sourcing and subcontracting, and the development of a tiered supplier structure, have encouraged regional industrial clusters with support services building up around large plants.

Another trend in the changing relationships between firms, beyond the emergence of global production networks, is the increased reliance on subcontracting and the growing out-sourcing of activities that were previously conducted within the organisation (often service activities - explaining the growing tertiarisation if the economy, but in some cases also of manufacturing activities through divestment of non-core activities and a reversal of the trend towards vertical integration). In the autos sector, for example, the production of components and motors vehicles assembly have grown further apart, as the main auto makers divested from component manufacturing to increase the flexibility of supplies - and reduce costs. In textile and clothing, food processing, and even chemicals manufacturing, a similar trend is noticeable.

In general, increased subcontracting and out-sourcing of non-core activities such as design of product development, or com-

Table 4: Geographical breakdown of exports, EU, USA, Japan, 1994

(%)	Share of region in World imports	EUR15	USA	Japan
EFTA	2.7	77.7	7.3	4.8
Mediterranean Basin	2.3	62.2	11.3	4.7
Latin America	4.9	20.8	45.9	6.7
NICs (1)	9.8	13.0	13.0	23.4
Central and Eastern Europe	1.6	67.1	3.9	2.4
China	3.2	18.0	12.0	25.9
Other Asia	8.1	20.7	16.0	29.5
Australia and New Zealand	1.7	25.1	23.2	20.1
Japan	4.6	22.5	27.0	0.0
USA and Canada (2)	21.9	17.2	20.8	18.9
EUR15	38.4	63.9	8.7	5.7
Rest of the World	1.1	52.5	11.3	11.2

(1) Hong Kong, Singapore and South Korea.
(2) For imports from USA, equal to share of Canadian exports in total USA exports.
Source: Eurostat, COMTRADE

Table 5A: Indicators of EU cost competitiveness for export markets (1)
Growth from 1987-1994

(%)	Share in total manufacturing production (1994)	Labour productivity	Unit wage costs (2)	Unit labour costs (2)	Unit intermediate costs	Total (2)
Mineral oil refining	4.9	-4.3	3.6	9.3	-15.1	2.5
Preliminary processing of metals	4.3	-24.2	-1.5	19.7	9.9	12.5
Non-metallic mineral products	3.7	-13.1	3.5	12.8	1.9	1.8
Chemicals and man-made fibres	1.3	0.0	0.0	0.0	0.0	0.0
Metal articles	6.4	-5.5	2.6	6.6	8.3	5.4
Mechanical engineering	7.8	-5.1	0.8	-0.1	4.6	1.3
Office machinery and data processing machinery	1.7	11.9	20.6	-3.6	22.7	13.9
Electrical engineering	9.7	2.4	8.9	7.5	-1.1	-2.6
Motor vehicles and parts	10.1	-0.1	5.7	-7.8	-3.0	-4.9
Other means of transport	2.5	-0.7	1.0	-7.6	0.7	-1.8
Instrument engineering	0.9	5.1	9.0	0.2	5.0	-0.1
Food, drink and tobacco	17.2	-12.4	-8.3	2.8	3.3	1.3
Textiles	3.2	0.0	0.0	0.0	0.0	0.0
Leather and leather goods	0.4	-13.9	6.9	12.4	27.6	22.8
Footwear and clothing	2.4	-12.4	13.7	20.7	0.7	4.8
Timber and wooden furniture	2.8	0.0	0.0	0.0	0.0	0.0
Paper, printing and publishing	5.9	-9.2	-3.6	4.0	5.1	3.8
Rubber and plastics	4.1	-9.0	4.4	8.7	9.1	5.3
Other manufacturing industries	0.8	-20.1	0.3	10.0	11.4	9.3
Total manufacturing	100.0	-5.2	4.2	5.5	6.5	4.2

(1) Each indicator measures the improvement/deterioration of the corresponding cost item in the EU relative to the USA and Japan; positive growth indicates an improvement in EU competitiveness.
(2) Growth from 1987-1993.
Source: Eurostat, DEBA GEIE

Table 5B: Indicators of EU cost competitiveness on the domestic market (1)
Growth from 1987-1994

(%)	Labour productivity	Unit wage costs (2)	Unit labour costs (2)	Unit intermediate costs	Total (2)
Mineral oil refining	-5.1	-1.1	5.0	-71.2	-0.8
Preliminary processing of metals	-20.7	-6.1	7.5	-29.4	5.1
Non-metallic mineral products	-13.9	-2.6	6.6	-37.6	-3.2
Chemicals and man-made fibres	-14.2	-3.5	8.5	-26.7	9.1
Metal articles	-6.1	-3.3	1.6	-37.1	1.4
Mechanical engineering	-5.3	-3.4	-3.7	-40.2	-1.5
Office machinery and data processing machinery	15.7	18.8	-6.5	-20.0	13.8
Electrical engineering	1.8	6.7	5.8	-34.6	-3.1
Motor vehicles and parts	-1.5	10.5	-3.6	-17.6	-1.8
Other means of transport	-10.4	-1.8	-2.0	-44.2	-3.6
Instrument engineering	5.8	6.1	-2.1	-23.1	-1.8
Food, drink and tobacco	-11.3	-12.5	-1.8	-45.9	-1.5
Textiles	0.0	0.0	0.0	0.0	0.0
Leather and leather goods	-14.1	3.5	8.6	-12.8	19.9
Footwear and clothing	-11.9	11.0	17.9	-53.5	3.3
Timber and wooden furniture	0.0	0.0	0.0	0.0	0.0
Paper, printing and publishing	-12.5	-9.4	1.5	-43.6	3.0
Rubber and plastics	-9.8	-3.1	2.2	-32.4	1.5
Other manufacturing industries	-20.1	-0.3	9.6	-12.9	8.8
Total manufacturing	-5.5	0.5	2.5	-26.9	2.3

(1) Each indicator measures the improvement/deterioration of the corresponding cost item in the EU relative to the USA and Japan; positive growth indicates an improvement in EU competitiveness.
(2) Growth from 1987-1993.
Source: Eurostat, DEBA GEIE

Table 6: Indicators of trade performance, EU Growth from 1987-1994

(%)	Total cost indicator (1)	Trade balance (2)	Share of OECD exports	Domestic market share (3)
Mineral oil refining	2.5	6.2	0.6	3.7
Preliminary processing of metals	12.5	-6.5	-4.2	-7.2
Non-metallic mineral products	1.8	0.8	3.7	-1.7
Chemicals and man-made fibres	0.0	3.3	-4.2	-3.5
Metal articles	5.4	-0.4	0.9	-2.6
Mechanical engineering	1.3	7.5	-10.3	-4.9
Office machinery and data processing machinery	13.9	-15.0	-3.3	0.0
Electrical engineering	-2.6	-1.5	-11.5	-6.4
Motor vehicles and parts	-4.9	0.4	-4.3	-1.3
Other means of transport	-1.8	3.7	15.3	-18.9
Instrument engineering	-0.1	-4.5	-16.6	-13.2
Food, drink and tobacco	1.3	1.2	1.6	-0.1
Textiles	0.0	-1.8	-4.5	0.0
Leather and leather goods	22.8	1.5	20.3	-17.6
Footwear and clothing	4.8	-12.9	-6.7	-11.1
Timber and wooden furniture	0.0	-4.5	-15.4	-1.6
Paper, printing and publishing	3.8	-0.8	6.7	-0.5
Rubber and plastics	5.3	-0.6	-11.1	-3.0
Other manufacturing industries	9.3	22.2	-27.8	-137.8
Total manufacturing	4.2	0.5	-6.2	-3.9

(1) Growth from 1987-1993.
(2) Difference between 1987 and 1994 as a percentage of production in 1994.
(3) Measured by the coverage of the European market production divided by the same ratio calculated for the Triad.
Source: Eurostat, DEBA GEIE

ponent manufacturing, or services, and the reduction in the number of subcontractors make companies principally selling to businesses more dependent from their principal customers; while giving the latter increased flexibility and allowing them to reduce costs by maximising efficiency in the production and distribution of inputs needed for production. On their part, the subcontractors must then constantly develop new skills and bear an increasing proportion of the costs and risks, in order to produce "just-in-time", guarantee product quality and meet increasingly stringent environmental standards. Indeed, supplier and sub-contractor quality is decisive since weaknesses in one of the links in the production and marketing chain can constitute a significant handicap for the entire sector.

It is important to stress that much innovative activity results from the dynamic relations between actors, rather than from the simple transfer of information or technology. The Community Innovation Survey found that external sources (suppliers, customers, competitors, business services) are more important drivers of innovation than internal sources or traditional research establishments. For SMEs, these external sources are markedly important with the feedback loops between different actors especially relevant. The survey shows that firms who engage in technical co-operation with an external partner tend to have a larger proportion of new or improved products in their total sales.

UNICE statistics show that, on a comparative scale representing research co-operation with firms in other regions, Japan shows the highest level of extra-region co-operation, with USA representing 80% of Japan's activity and Europe only 40%. However, since knowledge is often locally generated, much co-operation is currently inter-regional.

It is difficult to estimate the precise extent of sub-contracting in the European economy. The purchase of goods and services is an imperfect yardstick since it also includes purchases of raw materials and energy. However, that measure shows that sub-contracting is widespread with the purchase of goods and services equivalent to more than two-thirds of turnover in manufacturing industry and some three-fifths of that of the construction industry. Horizontal linkages between suppliers are, however, weak.

Private-public collaboration

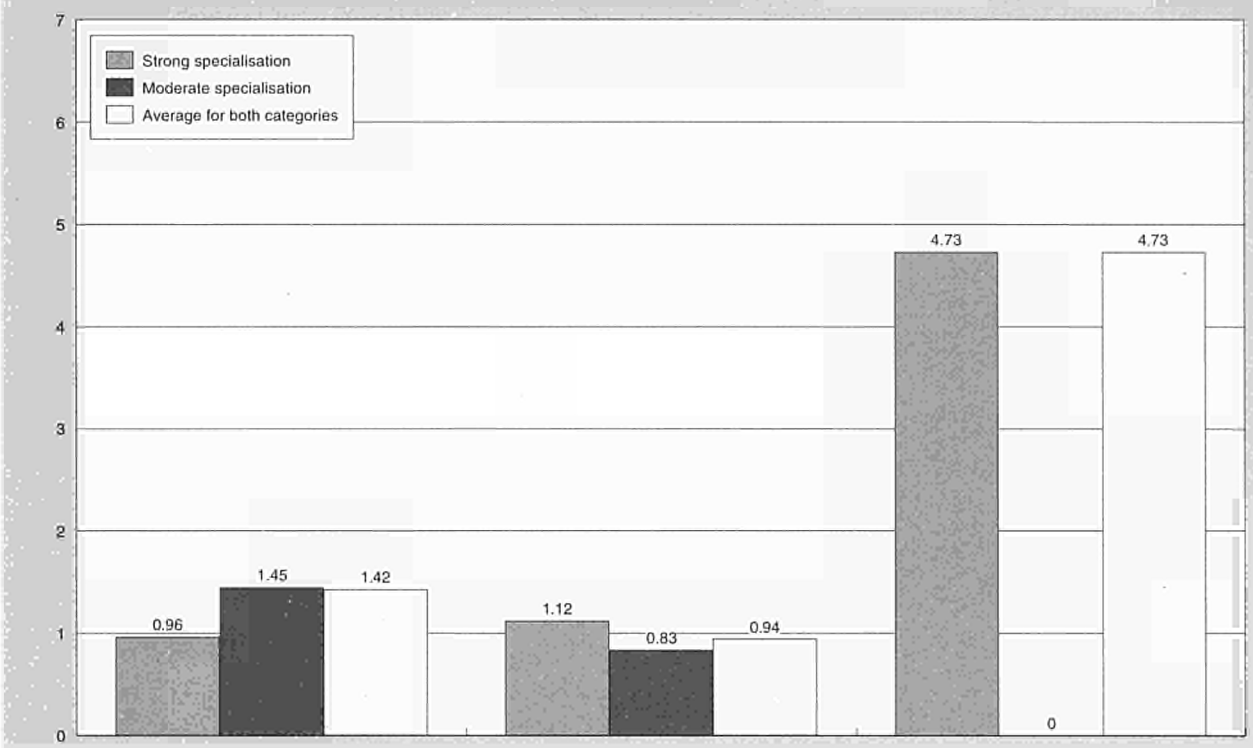
Public-private collaboration is decisive in improving competitiveness as it can allow to improve linkages between firms,

Table 7: Structure of R&D spending in the EU, USA and Japan, 1993

(% of GDP)	EU (1)	USA	Japan
Total R&D spending	2.0	2.7	2.9
Share of total R&D performed by business (%)	62.8	72.8	66.6
Share of total R&D financed by business (%)	53.0	57.4	68.2
RSEs (units per 1000 labourforce) (2) (3)	4.6	5.9	9.7
Business RSEs (units per 1000 labourforce) (3)	2.3	4.5	5.6

(1) EUR15 excluding Luxembourg.
(2) RSE: Research Scientists and Engineers.
(3) Eurostat estimates for EU.
Source: Eurostat, OECD

Figure 9: Cover ratio of specialised sectors, EU, USA and Japan, 1994 (1)



(1) Based on the export specialisation ratio as provided in Table 2 column 3.
(2) 0 means that Japan has no industry with a moderate specialisation ratio (included between 1.2 and 1.5).
Source: Eurostat

enable subcontracting to expand and ensure infrastructure support that meets business needs. For example, during the 1980s and early 1990s, European suppliers of consumer electronics were steadily losing ground to foreign competition, due mainly to the uncompetitive quality, price and delivery time of components found in Europe. In response, the European Commission and Japan's MITI were asked by manufacturers to support efforts to improve the competitive position of European suppliers. The pilot programme for consumer electronics that was launched as a result helped to build better links between firms and use best practices from more efficient suppliers. Industry associations and their clients (both European and Japanese) identified general weaknesses and audited a selected a number of suppliers' performance. The group of suppliers then spent about two weeks in Japan visiting the plants of their counterparts, to see what differences exist that might explain the reputedly greater competitiveness of Japanese suppliers. Following the mission, European suppliers devised and implemented improvement programmes with the help of specialists and their clients.

To stimulate and strengthen inter-firm linkages, the European Commission plays a main role in seeks to encourage co-operation, on a cross-border level, through the fourth Framework Programme. This provides funding of 12.3 billion ECU for co-operative research projects over the period 1994-1998.

Table 8: Share of total patents, 1993-1994

(%)	1993	1994
Share of patents granted in Europe		
EU (1)	53.5	51.0
USA	23.3	23.1
Japan	20.5	22.8
Share of patents granted in the USA		
EU (1)	17.4	16.5
USA	54.1	55.1
Japan	22.7	22.0
Share of patent applications in Japan		
EU (1)	5.9	5.3
USA	6.0	5.9
Japan	87.5	88.3

(1) EU stands for EPC States which include all the Members States of EUR15, except Finland, plus Switzerland, Liechtenstein and Monaco.
Source: European Patent Office, US Patent and Trademark Office and Japanese Patent Office

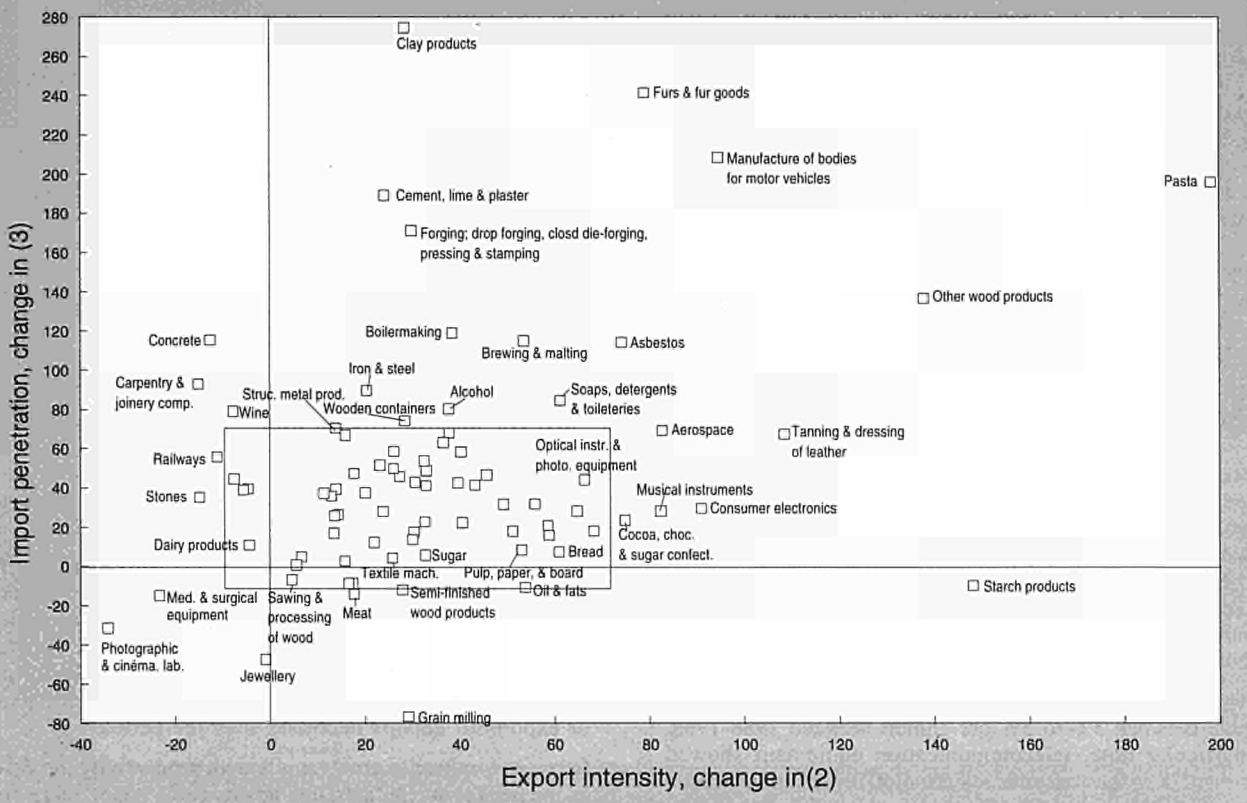
PERFORMANCE BY SECTOR

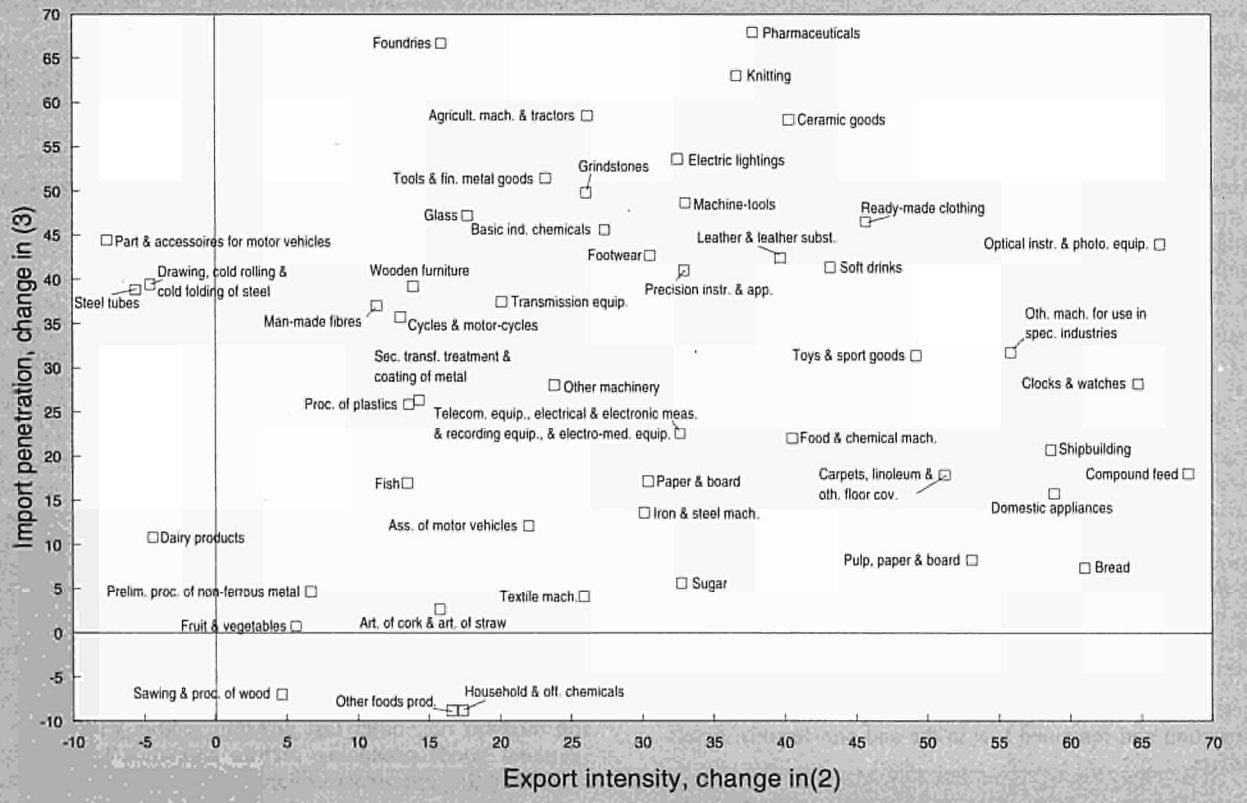
The EU economy is increasingly service-oriented, with market services accounting for 51% of GDP in 1995, Government services represent 14% bringing the total share of services in GDP to two-thirds.

Manufacturing now represents 22% of GDP in 1995, with agriculture (2%), energy (5%) and construction (6%). Within manufacturing, food, drink and tobacco processing is the largest sector representing 3% of GDP, with electrical engineering at 2.2% and mechanical engineering with 2.1% of GDP.

The different sectors are achieving very different levels of performance. Within a broad framework, the consumer industries, having finished the first wave of restructuring, have stabilised relative to other sectors in the economy.

Figure 10: Change in export intensity / import penetration by sector 1988-95 (1)





(1) Estimated.
(2) Calculated as extra-EU exports / production.
(3) Calculated as extra-EU imports / apparent consumption.
Source: DEBA GEIE

Table 9: Share of total patents by sector, 1994

(%)	EU	US	Japan
Share of patent applications in the Europe			
Food, drink and tobacco	42	27	9
Electrical machinery	37	25	20
Chemicals	32	36	15
Paper and printing	28	25	29
Transport equipment	50	18	10
Metallurgy	31	29	25
Textiles	43	20	14
Building	61	9	5
Mining	31	45	5
Engineering	46	23	13
Instrument engineering	24	35	27
Electronics	29	30	25

Source: European Patent Office

The other food products sectors, which includes products such as tea, coffee, diet products, condiments, etc. has been the fasted growing segment of food and drinks over the past years, growing at nearly 6% per year between 1988-95. Meat, fruit and vegetables and soft drinks show growth of over 3%, bread and cocoa and confectionery show growth of nearly 3%. While the other food sectors showed slower growth, no sector showed declining production during this period.

Growth in the electronics sectors has been good, ranging on average between 3% to 5% per annum between 1988-1995. Of particular note, telecommunication equipment showed growth of 5.35%, consumer electronics 4.7% and domestic electrical appliances 4.6%. Output in these information technology-related sectors shows the increasing penetration of personal computers and new telecommunication equipment into European business and homes. Part of the growth actually reflects a catch-up, as the spread of information and communication technologies in Europe still lags the USA and Japan.

Due to production consolidation, export intensity and import penetration for electronics products have risen over the period. Consumer electronics and domestic electrical equipment show the highest rate of growth in the cover ratio (exports divided by imports) reflecting improved European competitiveness in these sectors.

Consumer products in the chemicals sector have performed better over the period 1998-95, with pharmaceuticals showing nearly 7% growth per year, household and office chemicals 2.6% and soaps, detergents and toiletries 2.2%.

Investment industries are still recovering from the recent weak income growth and uncertainty about future production needs while large industry-wide restructuring takes place. The capital goods producing sectors suffered disproportionately in the latest recession, due to the fall in fixed business investment. With intermediate goods industries, the picture is mixed with many industries still in flux, depending upon the end consumer markets being served and how far the restructuring in these downstream demand industries has stabilised.

Output dropped in mechanical engineering, iron and steel and construction and remained low in the and non-ferrous metals industries.

Because of increased sub-contracting, the parts and accessories for motor vehicles sub-sector has seen much higher growth (on average 4.7% per year between 1998-95) than the manufacture of bodies for motor vehicles (1%) or the assembly of motor vehicles (no growth). The manufacture of cycles and motor-cycles showed good growth of nearly 4% per year, with railways at 3%. Aerospace showed no growth, while shipbuilding decreased slightly each year. In all sectors, restructuring meant a loss of employment, the more so in sectors where production growth was low.

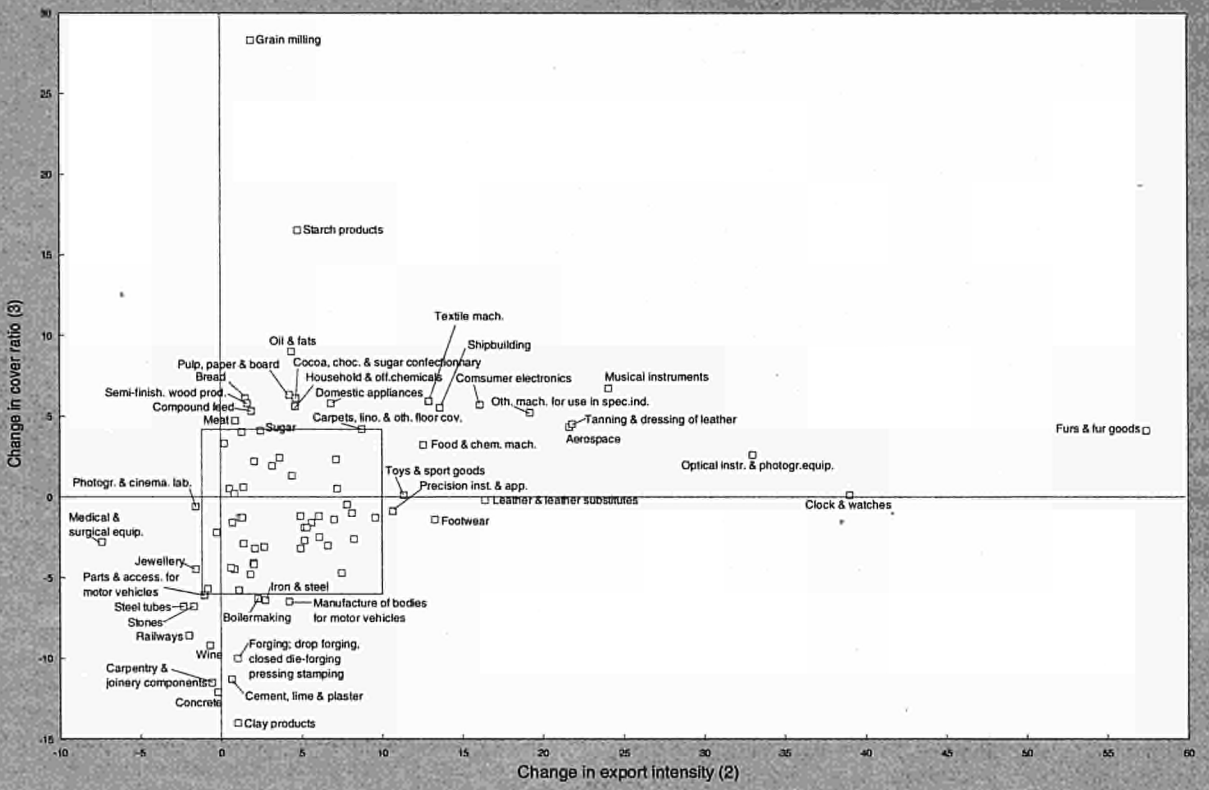
Motorcycles continue to show higher import penetration than other sectors. Due to the locally based, regional clusters of production and suppliers, less proportion in the motor vehicles sector is traded outside the EU, though while Europe's position in assembly of vehicles has improved, greater attention still needs to be given to component suppliers, whose cover ratio of exports to imports decreases over the period.

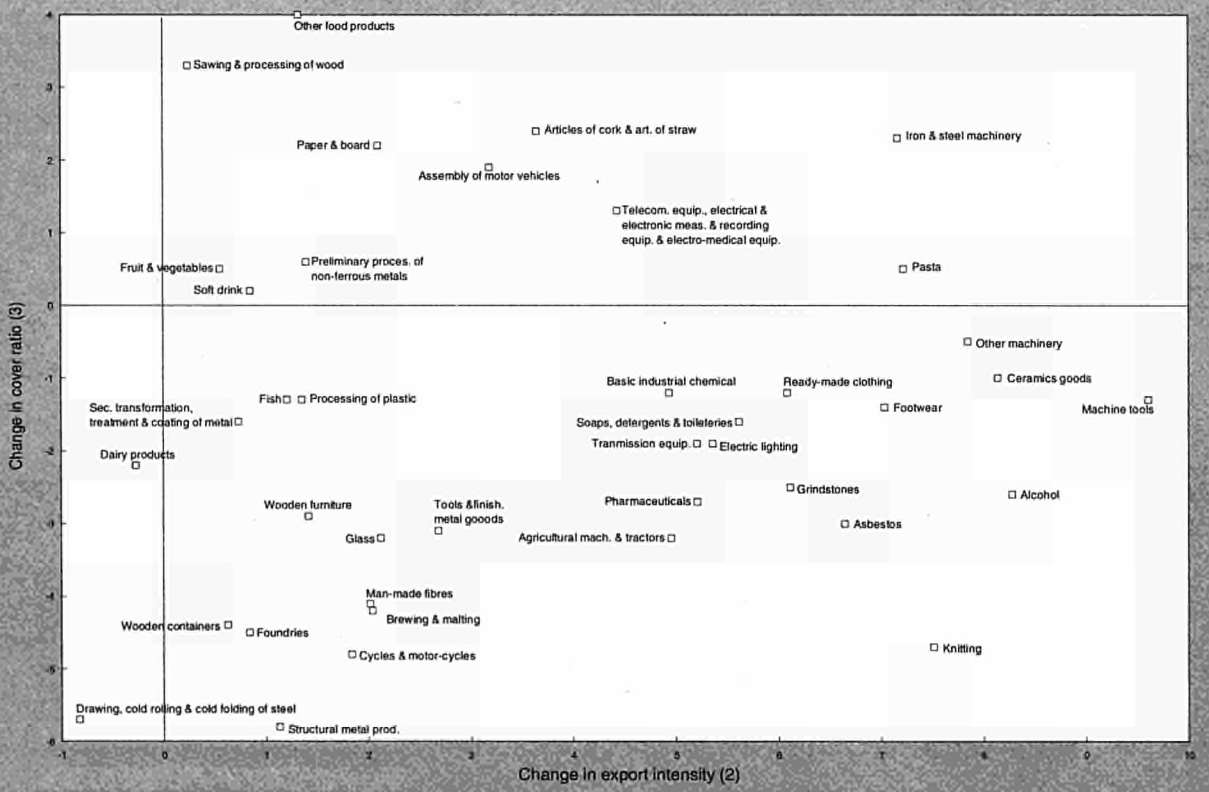
Services continue to grow rapidly with productivity increasing as the market deregulates, and profits being squeezed as competition increases. Telecommunication services represent a fast growing area and are important both for the direct impact on growth and as part of the information society infrastructure needed by business. Regulatory reform and competitive markets will help to boost growth and innovation in this area. Another sector that has expanded rapidly under liberalisation is air transport services. Meanwhile, the process of outsourcing non-core activities is fostering the creation of a wide range of specialised business and financial services and growth in this area has remained strong.

OUTLOOK

The globalisation pattern, combined with different rates of growth of demand, supply and competitiveness factors at world level, leads to differential rates of growth of different types of activities across regions. In the long run, the EU industry and service sectors that will develop fastest will be those producing specialised, technologically intensive products and services strongly relying on the region's human capital asset, and all the supporting activities to these businesses that require proximity. The sectors which are less human-capital intensive, that rely less on specialised technologies or on continuous innovation such as apparel production, basic footwear, mass production of standard machinery and equipment, and most basic metals sectors as well as exportable services, will grow comparatively slower in the EU, as these activities will progressive move to non-EU (emerging) countries. In the short and medium run, other fast growing sectors will be the investment goods producing sectors and, to a lesser extent, construction, as these sectors recover from the major downturn which they have experienced in the early 1990s, when the slowdown in activity and faltering business confidence led to a downturn in investment. In comparison, the consumer goods producing sectors are expected to grow more slowly, due to slow growing personal incomes in an economy still characterised by high unemployment and tight budget policies.

Figure 11: Performance of EU Industry in terms of exports, 1988-95 (1)





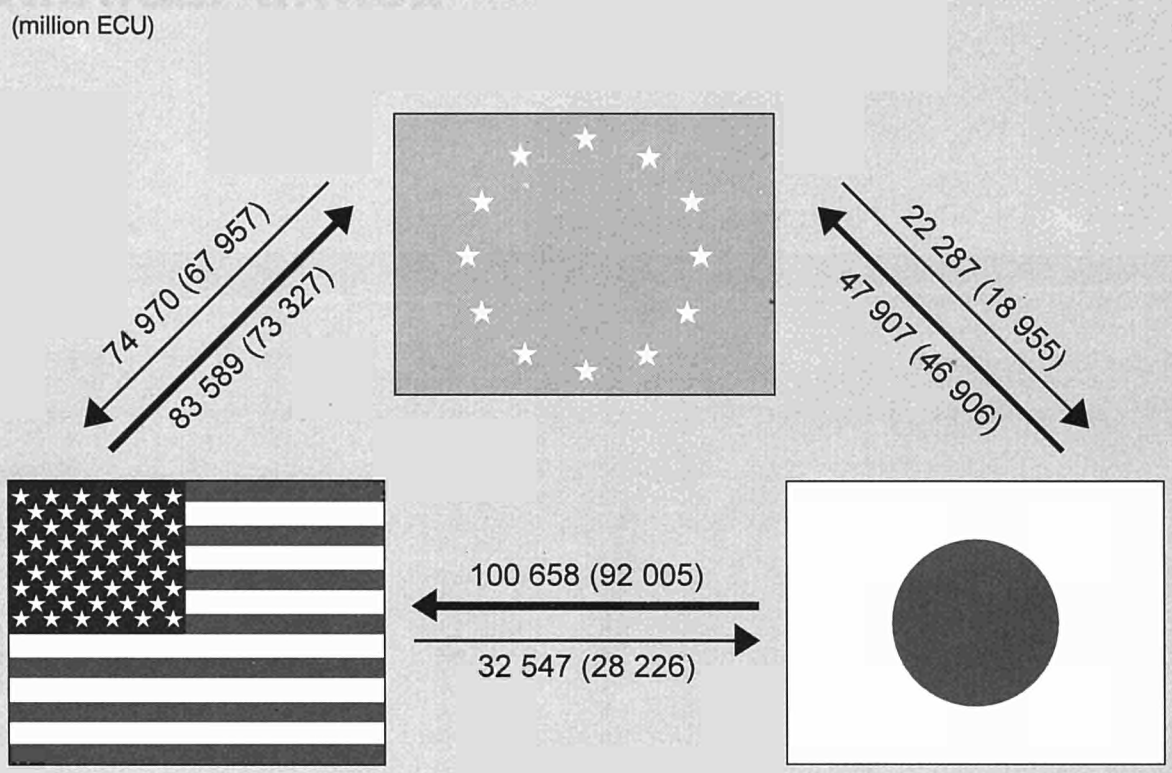
(1) Estimated.
(2) Calculated as extra-EU exports / production.
(3) Calculated as extra-EU imports / apparent consumption.
Source: DEBA GEIE

To improve productivity, job creation and growth, Europe's enterprises need to continue to improve their competitiveness, by achieving greater efficiency in the production system and by developing an increased capacity for innovation to develop new products and processes. This performance will be influenced by their market focus and ability to spot market trends, by the efficiency of their internal organisation and increasingly by their links and communication with other organisations and by the framework conditions set and economic infrastructure developed by policy makers at the national, European and international level.

The broad determinants of competitiveness are discussed in the chapters that follow. But to better grasp the dynamics in detailed sub-sectors of the European economy, the Panorama presents the driving factors and supply strategies for each sector, giving the background to EU legislation affecting the performance of the sub-sector and benchmarking European performance with that of the USA and Japan. In providing a wealth of comparable and clear industry information, private sector and public sector readers can compare different sectors to gain a better understanding of both the vertical and horizontal links between industries, and of the challenges facing European industry and services. In that sense, the Panorama represents a way to improve the links and communication between different enterprises and sectors of the Community.

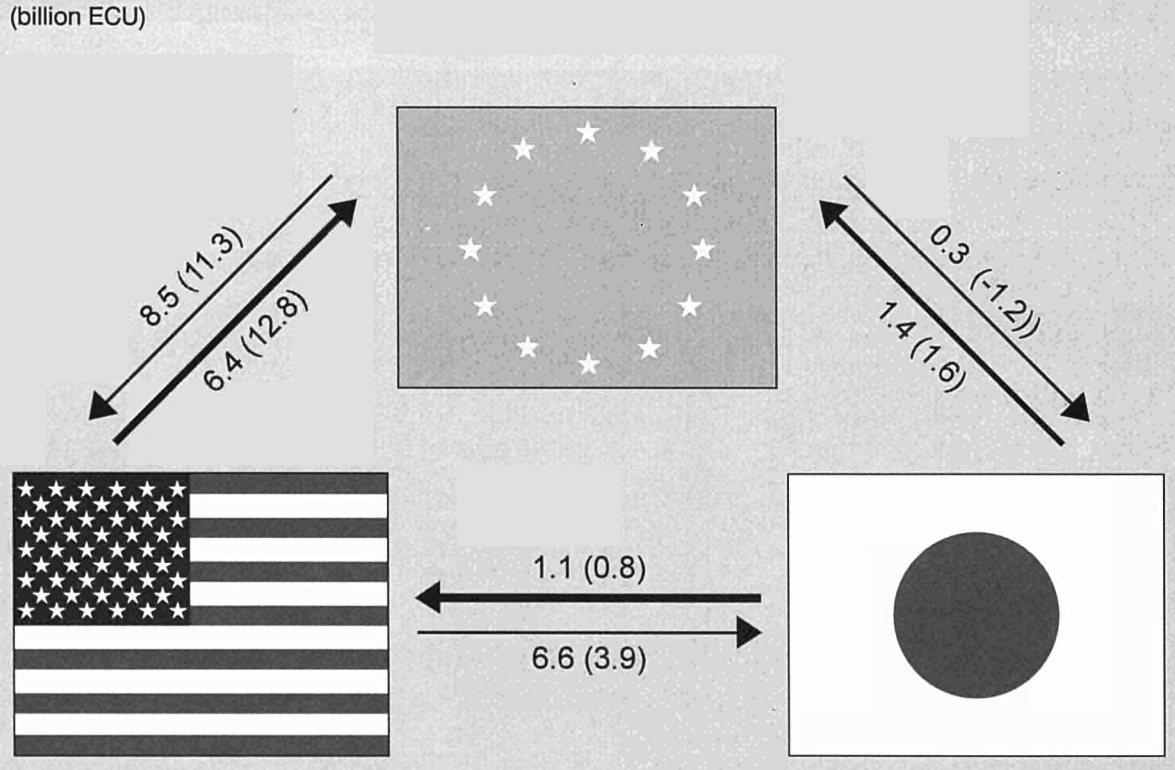
Written by: DRI Europe

Figure 12A: Exports between the EU, USA and Japan, 1994 (1)



(1) Manufactured goods, corresponding to SITC 5+6+7+8
Source: Eurostat, UN COMTRADE

Figure 12B: Foreign direct investment between the EU, USA and Japan, 1994 (1)



(1) Excluding reinvestment profits
Source: Eurostat, Survey of Current Business

Statistical annex

Table 1: Snapshots
GDP at 1990 market prices

(% annual change)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1996 (2)	1997 (2)
Belgique/België	0.8	1.4	2.0	4.9	3.4	3.4	2.2	1.8	-1.6	2.2	1.9	1.1	2.3
Danmark	4.3	3.6	0.3	1.2	0.6	1.4	1.3	0.2	1.5	4.4	2.6	1.3	2.7
Deutschland (3)	2.0	2.3	1.5	3.7	3.6	5.7	5.0	2.2	-1.2	2.9	1.9	0.5	1.8
Ellada	3.1	1.6	-0.5	4.5	3.8	0.0	3.1	0.4	-1.0	1.5	2.0	2.0	2.5
España	2.6	3.2	5.6	5.2	4.7	3.7	2.3	0.7	-1.2	2.1	3.0	2.0	2.9
France	1.9	2.5	2.3	4.5	4.3	2.5	0.8	1.3	-1.5	2.7	2.2	1.0	2.1
Ireland	3.1	0.3	4.7	4.3	6.1	7.8	2.2	3.9	3.1	6.7	8.6	5.6	4.9
Italia	2.6	2.9	3.1	4.1	2.9	2.1	1.1	0.6	-1.2	2.1	3.0	1.8	2.7
Luxembourg	2.9	4.8	2.9	5.7	6.7	3.2	3.1	1.9	0.0	3.3	3.2	2.6	3.0
Nederland	3.1	2.8	1.4	2.6	4.7	4.1	2.3	2.0	0.2	2.7	2.4	1.8	2.5
Österreich	2.5	1.2	1.7	4.1	3.8	4.2	2.8	2.0	0.4	3.0	1.8	0.7	1.1
Portugal	2.8	4.1	5.5	5.8	5.7	4.3	2.1	1.1	-1.2	1.0	2.5	2.3	2.8
Suomi/Finland	3.4	2.4	4.1	4.9	5.7	0.0	-7.1	-3.6	-1.2	4.4	4.4	3.0	3.6
Sverige	1.9	2.3	3.1	2.3	2.4	1.4	-1.1	-1.4	-2.2	2.6	3.0	1.2	2.0
United Kingdom	3.5	4.4	4.8	5.0	2.2	0.4	-2.0	-0.5	2.2	3.8	2.4	2.3	3.0
EUR15 (3)	2.5	2.9	2.9	4.2	3.5	2.9	1.5	1.0	-0.6	2.8	2.5	1.5	2.4
USA	3.1	2.8	3.1	3.9	2.7	1.2	-0.5	2.5	3.4	3.5	2.0	2.1	2.5
Japan	5.0	2.6	4.1	6.2	4.7	4.8	4.3	1.1	-0.2	0.5	0.9	2.9	2.6

(1) Spring 1996 estimates.
(2) Spring 1996 forecasts.
(3) Including former East Germany from 1992 onwards.
Source: Commission Services (DG II)

Table 2: Snapshots
Deflator of private consumption (1)

(% annual change)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (2)	1996 (3)	1997 (3)
Belgique/België	5.9	0.7	1.9	1.5	3.7	3.5	2.5	2.0	3.1	3.0	1.5	2.0	1.8
Danmark	4.3	2.9	4.6	4.0	4.3	2.7	2.4	2.0	0.3	1.7	1.8	1.8	2.4
Deutschland (4)	1.8	-0.3	0.7	1.4	3.0	2.8	3.9	4.8	3.9	2.7	2.0	1.6	1.6
Ellada	18.3	22.1	15.7	14.2	13.6	19.9	19.7	15.0	13.7	10.8	9.3	8.3	7.0
España	7.1	9.4	5.7	5.0	6.6	6.5	6.4	6.4	5.5	4.9	4.6	3.6	3.2
France	5.8	2.7	3.1	2.6	3.4	2.8	3.2	2.4	2.2	1.8	1.6	1.8	1.6
Ireland	5.1	3.7	2.4	4.0	4.0	2.0	2.8	2.5	1.7	2.7	2.5	2.3	2.4
Italia	9.0	6.2	5.3	5.7	6.5	5.9	6.9	5.6	5.4	4.6	5.8	4.1	3.5
Luxembourg	4.3	2.8	1.1	3.5	4.8	5.5	2.6	1.6	7.0	2.4	2.0	1.7	2.1
Nederland	2.4	0.3	0.2	0.5	1.2	2.2	3.2	3.1	2.3	2.4	1.1	1.9	2.0
Österreich	3.3	1.9	1.0	1.4	2.8	3.3	3.4	3.9	3.4	3.0	2.2	2.1	1.6
Portugal	19.4	13.8	9.6	11.4	11.8	11.6	12.6	11.1	7.1	5.2	4.2	3.1	3.0
Suomi/Finland	5.6	3.1	3.6	4.6	5.0	6.0	5.6	4.1	4.2	1.4	1.1	1.0	1.5
Sverige	6.9	4.7	5.3	5.9	6.8	9.6	10.2	2.2	5.7	3.1	2.7	1.7	2.5
United Kingdom	5.3	4.0	4.3	5.0	5.9	5.5	7.4	4.7	3.5	2.5	2.6	2.7	2.5
EUR15 (3)	5.8	3.8	3.6	3.9	4.9	4.8	5.6	4.7	4.1	3.2	3.0	2.6	2.4
USA	3.6	2.5	4.1	4.1	4.8	5.0	3.8	2.8	2.4	2.4	2.4	2.8	3.1
Japan	2.2	0.4	0.2	-0.1	1.8	2.6	2.5	2.1	1.3	0.3	-0.3	0.2	1.0

(1) In national currency.
(2) Spring 1996 estimates.
(3) Spring 1996 forecasts.
(4) Including former East Germany from 1992 onwards.
Source: Commission Services (DG II)

Table 3:Snapshots
Number of unemployed as a percentage of the civil working population

(% of the civil working population)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1996(2)	1997(2)
Belgique/België	10.3	10.3	10.0	8.9	7.5	6.7	6.6	7.3	8.9	10.0	9.9	10.1	9.8
Danmark	7.1	5.4	5.4	6.1	7.4	7.7	8.4	9.2	10.1	8.2	6.8	6.1	5.8
Deutschland (3)	7.2	6.5	6.3	6.2	5.6	4.8	5.6	6.6	7.9	8.4	8.3	9.3	9.4
Ellada	7.0	6.6	6.7	6.8	6.7	6.4	7.0	7.9	8.6	8.9	9.1	9.1	9.0
España	21.6	21.2	20.5	19.5	17.2	16.2	16.4	18.5	22.8	24.1	22.9	22.5	22.1
France	10.2	10.3	10.4	9.9	9.4	9.0	9.5	10.4	11.7	12.3	11.5	11.7	11.7
Ireland	16.9	16.8	16.6	16.1	14.7	13.4	14.8	15.4	15.7	14.7	14.4	13.4	12.8
Italia	8.5	9.2	9.9	10.0	10.0	9.1	8.8	9.0	10.3	11.4	11.8	11.8	11.7
Luxembourg	2.9	2.6	2.5	2.0	1.8	1.7	1.7	2.1	2.7	3.2	2.9	3.0	2.9
Nederland	8.3	8.3	8.0	7.5	6.9	6.2	5.8	5.6	6.6	7.2	7.3	7.2	7.0
Österreich (4)	3.6	3.1	3.8	3.6	3.1	3.2	3.5	3.6	4.2	4.1	4.0	4.6	5.1
Portugal	8.7	8.4	6.9	5.5	4.9	4.6	4.0	4.2	5.7	7.0	7.2	7.4	7.2
Suomi/Finland	6.3	6.9	5.1	4.5	3.5	3.4	7.6	13.1	17.9	18.4	17.2	16.3	15.0
Sverige	3.0	2.8	2.3	1.9	1.6	1.8	3.3	5.8	9.5	9.8	9.2	8.8	8.3
United Kingdom	11.5	11.5	10.6	8.7	7.3	7.0	8.8	10.1	10.4	9.6	8.8	8.4	8.0
EUR15 (3)	10.0	10.0	9.8	9.1	8.3	7.8	8.3	9.4	10.9	11.3	10.9	10.9	10.8
USA (4)	7.2	7.0	6.2	5.5	5.3	5.5	6.7	7.4	6.8	6.1	5.6	5.6	5.4
Japan (4)	2.6	2.8	2.8	2.5	2.3	2.1	2.1	2.2	2.5	2.9	3.2	3.1	2.9

(1) Spring 1996 estimates.
(2) Spring 1996 forecasts.
(3) Including former East Germany from 1991 onwards.
(4) OECD data.
Source: Commission Services (DG II)

Table 4: Snapshots
Net lending or net borrowing of general government

(% of GDP at market prices)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1996(2)	1997(2)
Belgique/België	-9.0	-9.4	-7.6	-6.8	-6.5	-5.8	-6.7	-7.1	-6.7	-5.3	-4.5	-3.2	-3.7
Danmark	-2.0	3.4	2.4	0.6	-0.5	-1.5	-2.1	-2.9	-3.9	-3.5	-1.4	-0.9	-0.6
Deutschland (3)	-1.2	-1.3	-1.9	-2.2	0.1	-2.1	-3.3	-2.8	-3.5	-2.5	-3.5	-3.9	-2.9
Ellada (4)	-11.6	-10.3	-9.6	-11.5	-14.4	-16.1	-11.5	-12.3	-14.2	-12.1	-9.2	-8.1	-6.9
España	-6.9	-6.0	-3.1	-3.3	-2.8	-4.1	-4.9	-4.1	-7.5	-6.9	-6.2	-4.8	-3.7
France	-2.9	-2.7	-1.9	-1.7	-1.2	-1.6	-2.2	-3.9	-5.9	-5.8	-5.0	-4.2	-3.0
Ireland	-10.7	-10.6	-8.5	-4.4	-1.8	-2.3	-2.2	-2.4	-2.4	-2.0	-2.4	-2.0	-1.6
Italia	-12.6	-11.6	-11.0	-10.7	-9.9	-11.0	-10.2	-9.5	-9.6	-9.0	-7.1	-6.3	-5.2
Luxembourg	6.5	4.6	2.9	N/A	N/A	5.0	1.9	0.8	1.8	2.2	0.3	0.7	0.3
Nederland	-3.6	-5.1	-5.9	-4.6	-4.7	-5.1	-2.9	-3.9	-3.2	-3.2	-3.4	-3.5	-2.9
Österreich	-2.5	-3.7	-4.3	-3.0	-2.8	-2.2	-2.6	-2.1	-4.3	-4.4	-6.2	-4.6	-3.1
Portugal (5)	-6.5	-6.5	-5.6	-3.6	-2.3	-5.5	-6.4	-3.3	-7.1	-5.8	-5.4	-4.4	-3.7
Suomi/Finland	2.9	3.4	1.0	4.1	6.3	5.4	-1.5	-5.9	-8.0	-6.3	-5.6	-3.3	-1.6
Sverige	-3.8	-1.2	4.2	3.5	5.4	4.2	-1.1	-7.8	-12.3	-10.8	-8.1	-5.2	-3.1
United Kingdom	-2.8	-2.9	-1.4	0.1	-0.1	-1.5	-2.6	-6.3	-7.8	-6.8	-6.0	-4.4	-3.7
EUR15 (6)	-4.5	-4.2	-3.6	-3.2	-2.4	-3.6	-4.3	-5.1	-6.3	-5.5	-5.1	-4.4	-3.4
USA	-3.1	-3.5	-2.5	-2.0	-1.5	-2.5	-3.3	-4.3	-4.1	-2.8	-2.4	-2.1	-1.5
Japan	-0.8	-0.9	0.5	1.5	2.5	2.9	3.0	1.5	-1.4	-1.6	-3.3	-4.5	-4.7

(1) Spring 1996 estimates.
(2) Spring 1996 forecasts.
(3) Including former East Germany from 1991 onwards; not including unification-related debt assumptions by the federal government in 1995 (Treuhand and eastern housing companies), equal to DM 236 bn (6.75 % of GDP).
(4) Breaks in 1987/88.
(5) Breaks in 1985/86.
(6) Including former East Germany from 1991 onwards; excluding Luxembourg.
Source: Commission Services (DG II)

Table 5: Snapshots
Total number of employed

(% annual change)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1996(2)	1997(2)
Belgique/België	0.6	0.7	0.5	1.5	1.6	1.5	0.1	-0.4	-2.5	-0.6	0.4	-0.1	0.7
Danmark	2.6	4.3	0.6	0.6	-1.9	1.0	-1.0	0.1	-2.3	-0.6	1.5	0.0	0.7
Deutschland (3)	0.8	1.4	0.7	0.8	1.4	2.6	1.7	-1.9	-1.8	-0.7	-0.3	-0.8	-0.1
Ellada	1.0	0.4	-0.1	1.6	0.4	1.3	-2.3	1.5	0.9	1.9	0.9	1.0	1.2
España	-1.2	1.9	4.4	3.4	3.9	2.3	0.2	-2.1	-4.4	-0.9	2.6	1.4	1.4
France	-0.3	0.2	0.3	0.8	1.2	2.9	0.2	-0.7	-1.0	0.1	1.2	0.1	0.6
Ireland	-2.3	0.2	0.8	0.0	-0.2	4.2	0.0	0.4	0.6	2.6	3.8	2.3	1.7
Italia	0.4	0.6	-0.2	0.8	0.1	1.7	0.8	-0.6	-6.8	-1.7	-0.5	0.2	0.4
Luxembourg	1.4	2.6	2.1	3.1	3.5	4.1	4.1	2.5	1.8	2.5	2.5	1.7	2.5
Nederland	1.8	1.5	1.6	2.9	2.0	3.3	2.6	2.0	-0.1	0.1	1.4	1.0	1.4
Österreich	0.0	1.5	0.5	0.3	0.9	2.1	2.1	1.8	0.6	0.1	-0.1	-1.0	-0.4
Portugal	-0.4	0.2	2.2	2.4	2.0	2.0	2.8	-1.8	-1.9	-0.2	-0.6	-0.1	0.5
Suomi/Finland	1.0	-0.4	-0.2	0.2	1.5	-0.3	-4.9	-7.1	-6.1	-0.8	2.2	1.7	2.1
Sverige	1.0	-0.7	1.6	1.4	1.5	0.0	-1.8	-4.3	-5.5	-0.9	1.6	0.3	0.5
United Kingdom	1.2	0.1	2.2	3.4	3.1	1.0	-3.3	-2.0	-1.5	0.0	0.6	0.9	1.0
EUR15 (3)	0.5	0.8	1.2	1.7	1.6	2.0	-0.1	-1.3	-2.5	-0.5	0.6	0.2	0.6
USA	2.0	2.2	2.6	2.2	2.0	0.4	-0.9	0.6	1.4	3.1	1.5	0.6	1.4
Japan	0.7	0.8	1.0	1.7	1.9	2.0	1.9	1.1	0.2	0.0	0.3	0.6	0.5

(1) Spring 1996 estimates.
(2) Spring 1996 forecasts.
(3) Including former East Germany from 1992 onwards.
Source: Commission Services (DG II)

Table 6: Snapshots
Cross fixed capital formation at constant prices in the construction industry

(% annual change)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1996(2)	1997(2)
Belgique/België	-0.5	3.9	4.5	14.6	7.9	7.2	2.3	5.5	-2.1	1.4	1.8	2.9	2.9
Danmark	8.9	18.0	1.1	-5.5	-6.1	-5.6	-11.2	0.3	-8.8	3.2	8.3	4.2	4.6
Deutschland (3)	-5.9	3.1	0.0	3.1	4.4	4.9	2.7	9.7	0.9	7.8	1.2	-3.1	0.5
Ellada	3.0	-0.7	-5.0	9.2	2.0	3.2	3.2	-6.0	-5.1	-3.0	2.1	8.5	8.9
España	1.8	8.8	9.4	11.7	15.0	9.8	3.9	-4.3	-6.6	1.2	7.0	2.6	5.7
France	-0.2	4.7	4.1	8.8	6.8	2.0	0.2	-2.5	-5.9	0.2	0.5	0.9	1.6
Ireland	-7.3	-0.8	-6.7	-4.0	10.8	15.3	1.3	0.3	-3.7	9.9	13.6	9.0	6.0
Italia	-0.5	1.9	-0.7	2.3	3.6	3.5	1.4	-2.4	-6.3	-5.8	0.5	2.8	3.1
Luxembourg	-3.1	4.6	11.4	12.3	13.0	9.8	8.7	N/A	N/A	N/A	5.1	6.2	3.6
Nederland	0.1	5.2	2.0	9.5	2.3	0.0	0.0	2.6	-1.6	4.6	2.0	1.4	2.3
Österreich	1.5	3.5	4.8	6.3	4.6	5.8	6.2	5.6	2.9	5.5	-0.2	-1.5	-0.5
Portugal	-6.0	8.7	9.5	4.4	4.3	5.3	4.7	5.4	-1.0	1.0	5.5	5.0	7.0
Suomi/Finland	-1.0	-2.4	1.2	9.0	14.5	-1.3	-14.5	-17.3	-18.8	-5.6	1.3	4.7	8.6
Sverige	-0.8	1.8	4.7	3.6	7.7	2.0	-5.2	-7.7	-19.2	-11.5	-3.1	7.8	2.0
United Kingdom	-1.7	6.1	12.0	14.3	2.1	-2.8	-8.4	0.3	0.1	2.1	-1.7	3.8	4.2
EUR15 (3) (4)	-1.5	4.3	3.7	7.3	5.5	2.9	-0.3	0.9	-3.3	2.1	1.5	0.9	2.6
USA	5.1	0.5	-0.3	-0.6	0.0	-3.0	-8.5	4.5	3.9	5.7	2.2	4.0	3.5
Japan	1.4	4.1	9.4	8.6	5.8	6.1	2.1	-0.6	-0.7	6.0	-2.7	7.5	4.0

(1) Spring 1996 estimates.
(2) Spring 1996 forecasts.
(3) Including former East Germany from 1992 onwards.
(4) Excluding Luxembourg.
Source: Commission Services (DG II)

Table 7: Snapshots
Gross fixed capital formation at constant prices in equipment

(% annual change)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1996(2)	1997(2)
Belgique/België	2.3	5.3	7.1	16.1	17.4	13.1	-5.1	-6.1	-12.4	-0.8	4.0	4.9	4.5
Danmark	16.2	16.6	-8.9	-8.6	9.7	1.9	0.5	-8.3	-0.9	3.2	13.5	3.5	5.6
Deutschland (3)	8.6	3.7	4.5	6.3	8.8	13.2	10.0	-3.5	-14.1	-1.2	2.0	0.5	5.5
Ellada	7.7	-12.6	-5.2	8.4	17.4	8.4	7.9	7.5	1.1	6.3	11.5	7.0	7.0
España	8.5	12.0	23.2	17.6	11.8	1.7	-2.5	-4.0	-18.1	1.7	11.0	8.3	6.5
France	9.2	4.3	6.8	10.4	9.2	3.8	0.2	-4.1	-5.8	2.3	6.2	2.4	6.5
Ireland	-8.2	1.5	1.9	1.6	17.5	6.2	-17.5	-8.2	4.0	3.3	10.0	7.0	6.5
Italia	2.0	2.5	11.5	11.6	4.9	4.1	0.2	-1.2	-19.5	7.5	11.5	5.6	8.6
Luxembourg	-20.5	87.2	18.7	16.0	4.4	-6.0	11.2	N/A	N/A	N/A	7.3	7.0	2.9
Nederland	16.8	8.8	0.4	-2.5	7.9	3.7	0.6	-1.5	-5.3	0.3	9.0	3.7	3.2
Österreich	10.1	3.9	0.9	5.6	8.3	5.7	6.5	-3.6	-8.2	8.8	6.1	2.7	3.5
Portugal	-1.8	13.2	26.7	16.9	5.1	5.6	-0.1	5.4	-9.2	5.4	3.0	4.6	5.8
Suomi/Finland	8.9	3.4	11.4	11.1	15.2	-8.5	-30.2	-16.0	-20.0	4.9	21.4	21.0	14.8
Sverige	16.1	-0.1	11.6	8.4	16.2	-0.6	-11.9	-16.0	-14.7	18.1	28.5	12.4	3.9
United Kingdom	10.6	-1.1	8.1	13.4	11.4	-4.3	-10.8	-3.8	1.2	5.8	0.6	4.6	5.6
EUR15 (3) (4)	7.9	3.6	8.1	9.9	9.3	4.3	-0.3	-3.3	-10.8	3.2	6.3	4.0	6.2
USA	6.1	0.6	2.6	9.2	3.1	2.0	-1.9	7.3	19.7	10.2	8.7	6.0	4.7
Japan	11.6	5.6	10.2	16.8	14.1	12.3	5.4	-1.7	-3.1	-5.1	2.7	4.5	4.0

(1) Spring 1996 estimates.
(2) Spring 1996 forecasts.
(3) Including former East Germany from 1992 onwards.
(4) Excluding Luxembourg.
Source: Commission Services (DG II)

Table 8: Snapshots
Ranking of EU manufacturing industry by production, 1995 (1)

(million ECU)	Production (% annual change over 1988-1995)	Employment (2)	Extra-EU exports	Extra-EU imports	Annual average growth rate (3)
Food, drink and tobacco	484 692	2 331 343	35 884	24 120	4.2
Chemicals and man-made fibres	345 667	1 532 195	72 420	46 903	4.1
Motor vehicles and parts	308 447	1 604 576	50 162	26 378	4.7
Electrical engineering	279 678	2 346 109	67 438	70 075	4.0
Mechanical engineering	228 716	1 940 667	89 662	37 817	3.2
Metal articles	196 469	1 964 068	18 962	12 866	4.4
Paper, printing and publishing	180 905	1 342 348	14 777	24 468	4.2
Mineral oil refining	136 661	100 876	7 636	7 871	3.6
Preliminary processing of metals	135 414	622 179	26 241	39 740	0.8
Rubber and plastics	126 386	1 071 861	15 337	11 620	5.7
Non-metallic mineral products	105 152	919 374	11 095	5 290	3.3
Timber and wooden furniture	82 491	879 115	7 980	14 706	4.7
Footwear and clothing	68 828	1 005 909	15 532	26 823	2.7
Other means of transport	68 702	629 045	27 343	19 872	2.8
Office machinery and data processing machinery	47 609	206 106	17 002	32 282	1.6
Instrument engineering	25 178	297 689	12 800	15 067	3.2
Other manufacturing industries	21 429	210 247	42 194	31 737	3.9
Leather and leather goods	9 773	90 432	4 733	4 686	-0.4

(1) Estimated.
(2) Number of employees.
(3) Calculated using production in constant prices (1990=100).
Source: DEBA GEIE

Table 9: Snapshots
Exchange rates, 1970-1995 (1)

(1 ECU= national currency)	BFR	DKR	DM	DR	PTA	FF	£IRL	LIT	HFL	ÖS	ESC	FMK	SKR	£UK	USD	YEN
1970	51.1	7.7	3.7	30.7	71.4	5.7	0.4	638.9	3.7	N/A	29.4	N/A	N/A	0.4	1.0	368.0
1975	45.6	7.1	3.0	40.0	71.2	5.3	0.6	809.5	3.1	N/A	31.5	N/A	N/A	0.6	1.2	367.7
1980	40.6	7.8	2.5	59.3	99.7	5.9	0.7	1 189.2	2.8	18.0	69.6	5.2	5.9	0.6	1.4	315.0
1981	41.3	7.9	2.5	61.6	102.7	6.0	0.7	1 263.2	2.8	17.7	68.5	4.8	5.6	0.6	1.1	245.4
1982	44.7	8.2	2.4	65.3	107.6	6.4	0.7	1 323.8	2.6	16.7	78.0	4.7	6.1	0.6	1.0	243.5
1983	45.4	8.1	2.3	78.1	127.5	6.8	0.7	1 349.9	2.5	16.0	98.7	4.9	6.8	0.6	0.9	211.4
1984	45.4	8.1	2.2	88.3	126.6	6.9	0.7	1 381.4	2.5	15.7	115.7	4.7	6.5	0.6	0.8	187.1
1985	44.9	8.0	2.2	105.7	129.1	6.8	0.7	1 448.0	2.5	15.6	130.3	4.7	6.5	0.6	0.8	180.6
1986	43.8	7.9	2.1	137.4	137.5	6.8	0.7	1 461.9	2.4	15.0	147.1	5.0	7.0	0.7	1.0	165.0
1987	43.0	7.9	2.1	156.3	142.2	6.9	0.8	1 494.9	2.3	14.6	162.6	5.1	7.3	0.7	1.2	166.6
1988	43.4	8.0	2.1	167.6	137.6	7.0	0.8	1 537.3	2.3	14.6	170.1	4.9	7.2	0.7	1.2	151.5
1989	43.4	8.0	2.1	178.8	130.4	7.0	0.8	1 510.5	2.3	14.6	173.4	4.7	7.1	0.7	1.1	151.9
1990	42.4	7.9	2.1	201.4	129.4	6.9	0.8	1 522.0	2.3	14.4	181.1	4.9	7.5	0.7	1.3	183.7
1991	42.2	7.9	2.1	225.2	128.5	7.0	0.8	1 533.2	2.3	14.4	178.6	5.0	7.5	0.7	1.2	166.5
1992	41.6	7.8	2.0	247.0	132.5	6.8	0.8	1 595.5	2.3	14.2	174.7	5.8	7.5	0.7	1.3	164.2
1993	40.5	7.6	1.9	268.6	149.1	6.6	0.8	1 841.2	2.2	13.6	188.4	6.7	9.1	0.8	1.2	130.1
1994	39.7	7.5	1.9	288.0	158.9	6.6	0.8	1 915.1	2.2	13.5	196.9	6.2	9.2	0.8	1.2	121.3
1995	38.5	7.3	1.9	303.0	163.0	6.5	0.8	2 131.5	2.1	13.2	196.1	5.7	9.3	0.8	1.3	122.9

(1) Annual average exchange rate.
Source: Commission Services

Table 10: Snapshots
Ranking of EU manufacturing sub-sectors by production, 1995 (1)

(million ECU)	Production (units)	Employment (3) (% annual change over 1988-1995)	Annual average growth rate (4)
Assembly of motor vehicles	232 027	1 026 069	4.2
Basic industrial chemicals	133 970	494 958	2.3
Telecommunications equipment, electrical and electronic measuring and recording equipment, and electro-medical equipment	100 604	778 577	5.8
Processing of plastics	95 696	765 528	6.8
Pharmaceuticals	83 324	397 369	7.7
Other machinery	83 255	701 740	4.7
Meat	81 261	434 280	4.2
Dairy products	79 353	248 343	4.5
Tools and finished metal goods	73 518	720 314	4.4
Iron and steel	64 873	292 513	-0.2
Parts and accessories for motor vehicles	63 976	470 651	7.0
Paper and board	54 513	371 503	5.9
Consumer electronics	48 612	322 077	3.9
Ready-made clothing	44 785	714 125	2.3
Other food products	43 615	198 288	7.8
Iron and steel machinery	43 033	339 150	3.6
Preliminary processing of non-ferrous metals	42 771	168 992	1.5
Aerospace	41 836	345 795	2.2
Wooden furniture	40 948	474 558	4.3
Soaps, detergents and toileteries	38 936	183 359	4.7
Pulp, paper and board	37 080	153 527	4.2
Concrete	31 781	237 185	5.1
Structural metal products	31 544	326 683	4.6
Food and chemical machinery	31 157	249 011	4.7
Compound feed	29 789	87 226	1.7
Bread	28 813	455 611	5.3
Secondary transformation, treatment and coating of metals	28 695	314 851	5.2
Domestic appliances	27 576	209 377	4.7
Brewing and malting	27 106	116 483	3.0
Cocoa, chocolate and sugar confectionery	25 655	162 806	4.9

Table 10: Snapshots (continued)
Ranking of EU manufacturing sub-sectors by production, 1995 (1)

(million ECU)	Production (units)	Employment (3) (% annual change over 1988-1995)	Annual average growth rate
Glass	23 739	221 238	3.3
Foundries	22 814	211 453	3.9
Boilermaking	21 026	199 301	4.0
Soft drinks	19 951	87 958	6.9
Oils and fats	19 367	47 652	2.8
Fruit and vegetables	19 196	131 113	4.7
Machine-tools	18 966	214 741	-0.8
Knitting	18 873	252 690	0.3
Footwear	17 879	221 613	3.7
Forging; drop forging, closed die-forging, pressing and stamping	16 817	160 434	4.1
Sugar	16 455	57 471	2.4
Ceramic goods	16 107	210 135	2.2
Carpentry and joinery components	15 665	156 011	6.5
Drawing, cold rolling and cold folding of steel	15 549	89 272	4.0
Other machinery for use in specific industries	15 081	131 139	1.1
Cement, lime and plaster	14 623	70 534	1.8
Shipbuilding	14 605	171 190	2.4
Transmission equipment	14 397	126 538	4.7
Household and office chemicals	13 909	78 129	4.3
Agricultural machinery and tractors	13 835	103 530	0.0
Alcohol	13 365	41 721	2.3
Manufacture of bodies for motor vehicles	12 445	107 856	2.8
Steel tubes	12 221	71 402	0.0
Wine	11 000	48 112	4.5
Grain milling	10 903	35 251	0.9
Wool	10 622	113 283	-2.9
Stone	9 884	82 693	4.0
Electric lighting	9 816	91 214	4.7
Fish	9 659	79 860	4.2
Textile machinery	8 991	74 818	0.5
Semi-finished wood products	8 969	62 409	3.7
Precision instruments and apparatus	8 903	104 307	1.8
Medical and surgical equipment	8 054	104 521	5.2
Carpets, linoleum and other floor coverings	7 981	62 737	1.9
Jewellery	7 696	54 776	4.7
Man-made fibres	7 268	40 694	-1.4
Optical instruments and photographic equipment	6 931	73 775	3.9
Sawing and processing of wood	6 702	66 324	3.5
Toys and sports goods	6 545	60 083	4.2
Clay products	6 474	69 135	3.3
Railways	5 890	65 785	5.6
Tanning and dressing of leather	5 769	39 035	-2.2
Cycles and motor-cycles	5 382	37 211	5.0
Other wood products	4 343	48 462	5.5
Pasta	4 181	19 031	-1.3
Leather and leather substitutes	4 004	51 397	2.9
Starch products	3 874	14 263	2.1
Wooden containers	3 620	40 156	6.1
Miscellaneous manufacturing industries	3 614	47 052	3.9
Photographic and cinematographic laboratories	2 880	38 168	4.1
Articles of cork and articles of straw	2 244	31 195	5.0
Grindstones	1 802	17 676	2.8
Clocks and watches	1 290	15 086	-1.7
Asbestos	742	10 778	-9.1
Musical instruments	693	10 168	-1.9
Furs and fur goods	352	4 685	-8.3

(1) Estimated.
(2) Number of employees.
(3) Calculated using production in constant prices (1990=100).
Source: DEBA GEIE

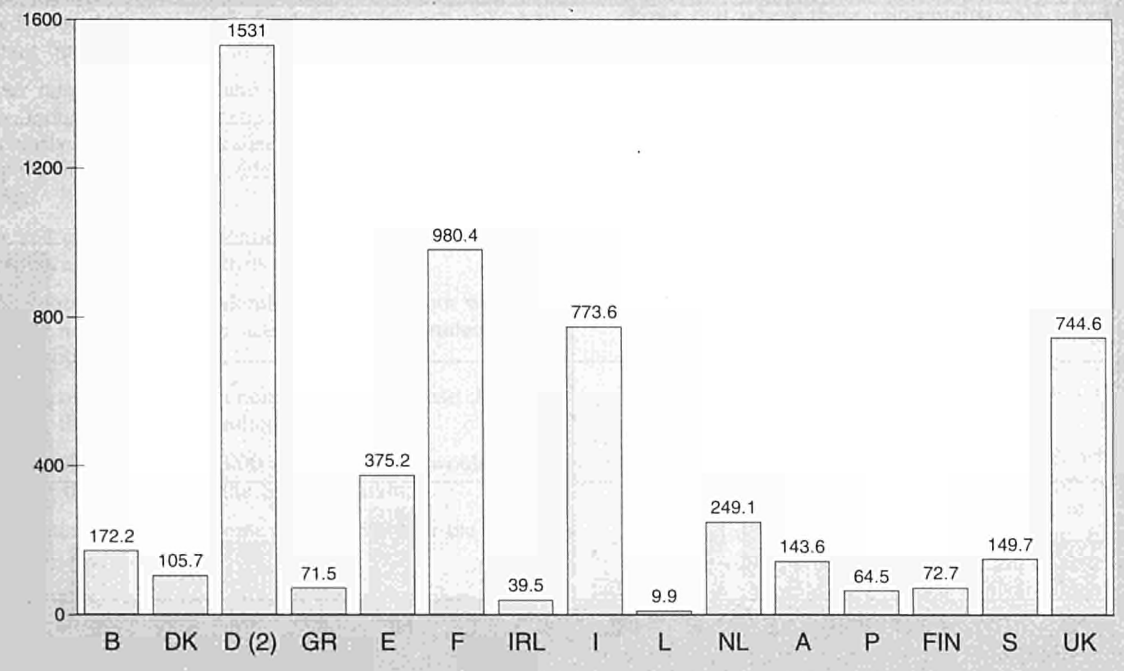
Table 11: Snapshots
Ranking of EU manufacturing industry by value added, 1995 (1)

(million ECU)

Chemicals and man-made fibres	120 897
Food, drink and tobacco	110 527
Electrical engineering	110 153
Mechanical engineering	90 151
Motor vehicles and parts	89 264
Metal articles	80 801
Paper, printing and publishing	67 565
Rubber and plastics	49 161
Non-metallic mineral products	42 938
Preliminary processing of metals	34 346
Timber and wooden furniture	29 576
Other means of transport	25 947
Footwear and clothing	22 964
Office machinery and data processing machinery	16 271
Instrument engineering	12 418
Mineral oil refining	11 335
Other manufacturing industries	8 658
Leather and leather goods	2 954

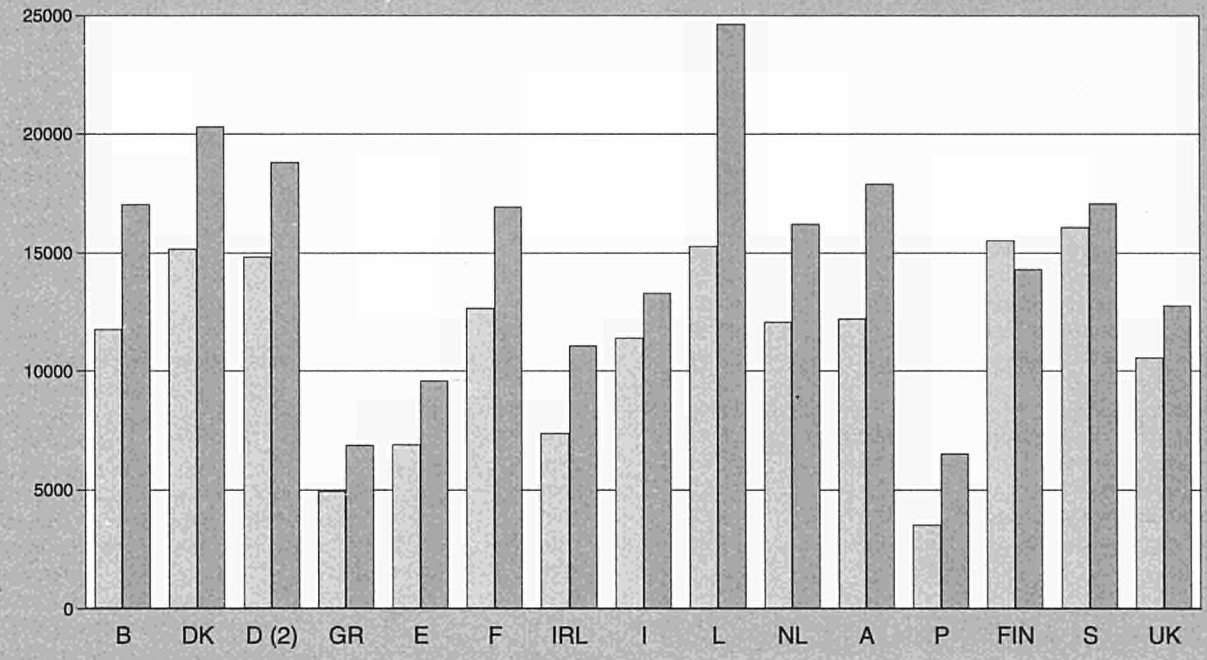
(1) Estimates.
Source: DEBA GEIE

Figure 1: Snapshots
GDP by Member State, 1994 (1)



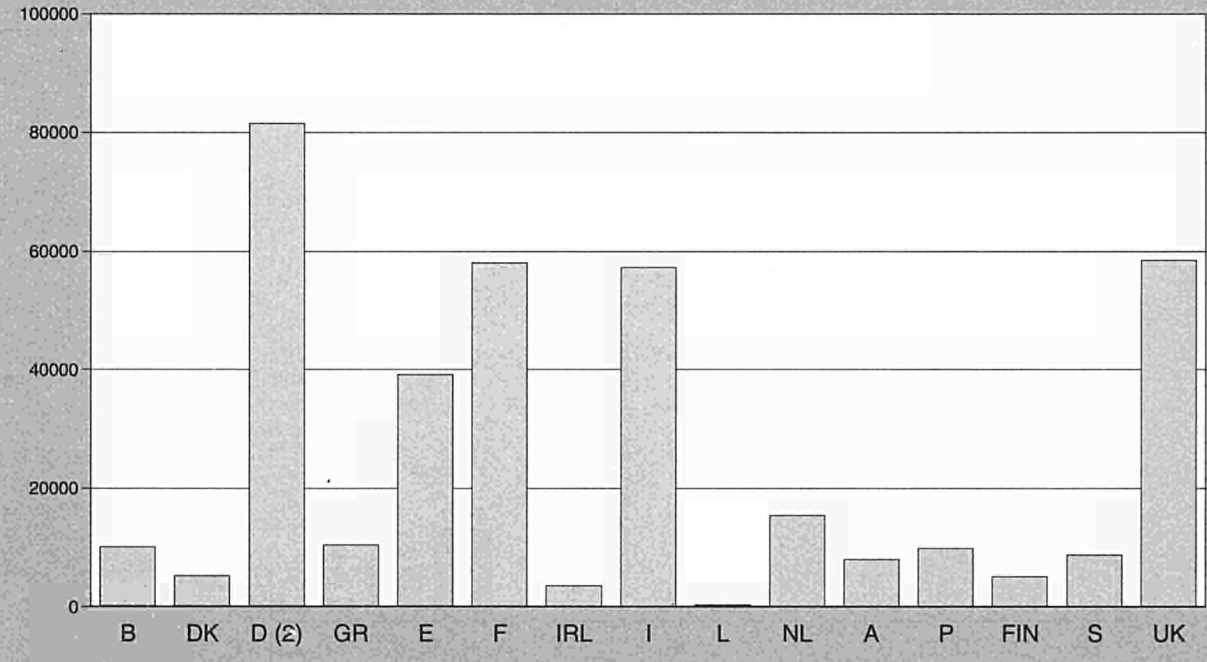
(1) At factor cost in current prices.
(2) Including former East Germany.
Source: Eurostat4.2

Figure 2: Snapshots
GDP per capita, 1988 and 1994 (1)



(1) At factor cost; population is equal to the annual average for 1988 and as of 1/1/95 for 1994.
(2) Including former East Germany.
Source: Eurostat

Figure 3: Snapshots
EU population by Member State, 1994



(1) Population of 1/1/95.
(2) Including former East Germany.
Source: Eurostat

The Impact and Effectiveness of the Single Market

Communication from the Commission to the European Parliament and Council, 30 October 1996

SUMMARY

Jobs and sustainable growth are at the top of the Union's agenda. The Commission's Confidence Pact, "Action for Employment in Europe", identified the Single Market as the launching pad for attaining higher levels of job creation and sustainable growth. The Commission now has solid evidence of the positive effects of the Single Market, based on a first exhaustive survey of its economic impact and effectiveness conducted over the past two years.[1)]

In terms of economic impact the news is encouraging. It is still too early for many Single Market measures to have taken full effect but there are clear signs of significant change in the European economy. We now have evidence of the following positive, albeit preliminary effects of the Single Market in triggering the expected reinforcement of integration, competition, economic performance and benefits for consumers:[2)]

- growing competition between companies in both manufacturing and services;
- an accelerated pace of industrial restructuring, with the resultant benefits in terms of greater competitiveness;
- a wider range of products and services available to public sector, industrial and domestic consumers at lower prices, particularly in newly liberalised service sectors such as transport, financial services, telecommunications and broadcasting;
- faster and cheaper cross-frontier deliveries resulting from the absence of border controls on goods;
- greater mobility between Member States for both workers and those not economically active (including students and retired people).

Calculations of the overall economic effects of these changes suggest that the SMP has resulted in:

- between 300 000 and 900 000 more jobs than would have existed in the absence of the Single Market;
- an extra increase in EU income of 1.1-1.5% over the period 1987-93;
- inflation rates which are 1.0-1.5% lower than they would be in the absence of the SMP;
- economic convergence and cohesion between different EU regions.

These benefits have been gained without any reduction in safety standards for consumers or workers. In many areas standards of protection for the citizen have in fact increased. Citizens of the Union also enjoy more personal freedom and have more choice than ever before. The Commission's survey confirms that Community legislation in the Single Market area has, taken as a whole, created the basic conditions for free movement and economic efficiency. The situation in today's Single Market is in sharp contrast to that of the mid-1980s when:

- all goods were stopped and subject to checks at frontiers;
- most products had to comply with different laws in each Member State;
- services such as transport, telecommunications, banking and broadcasting were not subject to competition; and
- citizens who were not employed could be subject to restrictions on residence and risk losing social security rights in another Member State.

It is up to economic operators to make the most of the Single Market. The role of public authorities at national and Community level is confined to creating appropriate economic and institutional conditions. In the context of a more favourable economic climate, operators will be better placed to exploit to the full the opportunities that are now available. This report shows that where these opportunities are taken the benefits are significant.

The Commission's analysis suggests that these opportunities would have been even greater if Member States had been more diligent in putting in place the Single Market measures already agreed and applying the principles of the Community law on which they are based. Delays in applying and enforcing Single Market rules at national level continue to limit the Single Market's positive contribution to growth, competitiveness and more employment.

The Community must build on its successes and iron out the remaining political and practical difficulties which inhibit the Single Market's full potential from being achieved. The Commission is putting forward clear policy recommendations for action at two levels:

- first and foremost, at the national level, where the main responsibility for applying Single Market rules lies. The Commission is urging that enforcement of Single Market legislation and Treaty rules be stepped up. In addition, the Commission calls for vigorous action to be taken to reduce excessive regulation at national level which inhibits both competition and competitiveness;
- at the Community level, where further efforts must be made to complete the 1985 agenda in a few key areas (such as abolition of border controls on persons, taxation and company law), where further means have to be devoted to the control of implementation and to updating the legislation

Table 1: Effectiveness of Single Market measures in removing barriers to the free provision of services (as perceived by economic operators)

	Barriers					
	Cross-border service restrictions	Restrictions on Establishment	Restrictions on Factor flows	Regulatory/technical barriers (1)	Fiscal issues	Others
Banking	✓✓ Discriminatory conditions for cross-border sale of services ✓ Restrictions on marketing and service content	✓✓ Discriminatory conditions for licences	✓✓ Capital controls	✓✓ Prudential requirements ✓ Conditions for sales	☹ Tax on savings ☹ Investment income tax ☹ Death duties	-
Insurance	✓✓ Discriminatory conditions for cross-border sale of services ✓ Restrictions on marketing and service content	✓✓ Discriminatory conditions for licences	✓✓ Capital controls	✓ Consumer protection Conditions for sales	☹ Taxation of reserves ☹ Taxation of premiums	L Contract law
Road freight transport	✓✓ Bilateral quota restrictions on the access to other EC markets ✓✓ Price restrictions	✓✓ Discriminatory licensing conditions	✓ Cabotage restrictions ✓✓ Recognition of diplomas	✓✓ Weights and dimensions ✓ Road safety rules ✓ Speed limiters ✓ Resting hours	✓✓ Excise duties	✓✓ Border formalities for goods
Air transport	✓✓ Bilateral restrictions on free access to other EC markets ✓✓ Price restrictions ☹ Slots allocation	✓✓ Exclusive rights for licensing of air carriers ☹ Ownership rules in third country bilaterals	✓ Cabotage restrictions ✓✓ Designation and capacity restrictions	✓✓ Conditions for sales ✓✓ Security and safety rules ☹ Airport charges	VAT	✓ Border formalities for passengers ✓✓ Access to computer reservation systems ü State aids, unfair practices
Telecoms liberalised services	✓ Discriminatory conditions for access to network	✓✓ Exclusive rights on: mobile, data and satellite services	✓✓ Exclusive rights to sell equipment	✓ Technical conditions for use of networks	-	☹ Fair access to networks
TV Broadcasting services	✓ Restrictions on cross-frontier broadcasting ✓ Rental and Lending rights ✓ Term of copyright protection ✓ Copyright applicable to satellite and cable	☹ National licensing rules for broadcasters ☹ Media ownership restrictions		✓ Technical conditions for use of networks	-	
Distribution (Fast moving consumer goods)	No restrictions	No restrictions	✓✓ Restrictions on free movement of goods	-	✓ VAT	✓✓ Border formalities for goods Technical barriers on products
Advertising	Types of products and media ☹ Comparative advertising	No restrictions	Restrictions on media	Misleading advertising Content restrictions	-	-

✓✓ Barrier effectively removed; ✓ Barrier partially removed; ☹ Remaining barrier; - Not relevant

(1) These type of barriers tend to increase the cost of supplying services internationally and could be considered equivalent to technical barriers in manufacturing

and where Community policies in related areas such as competition, consumer policy, information and the environment may need to be developed further in order to ensure the most effective use and development of the Single Market.

The introduction of a single currency in 1999 will also make the Single Market more effective by eliminating the constraints which now result from exchange risks and by generally increasing transparency and competition.

In its conclusions to this report, the Commission calls for action to deliver a properly working Single Market. It spells out what is required in terms of a renewed commitment to the Single Market, not only at the highest political level - the European Council in Dublin - but also from all those who must contribute to making the Single Market a success - national authorities, the European Institutions and, above all, economic operators themselves.

THE ECONOMIC IMPACT OF THE SINGLE MARKET PROGRAMME

Introduction

The Single Market Programme (SMP), as set out in the Commission White Paper of 1985, constituted the most ambitious and comprehensive supply-side programme ever launched. It has begun to remove the market rigidities and barriers to mobility which in the mid-1980s gave rise to persistent economic under-performance, reflected in rising unemployment and poor competitiveness.

Implementation of Single Market liberalisation measures is proceeding well. Without a doubt, the elimination of frontier controls and delays, the free circulation of capital and the liberalisation of financial services have been widely and warmly welcomed by economic operators. However, implementation of a certain number of measures has encountered problems (technical barriers, public procurement). The evaluation exercise begun here seeks to identify and estimate the economic effects of measures taken to eliminate trade barriers only to the extent that they have actually been successfully carried out.

It is important to underline that the following assessment cannot be definitive and unqualified, for the following reasons-because:

- first, it is difficult to isolate the effects which can be attributed exclusively to Single Market integration, the SMP has not been implemented in a vacuum. The past decade has witnessed the accession of five new Member States, German reunification, the economic transformation in Central and Eastern Europe, a substantial increase in the volume and effectiveness of Community Structural Fund assistance, a globalising world economy and the information technology revolution. These developments have affected the dynamics of the Single Market. It has proved difficult to isolate and quantify the effects which can be attributed exclusively to Single Market integration;
- second, the Single Market legislation is still to take full effect. Much of it did not come into force until 1994 or 1995; some will not be implemented until after the year 2000. Economic operators are still adapting to the new regulatory and commercial environment and have had little time to adjust to new freedoms; the recent recession may have made them reluctant to take advantage of new opportunities. There has been insufficient time for the effects of regulatory change to work through.

Given the nature of Single Market measures, their implementation has resulted in essentially microeconomic effects and modifications to the structure of production and trade inside the EU. As a consequence, the analysis focuses on identifying and measuring microeconomic phenomena. Nevertheless, an attempt is also made to evaluate the macroeconomic impact on income and employment.

Elimination of trade barriers has the following expected microeconomic consequences: lifting barriers will lead to improvements in the allocation of resources to take advantage of specialisation based on comparative advantage and economies of scale. There is a danger that the removal of barriers might be accompanied by a re-segmentation of national markets via anti-competitive behaviour (e.g. cartels, abuse of dominant position, state aids). Competition policy is an essential tool for preventing such behaviour and for translating efficiency gains into lower prices and better quality for consumers.

Trade and foreign direct investment.

The Single Market has led to an important increase in trade and in the EU's share of foreign direct investment at world level. However, the increase in trade amongst Member States has not been at the expense of trade with third countries. Furthermore, a relative convergence of Member States' production structures can be discerned as a result of specialising in the same sectors but different price-quality niches, a development which eases the process of Monetary Union.

The analysis carried out demonstrates that lifting trade barriers has increased trade volumes between Member States by 20-30% in manufacturing products. This growth has not been at the expense of exporters from outside the Community who have, in fact, also benefited from the creation of the Single Market. Fears expressed that the Single Market would be less open to foreign suppliers have turned out to be groundless. Extra-EU manufacturing imports have increased their share of consumption over the period 1980-93 from 12 to 14%.

As for trade inside the Community, a noticeable change in the nature of flows can be detected. The Single Market does not seem to have reinforced trends towards increased sectoral specialisation, with Member States concentrating on particular activities according to their respective comparative advantages; instead, Member States are increasingly specialising within industrial sectors in certain price-quality ranges. Consumers have benefited from the resulting increased range of products available for sale.

Member States are therefore active across the whole spectrum of economic activity, differentiating themselves from each other by the price-quality market niche that they strive to occupy. The result has been a convergence of Member States' industrial structures. This is particularly important in the context of Monetary Union.

Regarding foreign direct investment, one can see that the Single Market has made the EU more attractive as a location. As a result, the EU absorbed 44% of global foreign investment flows in the early 1990s, compared to 28% in the middle of the 1980s. The Single Market seems to have had a particularly strong impact on the financial services sector.

Market structures

The European economy has undergone profound restructuring characterised by an explosion in the number of mergers and acquisitions. Nevertheless, there has been an increase in competition on national markets, which has led to a greater convergence of prices for goods and services.

An important part of these foreign direct investment flows has been associated with mergers and acquisitions, which have themselves multiplied as the Single Market has been implemented. This applies, in particular, to cross-border mergers and acquisitions between Community firms. Between 1986 and 1995, the number of mergers and acquisitions has increased from 720 to 2296 in industry and from 783 to 2602 in services. However, 70% remain purely domestic operations between firms from the same Member State. This could reflect firms'

desire to pursue, at least in the first instance, a defensive strategy nationally, leaving some European level restructuring to the future.

Restructuring which has already been carried out has led to increases in the level of concentration at the EU level considered as a whole. Taking manufacturing, between 1987 and 1993 the share of the four largest firms increased from 20.5% of the total, on average, of European turnover, to 22.8%. Nevertheless, there has also been a decline in concentration at national level, even though the average size of firms has been rather stable. This development, apparently paradoxical, has a two part explanation: on the one hand, declines in the market share of dominant firms on their home markets due to increased competition; on the other hand, increases in these dominant firms' share of the European market due to a strategy of pan-Europeanisation. In other words, Europe-wide, large firms' volume of activity has grown, but the geographic distribution of this activity has changed, with relative declines on home markets and increases on other Member State markets. This development is significantly less marked for service activities, especially those that remain heavily regulated, where increases in national concentration can actually be observed. These sectors may witness major pan-European restructuring in the future.

Intensification of competition has reduced the increase in firms' profit margins (of the order of 0.5 percentage points between 1987 and 1991), particularly in sectors where trade barriers used to be most significant. In some of these sectors this has led to price reductions, benefiting consumers. Furthermore, the opening-up of markets has encouraged the convergence of prices across Member States for various goods and services. This convergence is all the greater the larger the degree of liberalisation due to the Single Market. As a result, between 1985 and 1993 the coefficient of variation for prices (including taxes) between Member States for identical goods and services shrank: from 22.5% to 19.6% for consumer goods, and from 33.7% to 28.6% for services. Conversely, the coefficient of variation actually increased for energy products from 21.1% to 31.7%, and for construction from 22.1% to 27.4%. In other words, in sectors where national markets remain very fragmented, no convergence can be seen.

Income, employment and convergence

The Single Market has had a positive impact on income. It is also one of the forces contributing to a certain convergence on the part of outlying Member States. The level of employment would have been lower in its absence.

The combination of microeconomic processes described above has been used to try to estimate the macroeconomic impact of the Single Market Programme using various models. These estimates indicate that investment has been boosted by 1 to 3%, whilst inflation has been reduced by 1% by comparison with what these variables would have been in the absence of the Single Market. As a result, Community income in 1994 is estimated to have been 1.1 to 1.5 percentage points higher due to the Single Market - an increase of 60 to 80 billion ECUs. Around half of these effects came from increases in competition and efficiency improvements, the rest from improvements in technical progress associated with the Single Market.

For several reasons, the recent EU's employment record has been poor. Economic analysis shows, however, that the SMP has produced a higher employment level than would have been achieved in its absence. The difference is estimated at between 300,000 and 900,000 jobs. However, this positive effect has been overshadowed by unfavourable economic conditions not connected with the SMP.

Furthermore, higher levels of Community-wide income have been accompanied by a certain convergence in favour of the majority of Member States on the Community's periphery with Ireland, Spain and Portugal experiencing growth above the Community average. This trend results from the joint effect of accession (in the case of Spain and Portugal), increasing support from structural and cohesion fund, and the Single Market. Economic analysis shows that the SMP has had a specific positive impact on convergence.

To conclude, the macroeconomic impact of the Single Market, as far as it can be detected so far, is clearly positive. Undoubtedly, these effects will continue to grow in the future, to the extent that the Single Market is properly implemented and economic operators actually readjust themselves to the new, more competitive environment created.

A SINGLE MARKET WORKING FOR ITS CITIZENS

The Single Market is much more than an economic enterprise. Together with other Community policies, it has contributed significantly to lower prices and more consumer choice, the extension of personal freedom and rights, higher living standards, better health and safety at work, product safety and reliability, and a safer environment.

Free movement of persons

The Single Market is essentially complete in this area, with the notable exception of the removal of border controls on people. Some clarification of legislation may be necessary, however and implementation at national and local level must be improved.

The freedom to move from one country to another to work, study and reside is one of the most tangible benefits of the Union for individuals. Free movement of workers has been a reality for the six founding members of the European Community since 1968 and now applies to all Member States and three of the EFTA countries (Norway, Iceland and Liechtenstein). Supporting measures, such as the mutual recognition of equivalent diplomas or the right to transfer social security entitlements, increase opportunities for individuals and their dependants to relocate anywhere in the EU.

Within the framework of the SMP, legislation also provided for aggregation and portability of workers' acquired pension and social security rights. Efforts have since focused on extending these freedoms to the unemployed, such as students and retired people, and on strengthening mutual recognition of equivalent educational and vocational qualifications so that employed and self-employed people are able to make use of their right to free movement without being penalised in the field of social security. The EURES network also provides services and information about EU job vacancies and living and working conditions.

Labour force surveys show a slow but steady increase in EU nationals working in other Member States. However, migration is confined to specific occupations such as managers, professionals or specialised technicians and contracted workers in the building sector, and is most prevalent in border areas where Intra-EC migration increased by 18% between 1987 and 1994.

In fact, there has been no large scale migration of labour within the Community. Increased trade between Member States as a consequence of the Single Market and the fact that capital has proved more mobile than labour have substituted for migration. Cultural and linguistic differences also continue to deter worker relocation.

The Single Market legislative framework is essentially complete in this area. Although significant progress has been made, there remains a need for further efforts at Union level, not least to ensure that the existing Community provisions are up-to-date, understood and applied. It is also clear, not least from the Commission's surveys of the functioning of the Single Market, that some real obstacles - both legal and practical -

still confront European citizens seeking to exercise their rights to free movement and residence within the Union. The Commission has launched a number of initiatives such as the High Level Panel on Free Movement, and "Citizens First!" information action. In order to address these issues the Green Paper "Education, Training and Research: the obstacles to transnational mobility" also analyses remaining obstacles to mobility for students, trainees, the unemployed, reseachers, voluntary workers (whether citizens of the EU or legal residents) and proposes some lines for action.

Community-wide agreement has not been reached on the removal of border controls on the movement of individuals. Progress between the majority of Member States has been on the basis of intergovernmental agreements only. The maintenance of border controls represents national preferences for carrying out identity checks against terrorism, drug trafficking and other public order controls at frontiers, rather than internally. This failure is an impediment to full exploitation of the opportunities afforded by the Single Market.

The Single Market and social policy

The SMP has influenced the EU's social environment, while social policies, at national and Community level, have facilitated the smooth operation of the Single Market. Fears that investment would flow substantially to Member States with lower labour costs, or which have opted out of some elements of the common social policy appear largely unfounded.

Many social measures form an integral part of the Single Market framework. Social security provisions recognising periods of insurance in another Member State and the European Works Councils Directive and the Directive on the posting of workers are among the examples of measures which support the free movement of people and ensure that the Single Market prevents competition based on lowering levels of social protection.

Outright harmonisation of social policies is not a Community objective. However, the realisation of the Commission's 1989 Social Action Programme has led to the establishment of a framework of basic minimum standards, for example in the field of health and safety at work. These provide a bulwark against using low social standards as an instrument of unfair economic competition. The continuing aim should be to develop and improve standards for all the Member States of the Union.

The SMP has accelerated the internationalisation of companies. Multinationals use restructuring and reorganisation across the Community to sustain competitiveness. The expectation of a shift in economic activity towards Member States with low labour costs has also not been borne out. Competitive undercutting of pay and conditions by firms exploiting Member State differences in labour costs or regulations is rare. Most EU and non-EU multinationals admit that except for very specific functions and sectors, for example centralised management for airlines, other factors have been more important in location decisions. In the manufacturing sector, for example, transport facilities or logistics are determinant.

Adequate social security protection is a precondition for use of the right to move within the Union. Without such protection, disparities between the social security schemes of the different Member States would adversely affect people moving across frontiers. Measures co-ordinating the social security schemes of Member States, guarantee that rights to social security benefits acquired or in the process of being acquired under national legislation (for example pensions, health insurance, family benefits) will not be lost when people leave their country to work to look for a job, to reside or to stay elsewhere in the Union.

Consumer interests

The efficiency and smooth functioning of the Single Market depend also on consumers' action and influence. A proper functioning of the market implies that a fair share of benefits will accrue to consumers. An efficient Single Market needs strong consumer organisations with access to clear information and instruments to represent and enforce consumers' rights. The SMP has offered retailers and consumers wider access to cheaper and better products and services.

European consumers, as well as businesses, were meant to benefit from greater competition, lower prices, a wider variety of products and services and new distribution channels. The evidence already presented in Chapter 1 shows that this is beginning to happen. In accordance with Article 100a(3), high levels of consumer protection are embodied in harmonising legislation

Considerable progress has been made. There is evidence of a switch to EU-wide sourcing, particularly in products such as electrical household appliances, branded food and furniture. In manufacturing sectors, such as foodstuffs and textiles, evidence on price levels is inconclusive; in service sectors, such as air transport and telecommunications, price reductions may not be exclusively linked to the SMP. However, the acceleration of price convergence, particularly in consumer goods where quality variation is limited, is due to the SMP. Lower prices and greater price convergence have been inhibited by price controls (particularly for medical and pharmaceuticals products) or consumer preferences for national, regional or local products (particularly for foodstuffs, where only branded products benefited from improved market access).

Consumers have had access to a wider range of products and services, particularly for telecommunications equipment, financial services, and more inter-city flights in air transport.

The benefits of more choice and keener prices have generally not compromised the safety or welfare of consumers. The SMP put consumer safety before the free circulation of goods and services. Open markets might have led to additional risks, for example as a result of variations in standards and of free circulation of imported goods and services. So the SMP was accompanied by the convergence of conformity assessment systems, tougher penalties against producers of defective products and early warning and withdrawal systems for use in emergencies.

The promotion of consumers' interests depends on the availability of clear and correct information on which rational and transparent choices should be based. This is a precondition for the proper functioning of the single market. In this respect, denomination and labelling information should be an effective and proportionate means of informing consumers without being used by Member States to fragment the market and to protect national producers.

Community actions such as those intended to improve access to justice and cross-border applicability of guarantees are critical if consumers are to exploit Single Market opportunities. But because the amounts involved are often small, cross-border law-suits are rarely feasible. The Commission has already proposed some innovative solutions to meet the needs of consumers with genuine grievances so that cross-border shopping can earn consumers' confidence. More generally, consumer policy needs to be integrated into other single market action (such as liberalisation, information, or financial services where consumers still face difficulties in protecting their interests) in order to better take into account and promote consumers' interests.

Environmental protection

Environmental policy and the Single Market are complementary. It is still too early to make a definitive assessment of the environmental impact of the SMP. Better coordinated ar-

rangements for environmental protection and fewer differences between Member States' legislation are essential to avoid new technical trade barriers while ensuring that environmental policy objectives are met.

Article 2 of the EC Treaty provides that the Community shall have as its task, by establishing a common market, to promote, inter alia "a sustainable and non-inflationary growth respecting the environment". Both policies must strive for a more efficient use of resources, including environmental resources, the cost of which must be properly taken into account. The link between these policies recognised in the Treaty is complemented by a widespread recognition among businesses of the need for environmental legislation. For some sectors, environmental requirements have been an incentive for businesses to invest in new environmentally-friendly technologies which have also increased competitiveness.

Prior to the implementation of the Single Market, expectations about the potential environmental impact of the Single Market were quite pessimistic. It is too early to make a definitive assessment and to quantify the environmental impact of the SMP in order to validate or disqualify those fears. However, the studies undertaken for this review estimate important medium-term gains for the environment when Single Market measures in some sectors such as energy are fully implemented. Thus a single energy market is likely to increase gas consumption, far less polluting than other fuels, and decrease CO_2 emissions by 105 million tonnes p.a..

As regards transport, it is difficult to assess the contribution which the Single Market has made to traffic growth in the first half of this decade. However, growth in road freight transport in EU-15 has been around 15% between 1990 and 1994, and average annual growth rates in road freight traffic were slightly higher between 1990 and 1994 than during the 1980s. The environmental concern associated with those trends, in the absence of major improvements in vehicle fuel economy, is the increase in both particulates and CO_2 emissions which makes it difficult for the Community to achieve inter-alia its CO_2 stabilisation and reduction objectives. In addition, increasing traffic puts additional pressures on the environment in transit regions (e.g. the Alps). At the same time, technological improvements made to vehicles under Community legislation, e.g., in harmonised technical specifications introducing stricter emission standards, will at least in the future lead to reductions in air polluting emissions from road transport. Early estimations foresee considerable emission reductions in the field of regional transport of goods. It is also hoped that progress on fair and efficient pricing in transport as well as the proposed revision of the current fiscal framework for heavy goods vehicles (COM/96/331) will result in an additional substantial reduction in emissions. Finally, it is expected that the strategy to revitalise the Community's railways will, in the longer term, strengthen the competitive position of this environmentally more benign form of transport.

Measures to provide for free circulation within the SMP, such as technical specifications, have embodied high levels of protection for the environment, in accordance with Article 100a(3). In 'new approach' legislation, environmental protection and energy-efficiency are often enshrined as 'essential requirements'

However, as in other areas where there is a growing awareness of the need for an adequate regulatory framework to meet the concerns of today's citizens, there is a risk that Member States may adopt diverging legislation in the environmental field which may result in the fragmentation of the single market. A Community framework may in many cases be the best guarantee that actions taken have their full impact and strike an appropriate balance between single market and environmental objectives.

Examples of areas of national regulation which require scrutiny in this context include:

- emissions and hazards which, although partially regulated at EU level (e.g., use of titanium dioxide), is mostly covered by national legislation (emissions of solvents);
- national eco-label schemes, which are currently proliferating in spite of progress with the development of the Community eco-label may lead to market distortions and confusion among consumers;
- waste management regulations, where insufficient enforcement or inadequate implementation have resulted in different requirements for producers at national level.

The Commission considers that the proper integration of single market and environmental policy to ensure the best possible progress towards the achievement of Treaty objectives is a key issue for the Community. Further reflection is needed among European Institutions about how to achieve this balance. The Commission therefore intends to initiate a political debate on this subject on the course of 1997.

THE EFFECTIVENESS OF THE SINGLE MARKET PROGRAMME

The SMP has transformed the conditions under which cross-border business is carried out. Most of the principal obstacles to integration of product, service and capital markets have been removed. Internal political boundaries are no longer strategically important for business.

The process of removal of barriers is more advanced and the legislative framework is more mature for product markets than for services. Distortions of investment decisions and cross-border transactions in some service markets are still widespread. This is partly explained by structural and behavioural impediments, but regulatory or administrative obstacles still apply in some sectors.

In several areas, Single Market rules have yet to be completely implemented. But even here, the necessary structures have been put in place to eradicate remaining barriers and prevent their replacement. These make the recent gains in completing the Single Market irreversible.

The removal of trade barriers and wider commercial horizons have helped to increase options for European businesses. The barriers are coming down and companies can win new market share if they grasp the emerging opportunities. Whether the Single Market will deliver on its promise now depends primarily on the responsiveness of companies to new market openings.

The scale of the challenge

Competition in the European economy was severely limited in the mid 1980s by barriers to trade and investment between the Member States. Cross-border shipments required voluminous paperwork and faced interminable delays at frontiers. Manufacturers had to re-engineer products for each national market. Public procurement markets were shielded from cross-border and local competition; contracts were usually awarded to local suppliers. Service providers were either prohibited from providing cross border services and operating in other Member States or faced insurmountable barriers. Businesses anxious to reorganise on a pan-European footing were confronted with legal and fiscal complications. Exchange controls and other obstacles hindered cross-border financial transactions. The victim of this protectionism was the consumer, who paid too much and had less choice.

The SMP aimed to remove these obstacles to free circulation of goods, services, capital and persons. However, the positive impact of single market legislation may be countered by national regulations which are inconsistent with single market

rules or by anti-competitive business practices. These may stand in the way of the development of efficient product, services and labour markets that can adjust easily and quickly to increased outside competition. Although Member States are responsible for most of the features of the business environment, it is also the role of Community competition and state aids policies to ensure that firms do not engage in anti-competitive behaviour, that the operation of providers of services of general economic interest is consistent with the competition provisions of the Treaty, and that state aids do not distort competition.

This chapter assesses whether legislation to remove obstacles to the free circulation of goods, services, capital and for opening up of procurement markets has been effective, i.e., to what extent obstacles to free movement have been overcome.

Survey results

The economic evidence that the Single Market is working is backed up by the perceptions of European business, which clearly sees the SMP as having removed a series of obstacles to cross-border transactions and as having increased market opportunities. Two major surveys, one involving organisation representing 50% of EU industrial production and 48% of jobs, the other using replies from 13,000 European businesses, confirm this positive perception by industry. The approval rating, however, is higher among manufacturing firms than services (31 to 51% for manufacturing and 15 to 37% for services). The proportion of companies seeing the Single Market as effective is even higher in sectors where non-tariff barriers were most prevalent and onerous (i.e. electrical machinery, food, chemicals, transport). These findings represent business across the spectrum, since the survey was not confined to sectors most directly affected by the SMP.

Larger companies are particularly outspoken in their positive assessment of Single Market integration; 47% of large companies with more than 1000 employees consider that the SMP has successfully eliminated obstacles to EU trade in their sector, as opposed to 38% of firms with 20 to 49 employees. Intervening sizes of firm hold intermediate positions. This pattern is repeated for views on specific measures. Lower levels of enthusiasm on the part of SMEs may reflect their generally more national or local scope. Many sectors most sensitive to the SMP are dominated by higher than average sized firms (telecommunications equipment, electrical machinery, chemicals and man-made-fibres, pharmaceuticals, motor vehicles and machine tools).

Compliance costs are a big problem for most SMEs. Large companies can redeploy staff to deal with the associated paperwork. Smaller companies say that this imposed fixed cost represents a higher proportion of their turnover than that of a larger company. Nevertheless, SMEs in some sectors have expressed positive views about the impact of the Single Market on their activity. For example, in the detergent and cosmetics sector, SMEs have had better access to European markets, and in the construction machinery sector, 29% of SMEs as opposed to 7% of large firms feel that the Single Market has encouraged them to sell abroad.

Within this broadly positive picture SMP effectiveness varies. The Commission's findings are summarised under the headings of products, services, capital and public procurement liberalisation.

Products

Single Market legislation has assured the free movement of most products and the new regulatory system is generally welcomed. Border controls have been successfully abolished. Implementation of the remaining Directives will enable full exploitation of the benefits. The principle of mutual recognition is difficult to apply in practice but the problem is being addressed. More European standards are needed to eliminate non-regulatory obstacles to market access. On the whole, producers can now confidently work to product specifications for a Single Market.

It is above all in the market for manufactured products that, in contrast to the situation that prevailed a decade ago, the dimensions and the characteristics of the Single Market can be seen emerging. The two outstanding contributions to this change situation are the abolition of customs and fiscal formalities and the elimination of technical barriers to trade.

Abolition of customs and fiscal formalities:

Changes in customs and fiscal procedures have reduced by two-thirds the supplementary cost of cross-border-shipments, eliminated 60 million customs forms and allowed for an 85% decrease in the number of Community transit movements. These savings amount to about 0.7% of the value of intra-EU trade, or 5 billion ECU per annum. Traders now regard the change as generally beneficial, although adjustment costs and current arrangements for fiscal declarations on cross-border transactions are seen as cumbersome. In general, traders welcome the abolition of physical stoppages at internal frontiers. However, two-thirds of respondents to a special survey regard the present VAT payments system as transitional and want an origin-based system.

Abolition of technical trade barriers:

The greater part of Community trade in products is subject to legally binding specifications or tests with which they must comply before being placed in the market. In the past, these mandatory requirements (over 100,000 of them existed in 1985) were defined at national level, excluding partner country products from the market unless they were re-engineered or tested to local specifications, possibly at considerable cost. There are now signs that business believes that technical harmonisation and mutual recognition, introduced to remove the barriers, have been effective. In key product sectors (chemicals, mechanical engineering, office equipment, foodstuffs, motor vehicles), 35 to 50% of respondents to the Eurostat survey regard the technical harmonisation and mutual recognition measures as effectively overcoming technical barriers.

The measures introduced have been based on a number of distinct elements. It is useful to consider them separately. Most have had considerable success, but they have also had their difficulties.

Detailed harmonising legislation cover products accounting for some 30% of industrial output. Endorsement of efforts to remove barriers in these sectors, including chemicals, pharmaceuticals, and motor vehicles has been particularly marked.

- New approach Directives cover at least a further 17% of output. Where the measures have been in force for some time, as with the Pressure Vessels Directive, they have been favourably received. The new approach is distinctive because of the choices it offers to the producer as to the technical solution chosen and as to the choice of any test or certification body. It is therefore perhaps unsurprising that anxieties seem to focus around the early days of operation of the Directives and how this flexibility is to be interpreted in practice.
- Harmonised European Standards offer optional fast track compliance with new approach Directives. Some problems have been experienced due to delays in the delivery of the standards. This reflects the time-consuming nature of standards writing - on average it takes 5 years for the private sector standards bodies to draft and obtain consensus on a European Standard. Notwithstanding notable shortfalls in areas such as construction products, the standards bodies have made rapid strides in adapting to the surge in demand. It is expected that the bulk of the standards required for the operation of the new approach legislation will be in place within two years. 80% of standardisation now takes

place at European or international level, as compared to 80% at national level only 10 years ago. The onus will be on European industry, if it wants the harmonised standards, to provide sufficient resources to finish the job.

- The SMP offers producers increased flexibility to choose bodies for test and certification. There has been a shortage of choice of such bodies in some sectors and in some Member States. Much depends on the diligence of the Member States, both in expediting the notification of suitable bodies and in ensuring that a uniformly high standard of performance is met.
- Un-harmonised national requirements affects some 25% of output. Market access for these products depends on mutual recognition and this is proving difficult to enforce in a way which guarantees access to all Member State markets. The entry into force in 1997 of a new notification procedure for national measures restricting market access should reduce uncertainty about the application of mutual recognition.

Despite these caveats, the surveys make clear that the Community has succeeded in establishing ground-rules and an institutional infrastructure which is capable of delivering a technical barrier-free Single Market.

Further, this progress has been based on high levels of health, safety, environmental and consumer protection. Only rarely have national authorities contested these as being insufficient. Fears expressed in the early days of the SMP have proved groundless; improvements in free circulation have been achieved without putting these overriding requirements at risk. The Commission's use of independent scientific advice when preparing harmonisation measures intended to protect public health has certainly made a big contribution to this. Its independent scientific committees have been particularly useful. Recourse to such advice in the management of Community rules will help to prevent problems and to provide rapid and effective responses to those problems which do emerge.

Even where regulatory problems have been resolved, some producers have experienced difficulties in persuading economic operators to accept the results of conformity assessment from bodies which they do not know, or the adequacy of voluntary national standards and marking requirements with which they are unfamiliar. The Commission encourages market-led initiatives to remove obstacles to mutual recognition and inter-changeability of marks or to develop common European standards and marks. But this is not a regulatory problem. Only a change of customer attitudes can overcome this non-regulatory technical barrier.

Yet this shows how far consumer confidence is crucial to the operation of the Single Market. For the market to work well, customers need to be sure that products do indeed meet the requirements for placing on the market. This is especially so for those with which they are unfamiliar. This confidence could be undermined, in the Single Market, by a suspicion that products could be placed on the market in another Member State and then circulate freely without being in conformity, either because the common technical specifications had not been implemented there, or because the lack of an adequate mechanism for detecting and punishing false declarations of conformity, inadequate controls at external frontiers, or inadequate supervision of test procedures. The achievement of free movement has reinforced the need for agreed inspection and surveillance procedures to prevent such concerns from arising. More attention to this area is needed in the future management of the Single Market.

Services

The Community has established a basic legal framework in many service markets. The most obvious restrictions have been removed. But legislative measures have only been coming on stream since 1993. Delays in transposing the new rules into national law have impeded progress (e.g. insurance). Further measures may be needed, particularly for financial services.

More effort has been needed to integrate service markets than products. The measures aimed to eliminate deep-seated unchallenged obstacles to cross-border provision of services and establishment in partner countries. Prior to the SMP, national markets were segregated through quantitative restrictions on trade, by means of outright prohibitions on competition from non-domestic suppliers (road freight transport) or privileged treatment for them (air transport). Other requirements in national regulations increased the cost of entry or establishment (financial services) or deterred cross-border provision of services (insurance).

The SMP aimed to separate decisions on market access from technical rules on supervision, market stability, safety and consumer protection by setting minimum EU licensing requirements for operation (subject to 'home country control'). In other sectors, where services could be offered across borders, harmonisation of general interest provisions was necessary to allow for the home country control principle to be applied. In professional or regulated services, where the right to practice is often conditional on holding specified qualifications, the approach of the "mutual recognition" of equivalent qualifications was pursued.

Services targeted by the SMP account for over 50% of jobs and added-value in service sectors, including sectors with high growth and job creation potential. Other service sectors have been indirectly but significantly affected. The physical organisation of distribution and shipment networks has been transformed to meet the needs of an integrated market. These market services contribute to other sectors: every 100 ECU of industrial output embodies 20 ECU of service inputs.

Table 1 shows the effectiveness of EU measures for services sectors as perceived by economic operators. The SMP has successfully removed most of the targeted restrictions. In road freight, air transport and telecommunications liberalised services, operators can now freely provide services across borders. Removal of the restrictions has fundamentally changed operator capacity to win custom in partner countries. Between 1990 and 1995, there has been a 300% increase in the volume of road transport services delivered by partner country hauliers within the territory of individual Member States. This has allowed for more efficient provision of pre-existing volumes of haulage services. In air transport, new alliances and new market entrants are removing rigid structures, to the benefit of consumers. In banking services, the introduction of the 'single banking licence' has substantially reduced the cost of establishment in partner countries; cross-border branches have increased by 58% in the 2 years since the legislation entered into force.

In telecommunications, the liberalisation of telecommunications equipment, data and value-added telecoms services, satellite services and, from 1996, mobile communications and the use of utility-owned networks and cable TV networks has removed barriers to investment and led to lower prices and better service. In isolated instances, however, such as insurance, the measures have not yet succeeded in opening up national markets. The approximation of legislation undertaken to date still contains some loopholes which are used to hamper cross-border provision of services or establishment (such as national rules on protection of the "general good" in financial services).

These problems, discussed further in Chapter 4, require case-by-case examination and further measures may have to be taken to remove remaining restrictions. Furthermore, the Commission is concluding consultations on the 'freedom to provide services' and 'general good' provisions of the Second Banking

Directive and a Green Paper consultation on Consumers and Financial Services. More general initiatives may be needed, especially in the area of new Information Society services.

Capital

Almost all impediments to free movement of capital have been removed. Remaining national restrictions derive from taxation law or prudential controls in the financial services field and are not a serious impediment, except for continuing restrictions on investments by pension funds; However, the lack of a harmonised approach to taxation of income from capital remains a major distortion of the market.

Capital restrictions on long-term investment flows and commercial transactions have long been abolished. Directive 88/361 introduced complete liberalisation of capital movements in the EU from 1990 (all derogations have now expired). In 1993, controls on exchange and financial transactions were removed. The adoption of new Treaty provisions prohibited all restrictions on capital movements and payments between Member States.

These freedoms are qualified by Member States' right to restrict capital transfers where permitted by their fiscal law or to ensure application of national prudential controls in the area of financial services. These rights are used by some Member States for different financial markets; ten Member States have entered reservations within OECD against freedom of establishment and operation of branches of foreign insurers, banks and other financial institutions.

The most significant restrictions affect investment undertaken by pensions funds. six Member States currently restrict a range of pension fund investments. Where restrictions go beyond prudential necessity, they amount to breaches of the Treaty and prevent the maximisation of returns for both the fund's members and the employer. Technological advances and the global freedom of capital movements make a single capital market crucial to EU competitiveness, growth and jobs.

Flows of capital are also distorted by national differences in the tax treatment of income on savings and the tax deductibility of life insurance premiums and mortgage interest payments. It should be recalled that Directive 88/361 also referred to the need for fiscal harmonisation, the absence of which may give rise to distortions in capital flows that are likely to be accentuated by a single currency.

Despite these constraints, almost all formal impediments to free circulation have now been eliminated. The outstanding OECD 'reservations' are limited to certain financial instruments and geographical areas and, except for pension fund restrictions, do not apply to a large volume of capital market transactions. Between 1984 and 1994 the volume of foreign assets and liabilities held by investors or owed by borrowers in other Member States doubled. In the UK, for instance, outward portfolio investment stocks rose from 6 to 60% of GDP between 1979 and 1993, whilst the inward stock rose from 6 to 42% of GDP over the same period. In countries such as France, Italy and Spain, where capital restrictions were previously significant, the Single Market has led to the removal of liquidity constraints. Demand for borrowing by investors can now be more easily met by capital inflows from partner countries and returns on capital investment across the EU are steadily converging. In addition, capital market liberalisation has reinforced the pressure on national authorities to comply with fiscal and monetary disciplines.

Public procurement

For the full benefits of procurement liberalisation to be achieved, more effort is needed both from national public authorities to implement the Directives and from purchasing entities to apply them to their procurement procedures. It is also necessary to improve access for suppliers. Where public purchasers and firms seeking to do business with public entities have applied the liberalised framework of Community rules, they have in some cases brought economies to public budgets and new business to dynamic enterprises.

Open competition in public procurement is the key to a vigorous enterprise economy and successful Single Market. Public procurement accounted for 11.5% of EU GDP in 1994, or ECU 721 billion (the combined size of the Belgian, Danish and Spanish economies or ECU 2,000 per citizen). About 110,000 of EU public authorities are estimated to be required to follow public procurement procedures.

Even though the overall figure of 10% import penetration of procurement markets is disappointing, 15% to 25% of products like office machinery, medical equipment, telecoms equipment and motor vehicles are now procured from suppliers in other Member States.

On the supply side, a Commission survey of 1,600 procurement active suppliers showed high response rates to new market openings (of 90% and 70% to domestic and cross-border opportunities respectively). Tenders for new cross-border opportunities led to 44% winning new business and 31% selling to authorities in other Member States; 36% reported increased domestic competition. This reflects the increase in transparency in the market: the number of tender notices published in the Official Journal of the European Communities increased from 12,000 in 1987 to 95,000 in 1995.

But these results still fall far short of the total potential benefits. 85% of public authorities, many of which are very small and engaged in limited volumes of procurement, are not publishing tenders.

One of the reasons for this under-achievement is of course the substantial delay in incorporating the 11 procurement Directives into national legislation and enforcing them effectively. Only 72% of the national implementing measures required have been taken. There are 39 procedures currently in motion for lack of implementation, or unsatisfactory implementation of the Directives. Overall, only 3 Member States have completely and correctly transposed all the Directives. The European Council in Florence singled out the procurement sector as requiring an acceleration of national transpositions efforts. Market surveillance and enforcement remain a serious issue.

For its part, the Commission is considering such issues as effective application and enforcement of the legislation; how market access can be improved by information, training and electronic procurement; how the application of public procurement law can also take account of other policies on Trans--European Networks (TENs), SMEs, the Cohesion and Structural Funds; and access to third countries' procurement markets.

REMAINING OBSTACLES TO FREE MOVEMENT

If the Union's efforts to complete a Single Market have largely been effective, there are no grounds for complacency. It is inevitable in a project as complex as the SMP that problems will be encountered in the definition and implementation of the new ground-rules.

Ineffective implementation, enforcement and redress

Agreed Community rules must be put into law in every Member State and applied effectively and fairly. Regrettably this is not always the case. Member States have not yet fully delivered on their commitments.

The Commission has been actively pursuing these shortcomings, in particular by opening formal infringement procedures against Member States which do not fulfil their obligations, but the real remedy is more determined action at the national level. This review also confirms the diagnosis

of the Commission's Strategic Programme for the Internal Market (1993) that the lack of consistency between legal systems in the individual Member States affects the exercise of Single Market rights.

Transposition

Although the transposition rate for Single Market measures is steadily improving, with an average rate of 90.% for EU-15, inadequate transposition is still a concern. 56% of the 1985 White Paper measures have been transposed in every Member State. Substantial delays have occurred and poor quality transposition is also preventing business from fully exploiting the potential of the Single Market.

Member States may also use different transposition techniques, which can result in legislation which, after transposition, leads to legal uncertainties and problems of interpretation. The result is that interested parties may have to cope with different requirements, according to the Member States in which they operate, which leads to high compliance costs. Typical examples are public procurement and recognition of diplomas. But the costs do not only fall on businesses and citizens; recent Court judgements have shown that Member States can under certain circumstances expose themselves to substantial claims for damages by inadequate transposition.

Enforcement

Uneven enforcement of EU legislation is often regarded as the most persistent barrier to trade or fair competition within the Single Market because overcoming it entails close scrutiny of national, regional, or even local practices. What is needed, above all, is mutual confidence between the Member States. Yet enforcement methods are far from harmonised across Member States, leading to two major concerns:

the risk of exploitation of inadequate enforcement by some producers or service providers, which will undermine the high level of protection which the legislation aims to uphold; and distortion of competition between producers as a result of differences in the way that enforcement is carried out. Business is complaining about the uneven and sometimes allegedly discriminatory application of controls, both between and within Member States.

The lack of familiarity with, and consequent incorrect application of, Community law by national civil servants is a frequent cause of complaint from both businesses and individuals trying to exercise their rights in the Single Market.

There is a pressing need to ensure effective and equivalent enforcement in every Member State, if necessary by adopting new rules, for certain aspects of harmonised product legislation. In the area of harmonised product legislation, particularly where the producer alone is responsible for assuring that his product conforms to the law, effective market surveillance is required to deal with such subjects such as mutual assistance between control authorities, information exchange, common control programmes, audits, training and data-bases.

Another kind of enforcement problem may arise in areas where market opening relies on the 'mutual recognition' principle. Inspectors in one Member State may have difficulty in identifying the requirements with which products or service providers must comply or in assessing the conformity of the product or service provider to those requirements. There is a need for more exchange of information about national regulations and related conformity assessment procedures.

Redress

The absence of effective remedies may hinder the correct enforcement of Community legislation. The provision of effective remedies requires a chain of mechanisms, from the capacity to identify a defective product to the willingness and ability to take measures to remove it from the market and, if appropriate, impose sanctions.

Redress can be sought by private parties through the courts but here, too, there are barriers. The absence of effective judicial remedies to enforce Community legislation may hinder redress. Common measures to guarantee proper enforcement of harmonised law by the courts have sometimes been introduced (e.g. for the Community Trade Mark), but elsewhere the enforcement of the liability of the State by private parties in civil actions may be limited. In some cases, it is unrealistic to expect individuals with limited resources to take action before national courts. Even when such action is taken, the degree of awareness of Community law among legal practitioners is sometimes very low.

Gaps in the legislative framework

Eleven years after the 1985 White Paper programme was agreed, a 'hard core' of its proposals still remains to be adopted, and market liberalisation in sectors which were not covered by that programme has not been completed. Some adjustment of existing measures is also needed to clarify and, in some cases, simplify Community rules.

(a) Non-adoption of White Paper measures

The main stumbling blocks are in key areas affecting business management, such as company law, and corporate taxation, financial services and the liberalisation of the transport and energy markets. In particular, the failure of the European Union to put in place a consistent and simplified taxation system at EU level or to remove discriminatory provisions which create distortions between Member States' tax regimes has prevented companies from conducting operations as a single, integrated Union-wide business. This, in turn has inhibited their contribution to higher employment. The importance of these problems is consistently confirmed in submissions from business organisations.

The areas in which the original Single Market agenda has not been delivered are:

Company taxation

A more coherent approach to the tax treatment of company income within the Single Market is long overdue. There is still no policy framework for eliminating all forms of double taxation on, and other possible obstacles to, cross-border income flows within the Single Market. Such a framework would also prevent tax losses as a result of cross-border arbitrage, avoidance or evasion. Problems often referred to by business, which are only partly covered by current Commission proposals, include the absence of a common system for EU-wide consolidation of losses within groups, the tax treatment of permanent establishments compared to domestic companies, the persistence of withholding taxes on interest and royalty payments within groups of companies as well as for intercompany dividends, and the uncompleted network of "bilateral conventions".

Approximation of taxation treatment of investment income

The current co-existence of 1different national systems of taxation for investment income and the current distortions between residents and non-residents which prevail in some countries lead to distortions in capital movements.

An origin-based VAT system

Many of the concerns voiced today do not in fact stem from the transitional regime but rather from difficulties with the Community VAT legislation. The present system is based on physical monitoring of the movement of goods and as such is no longer suited to modern business practices. In addition, special arrangements, options and powers allowed by Directives, together with derogations and differences in implementation of common provisions, have led to divergence in the way the common VAT system is applied. The recently-proposed work programme for an origin-based VAT system aims

to get rid of these problems by removing any distinction between domestic and intra-Community transactions and providing legislation which can be applied and enforced equitably throughout the EU.

Company law

Cross-border mergers are still hampered by legal problems. Two unadopted proposals (the tenth Directive and the European Company Statute) would complete the legal framework and allow companies to reap considerable cost savings through simplified organisation and administration. This is a high priority for facilitating business in Europe. The adoption of the proposed framework Directive on take-over bids would provide several means of guaranteeing minimum standards of protection for shareholders in case of take-overs. This measure does not tackle structural barriers to take-overs but could provide a framework of greater legal security which would make it easier to address these other obstacles later.

(b) The need for adjustment of existing measures

This review has identified some instances where existing measures do not meet the needs of economic operators wanting to engage in cross-border transactions, either because of imprecise provisions or narrow scope.

Unclear legislation

Some SMP rules have resulted in divergent, occasionally even conflicting, interpretations in the Member States. Lack of clarity in the public procurement Directives has led to some enforcement problems. Other sector-specific measures (machinery in the work place, the "leased line" Directive, and the transparency Directive for pharmaceutical products) have also given rise to problems of interpretation.

In the foodstuffs sector, questions have arisen about the balance between harmonised and non-harmonised measures and about the interaction of the various legislative texts. The Commission intends to address these issues, amongst others, in a wide-ranging Green Paper on Food Law.

Limited scope

In a few cases, Single Market legislation has not adequately covered all barriers to trade or anticipated new developments in the market as for example the difficulties caused by the absence of a single authorisation procedure for insurance intermediaries or national installation rules in respect of certain industrial products.

Over-complicated rules

In a limited number of cases, the implementation of the SMP has generated additional costs for business, of two kinds:

- the first is short-term, transitional costs of change to harmonised systems and new technical requirements (such as the need to prepare and translate documentation for compliance with Machinery Directive);
- the second is the cost of excessively complex and detailed regulation, which forces companies to invest substantially and on a permanent basis in order to comply. For example, INTRASTAT imposes relatively high reporting requirements on traders compared to the previous system. Current arrangements for indirect taxation can be burdensome in respect of the place of supply, the need for fiscal representatives and the introduction of special schemes for distance selling or new means of transport. Both of these issues have now been addressed by initiatives taken by the Commission, namely the SLIM initiative and the recent proposal of a work programme for a new common VAT system.

Old and new obstacles at national level

Simplification of national rules would contribute to a more efficient Single Market. The successful abolition of the "first line" of market-fragmenting measures has increased the importance of removing remaining national regulatory obstacles to cross-border transactions.

While national rules may serve public policy objectives, they are not always proportionate to the desired objectives and some may be protectionist in effect. Many of these obstacles were familiar to the architects of the original SMP.

An illustration can be found in the pharmaceuticals sector, where national regulations in respect of price and reimbursement schemes delay access to national markets and may be used to encourage local products.

Uncoordinated technical legislation aimed at protecting the environment and consumers is frequently seen by business as a complication in the Single Market and a reason for a greater degree of harmonisation of rules. In some cases, the problem may be linked to shortcomings in existing EU legislation as, for example, in waste recovery, where there is little restriction on the type of measures that Member States can adopt. In others, Community rules have been overtaken by additional, more stringent specifications at national level. Such differentiation has a significant impact on smaller companies seeking to enter new markets. Although many of these measures can be justified by Treaty provisions, they may sometimes be out of proportion to their objectives. Invocation of the subsidiarity principle and recourse to Article 100a (4) to justify the maintenance of national environmental protection measures also worries some sectors, particularly chemicals, although to date recourse to Article 100a(4) has been limited to a handful of cases with limited trade effects.

The advent of information society services is also bringing with it the risk of uncoordinated national initiatives to address public policy concerns. The Commission has recently made a proposal for mechanisms to reinforce regulatory transparency in the single market for information society services in order to ensure a more co-ordinated approach where necessary.

More generally, the persistent tendency of some Member States to prescribe detailed technical regulations for products represents a constant threat to the Single Market; on average more than 450 new national technical rules for products are notified to the Commission every year. There is little sign yet that Member States are ready to observe the self-discipline in rule-making that they advocate so vociferously for the Union.

Management of Community Legislation

(a) Scientific expertise

The objective of the management of technical regulations is to keep the protection of the health and security of EU citizens and of the environment at a high level. Directives therefore need to be adapted according to the latest scientific knowledge.

The efficiency of regulations depends on a fast decision making process; the food additives case provides an example of the difficulties which arise when procedures are excessively slow and cumbersome.

The adaptation of directives should be based on independent scientific evidence in respect of relevant processes, production methods, inspections, sampling and testing methods.

The Commission has a number of scientific committees involved in the preparation of proposals. In order to strengthen the credibility of their decisions, these bodies need to be reinforced in their autonomy, structure and composition.

The availability of scientific knowledge at Community level is a requirement for legislation guaranteeing the best possible protection of health, security and the environment, but it also enables the Community to react to new challenges demanding new regulations, in order to prevent the appearance of new obstacles to trade. The Commission will increasingly make

use of scientific expertise available from its Joint Research Centre to contribute to questions related to the protection of health, security and the environment.

(b) The external aspects of the Single Market

The development of internal Community legislation is not independent from the actions of the EU in the external sphere:

- Member States' commitments in international negotiations can affect their commitments towards the Community and vice versa;
- it is in the interest of the Community to base internal legislation on the outcome of progress achieved by international bodies in so far as the standard guidelines and recommendations of those bodies are scientifically justified and capable of meeting the Commission's specified levels of health protection.

The Single Market implies that the EU needs to negotiate coherently in international trade matters in order to achieve further market openings through bilateral or multilateral means such as Mutual Recognition Agreements in the field of recognition of conformity assessment results.

The Single Market is also a critical factor for the promotion of the global competitiveness of European business: firms have to operate in a wider market, thus prompting rationalisation of operations, reduction of costs and innovation and diversification of products; the introduction of competition in upstream activities leads to a reduction of costs for inputs; and the increased competition that they face in their own sectors pushes business to become more efficient and cost competitive, and to offer higher quality products and services.

The Single Market and services of general interest

Efforts to establish a Single Market in services of general interest, where Member States have traditionally awarded special or exclusive rights to designated suppliers, have made significant progress but are still incomplete.

In telecommunication services, value-added services have already been liberalised and the deadline for liberalisation of voice telephony and infrastructures is imminent. In these areas, the definition of transparent rules to guarantee access to networks under fair and competitive conditions and to promote consumer interests, and subject to guarantees for certain regulatory objectives, such as the provision of universal service or technical requirements for inter-operability, is currently receiving much attention.

In energy, although important steps were made in the early 1990s in the form of the Directives on transit and price transparency, efforts at market liberalisation are only now coming to fruition. A common position for a Directive concerning common rules for the Single Market in electricity was agreed in July 1996 which foresees limited but progressive market opening and competition and introduces the element of customer choice, thus breaking existing monopoly situations. Progressive market opening will liberalise one-third of each national electricity market after a period of six years. Substantial benefits for all consumers can only be expected from full liberalisation: additional gains for consumers would amount up to ECU 10-12 billion per annum, an equivalent of ECU 30 per inhabitant - or twice as much as gains anticipated from the opening already agreed. The introduction of third party access in gas would also lead to savings of 900 million ECU per annum for consumers and substantial additional gains could result from increased gas-to-gas competition.

Further attention to the regulatory framework for liberalisation will be required if the full benefit from integration is to be reaped. Competition rules will be a key tool for regulating the market (both through ex-ante guidance and case-by-case application). In the transition to effective competition in sectors where access to networks is important, action on two fronts will be needed:

- agreement on common rules to provide transparency in the behaviour of network operators and clear criteria regarding conditions for access to the network and the services provided over them;
- rigorous application of EU competition rules alongside implementation of the regulatory framework.

Effective liberalisation would be assisted by the separation of regulatory responsibilities and operational activities. The application of the principle of the Single Market to rail transport and to postal services should also result in significant cost reductions and consumer benefits.

A RENEWED COMMITMENT TO THE SINGLE MARKET

In this concluding chapter, the Commission puts forward the basis for a new political commitment to the Single Market. This constitutes a call to action to all parties concerned with making the Single Market a success: the national authorities in the Member States, the economic agents for whom the market has been created and the Institutions of the Union.

The Commission identifies the main areas to be addressed in order to achieve full commitment to the Single Market. This will involve, in the first place, living up to commitments already entered into, including:

- effective application and enforcement of existing Community law;
- reducing the burden of over-regulation, particularly, but not exclusively at national level, which still impedes the operation of the market; and
- filling in the few important gaps in the Single Market to meet objectives that were set in 1985.
- It will also require a new commitment to meet new challenges.

Effective application and enforcement of Community law

Proper enforcement of common rules across the entire Single Market is the major priority. This issue is widely perceived as a problem by businesses and individuals, who suffer from delays in implementation of the law in some Member States, and variations in its interpretation and enforcement from one Member State to another. But it is also important for ensuring equivalent levels of safety and security throughout the Union. This may require change in the administrative and even judicial culture in each Member State.

Enforcement issues present a growing challenge and should be given greater attention at the political level. All parties concerned should be ready to consider a more innovative approach, to include the following programme:

- Specific initiatives to strengthen Community rules: more effective rules for enforcement are required and in particular a strengthening of market surveillance of compliance with Community requirements.
- A framework for enforcement policy: Member States should be more open in discussion of enforcement and be ready to exchange detailed information about their enforcement structures, procedures and problems.
- Audits of national enforcement measures are needed in order to establish a high level of mutual confidence between enforcement agencies in the Member States.
- Mobilising scientific and technical expertise: more systematic recourse should be made to independent scientific and technical expertise

- Speeding up infringement procedures: rapid follow-up to well-founded complaints and where necessary the pursuit of infringement procedures against the Member States will be given high priority.
- Better enforcement instruments for the Single Market, as well as wider involvement of national courts in enforcement.
- Monitoring the operation of the Single Market, should be stepped up by improvement of national collection of statistical data on services and greater use of the Commission's network of Euro-Info Centres.

Reducing over-regulation

Some national legislation untouched by the SMP is still a significant and perhaps unnecessary barrier to market access and cross-border operations. Specific measures are needed to increase the visibility of such legislation and to simplify it where possible. Action already underway to simplify Community legislation for the Single Market should be extended.

(a) Community rules:

The Commission has already launched the SLIM (Simpler Legislation for the Internal Market) initiative which aims at the development of ideas for the simplification of Community Directives and, where appropriate, the national rules which implement them. A report on four areas (INTRASTAT, construction products, ornamental plants and recognition of diplomas) will be presented to the Council shortly. On the basis of these results the Commission will define the working method and scope of further work.

(b) National rules:

The following measures should be considered:

- A Register of national market-fragmenting measures, which will allow a review at Community level of national legislation which is alleged to obstruct the Single Market.
- Reduction of administrative burdens arising from Member States' regulation, in particular measures to address the issues of simplification of the start-up phase for business.
- Exchange of information, in particular about Member States' experience in reviewing their own regulations in order to assess the need for them or to reduce their costs.

Completion of the legislative framework at Community level

There are a few important gaps in the legal framework necessary to ensure the free movement of goods, services, capital and persons. These result either from a failure to act on proposals already made or from new developments in society which make common rules necessary.

(a) Finishing off the 1985 White Paper:

A number of key elements in the White Paper blueprint have yet to be implemented. The outstanding gaps are critical to furthering growth, competitiveness and employment and in ensuring the full participation of citizens the Single Market. Proposals have been presented to the Council in respect of a number of key areas:

Measures to ensure the free movement of persons: The legal framework necessary to ensure the free movement of persons is not yet in place. In political terms the persistence of border controls on persons at some internal frontiers, if not all, is the most important failure of the SMP. Proposals for three Directives necessary for the removal of border controls are before the Council and Parliament and must be acted upon. The Commission may also wish to propose additional measures to improve further the right for persons to move and reside freely within the territory of the Community. Further work is also required to facilitate the acquisition and preservation of entitlements to social benefits.

Taxation issues: This report has highlighted a number of areas in which the absence of a common or coordinated approach to taxation constitutes an impediment to the operation of the Single Market.

- A common system for Value Added Tax: Until the distinction in the tax treatment of "domestic" and "cross-border" operations is removed it will not be possible for business to treat the entire Single Market as its home market. The Commission has recently put forward a multi-annual work programme to achieve this objective.
- Eliminating double taxation and other obstacles to cross-border income flows: Lack of progress on the harmonisation of the tax treatment of companies or individuals operating in more than one Member State has been one of the most conspicuous failures of the original SMP. It also represents a serious obstacle to the generation of more jobs.
- Approximation of taxation of investment income: Different national systems of taxation of investment income are still leading to distortions in the Single Market for capital.

The creation of a European company law system: The absence of a Community-wide company law system imposes additional costs on the significant minority of firms wishing to be established in more than one Member State.

Adjustment of existing legislation: Some internal market legislation contains unnecessary ambiguities or complexity. The main areas for immediate action are construction products and financial services; others will be identified in due course.

(b) A Single Market for tomorrow's economy:

The needs of the information society: As national authorities seek to establish rules for the operation of information technology-based services, they may inadvertently re-fragment the Single Market. The Commission will present an action plan considering, inter alia, legislative measures necessary to ensure the functioning of networks for the communication and transmission of information, or the possibility of extending the principle of 'mutual recognition' of national rules to these emerging markets.

Biotechnology: Biotechnology provides the key for developing a wide range of new products, while ensuring safety and the protection of health in the fields of medicine, agricultural products and foodstuffs. Without common science-based legislation compatible with the Single Market, European research and exploitation of its results will be discouraged and placed at a disadvantage compared with its competitors.

Specific initiatives for services: The importance of services for the Union economy (about 70 per cent of employment) means that additional measures may be needed to overcome the obstacles to the cross border provision of services or establishment.

A single energy market: After evaluating the experience gained in the first phase of market opening, the Commission will propose the final steps required to build a real single market for electricity. Building on the success demonstrated by the unanimous common position of the Council on electricity, similar efforts are now being initiated to liberalise the gas market.

Complementary action at Community level

A legal framework is not enough for a Single Market. Other policy instruments will have to come into play in order to promote full use of the Single Market; first and foremost, a single currency.

A single currency: The Euro is the most important means of consolidating and increasing the efficiency of the Single Market. It will not only reduce transaction costs and remove the exchange risks associated with cross-border trade and inves-

tment, but also increase price transparency, thereby enhancing competition.

Employment and social policy: The Community should support national training and active labour policies, notably through the European Social Fund. Community social policy will also continue to ensure that free movement of persons is not hampered by national social policy measures and that high social standards can prevail in the Single Market.

Competition policy: The introduction of a Single Market requires even greater vigilance in the implementation of competition policy. The current framework may need to be reconsidered in respect of streamlining Community guidelines on state aids.

Tax policy: In its recent report, the Commission, taking into account the views expressed by members of the High Level Group of personal reprepresentatives of Finance Ministers, gave its assessment of the need for a coherent overall tax policy at Community level.

Information policy: The Commission is already implementing a number of initiatives, such as the 'Citizens First!' information action, to meet the growing need for permanent access to information about individual rights and opportunities in the Single Market and clear sign-posting to problem-solving contact points in national and local administrations.

Environmental policy: The Single Market is based on sustainability and adequate protection of the environment. Uncoordinated national initiatives may run the risk of achieving sub-optimal effectiveness in terms of environmental policy as well as impeding the benefits of a Single Market. The Commission is determined to improve the integration of environmental policy within the Single Market.

Enterprise policy: The Multi-annual SME Programme can assist smaller firms in the Single Market, notably by the improvement of the business environment and the Europeanisation of business strategies for SMEs, through the provision of information and support services providing transnational co-operation opportunities.

Trans-European Networks: Infrastructure networks need to be integrated to accommodate the increasing mobility in goods, services and people. Public and private resources can jointly accelerate the development of trans-European infrastructures. Overcoming the barriers to such public private partnerships should be a priority for the Community.

Research and innovation policy: Community Research, Development and Technology policy contributes to the scientific knowledge necessary for the implementation of the Single Market in a number of fields (health, standardisation and telematics). The progressive development of Community innovation policy will help to create the conditions for a better use of the opportunities created by the Single Market, notably through high-technology start-ups.

Consumer policy will need to enhance consumer interests, especially in respect of financial services, services of general interest and the Information Society.

Conclusions: the need for a renewed commitment to the Single Market

The Single Market under the impetus of decisions already taken will undergo important developments in the coming years. This Communication has shown how far the Single Market has already fundamentally modified the economic and political environment within the Union.

- On the economic front, many of the expected benefits of a Single Market without internal frontiers are beginning to make themselves felt, in terms of increased competition between firms, industrial restructuring, lower prices and more choice for consumers. Although the overall economic effect of these changes has so far been relatively modest in terms of extra economic income or extra jobs, a process is well under way which will yield increasingly important dividends in the future. Business is getting more competitive at the international level - as the growing foreign direct investment in the Union shows. The strategy of European businesses is also changing to become more oriented to a wider market.
- Politically, too, the existence of a Single Market has radically altered the framework for national decision-making on matters which affect the market. The new mobility of economic resources means that national rules increasingly need to take account of these market effects. In addition, the inter-dependence of Member States in ensuring that the objectives of common legislation are met has increased. In a market without internal frontiers the protection of security, safety and health are indivisible; the effective enforcement of the law has become a common, rather than a purely national concern.

The Single Market remains politically centre-stage as a key instrument by which the current priorities of the Union can be delivered.

- First, jobs. As the Commission indicated in the Confidence Pact, making the most of the Single Market is the first step towards generating employment in the Union. Increased competition generated by open markets is the key to international competitiveness which will secure the livelihood of our citizens in the longer term. Already there are signs that the existence of the Single Market is beginning to make a positive contribution to overall employment levels in the Union, even during a severe recession. A more favourable economic climate should produce even better results in future.
- Second, the Community is faced with the trend towards the globalisation of the world economy. The move to the Single Market represents by far the most extensive and successful example of the elimination of barriers between national markets. If the momentum is sustained, both at the level of the market framework and of business adaptation to it, then the Community will be well placed to influence and exploit the wider opportunities which globalisation will offer. Progress towards the extension of the Single Market to services of general interest will accelerate this trend, as will the effects of full entry into force of the legislation already in place.
- Third, the achievement of EMU will contribute to the efficient operation of the Single Market by elimination of transactions costs and exchange risk of cross-border payments and by eliminating the sub-optimal allocation of resources to which currency fluctuations can give rise. But the Single Market, by promoting convergence and a more economically homogeneous environment, will contribute to the conditions for the success of EMU.
- Fourth, the Union commitment to develop its relationship with the Central and Eastern European Countries (CEECs), through the Europe Agreements and through negotiations for enlargement, places the take-over of the acquis of the Single Market by the CEECs squarely on the agenda. The preparation of the CEECs has already begun within the framework of the pre-accession strategy. The success with which the Single Market can be extended to these countries will be strongly influenced by the extent to which they perceive it as comprehensive and fully operational, based not only on a complete and coherent legal framework, but on the institutions, structures and practices to support it.

These huge rewards can still escape us if we are not fully committed to delivering a Single Market that works. If the major effort of putting a common legal framework into place for the Single Market is largely behind us, what is needed

now is to ensure that the conditions exist in every Member State to allow businesses or citizens to take full advantage of this framework. This requires a commitment at every level: Community, national, regional and local. Making a success of the Single Market also requires the engagement of economic operators as well as those responsible for making and applying the rules.

Appendix 1: Sources of information for this review

(a) The scope of the Single Market Programme (SMP)

For the purposes of this review, the SMP has been taken to comprise:

- the 282 measures outlined in the Commission's White Paper of 1985 which aimed to remove outstanding fiscal, technical and physical barriers to the free circulation of products, services, capital and persons;
- pre-existing legislative measures which provided an important basis for single market completion. To a large extent, the 1985 White Paper completed an already extensive construction. However, the measures identified in 1985 were particularly important as they addressed residual obstacles which had the effect of preventing much of the benefit of earlier actions from being reaped;
- additions to the programme of legislative measures to bring about single market completion in areas which had been overlooked in the 1985 White Paper (these included liberalisation of certain network-based services, such as telecommunications and energy markets);
- flanking Community policies designed to optimise the functioning of the single market, such as competition policy and measures to promote regional cohesion.

(b) The research effort:

In order to provide a thorough and informed response to the Council mandate for this review, the Commission launched an extensive information-gathering exercise. This has comprised 38 studies and an extensive survey of business opinion, as described briefly below:

- 19 studies of manufacturing and services sectors: each aimed to determine whether the Single Market measures under review have led to the disappearance of barriers to free circulation and identify any remaining obstacles to cross-border transactions;
- 6 "barrier studies": each aimed to assess progress in dismantling the most important non-tariff barriers (technical barriers, public procurement, customs and fiscal formalities, industrial property protection, currency management and capital market liberalisation);
- the economic impact of removing barriers was examined in a further 13 studies, which dealt inter alia with trade and investment flows, price convergence, competition and competitiveness, employment and labour markets, and economic cohesion.
- a major survey of the awareness, attitudes and reactions to the Single Market programme at company level was coordinated by the Statistical Office of the European Communities (Eurostat), based on replies from 13,000 enterprises in 12 Member States; it asked a representative sample of firms with more than 5 employees in the services sector and more than 20 employees in the manufacturing sector, (24,000 in all) to rate the success of the Single Market programme and its impact on their strategies and operations.

Other sources of evidence about the effectiveness of Single Market legislative measures have also been considered, including independent studies or surveys carried out in the Member States.

(c) Data issues:

Throughout this analysis an effort has been made to obtain up-to-date Community-wide data from a single source (Eurostat). The advantage of data from this source is that it is based on uniform definitions and builds on reliable data collected at regular intervals by national statistical bodies. This approach had to take account of the following considerations:

- many of the data series examined in this review are relatively specialised and are not collected with great regularity (as with price level data, where surveys are only carried out at 5-yearly intervals). In such cases, it has proved impossible to obtain data for the period after the last survey (1993).
- many of the concepts involve ratios or relative indicators which require a combination of two sets of data used in the analysis (such as price-cost margins or concentration indices). In many cases, all relevant data is not available from Eurostat and use has been made of specialised databases (e.g. Visa, PIMS, Amdata). More complex data of this kind often lags behind more accessible indicators such as trade flows;
- much of the analysis classifies data by sectoral groupings, as with productivity and efficiency effects, for example, where comparisons are undertaken by degree of sensitivity to the SMP. This level of analysis requires data which is disaggregated by sector. such data only becomes available after some delay;
- data problems are particularly pronounced in respect of service sectors. This reflects lack of attention to service sectors in the past, because of the mistaken belief that they were not affected by internationalisation. In addition, many of the traditional concepts related to cost, productivity and trade do not always find a quantifiable equivalent in service sectors. Lack of data availability for services has proved to be a particular difficulty in the course of this analysis. Quantified findings quoted in respect of individual service sectors are often taken from the specially-commissioned studies for these sectors, and involve calculations performed specifically for the purposes of this review.

FOOTNOTES

1) A more detailed account of the Commission's findings can be obtained from the Office of Official Publications in the following documents:
38 The background studies mentioned aboveand 1 business survey (to be published Nov. 1996 - Jan. 1997); A (100 page) Working Document of the Commission Services summarising the main findings of the studies (Nov. 1996)
2) A more detailed analysis of the economic impact will be published in "European Economy" (Dec. 1996)

The world's largest industrial groups

This article describes in the first part the relative recent performance of the world's 200 largest manufacturing companies by region and by sector in terms of turnover, profit and other key indicators. In the second part, it presents in more detail the past trends in key financial indicators of Europe's top 200 companies (including manufacturing, energy and services companies). All graphs and tables presented in this article have been produced using data from the European Commission's database on large enterprises (DABLE). The data covers mainly the period 1988-94 and relies on official figures from the companies' annual reports. All figures are reported in current ECU and have been converted to ECU using the 12 months moving average exchange rate during each company's fiscal year.

When broken down on a sector basis, companies have been put in the sector which accounts for the greatest share of their turnover. Thus, turnover are consolidated figures. Profits are shown as the consolidated company's share of total net income (after taxes). Employment figures show either a year-end or yearly average number. As for the classification by country, the criterion is that of the company's country of origin. However, the criteria of sectoral activity and geographical location have lost a lot of their relevancy in today's world of ever increasing globalisation where many multinational companies are present in several countries and many sectors.

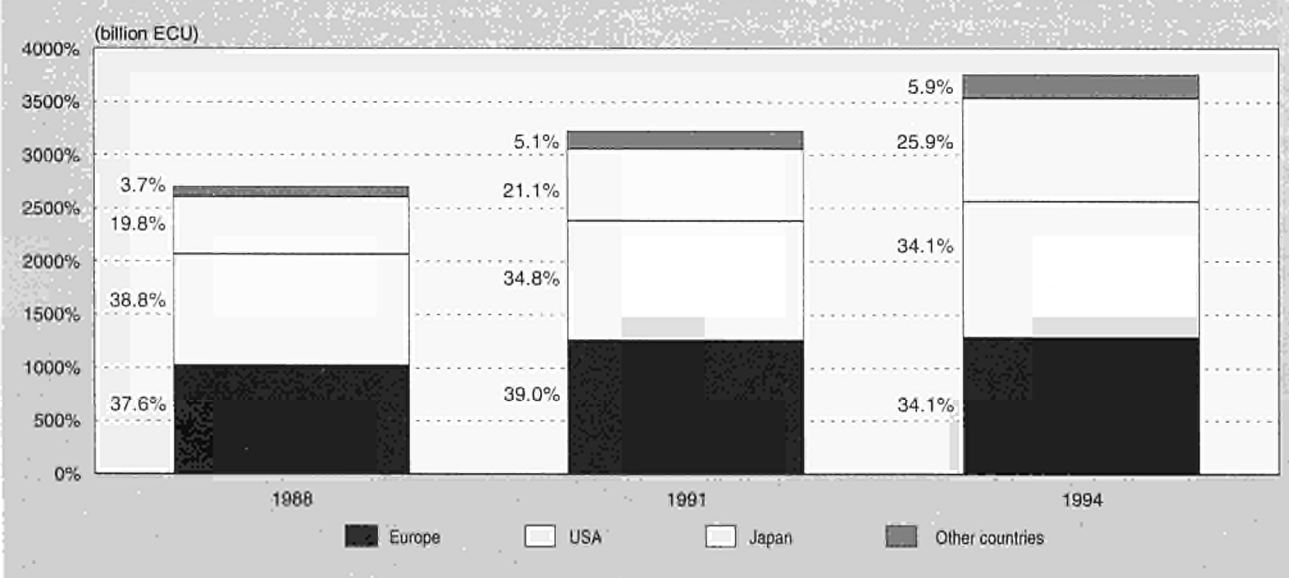
THE WORLD'S TOP 200 MANUFACTURING COMPANIES

Overall performance

Between 1991 and 1994, the total turnover of the world's largest 200 manufacturing companies increased by 5.2% per year on average, compared to 6.1% from 1988 to 1991. This reflects in general the slowdown in economic growth that the regions of the Triad (Europe, US and Japan) have successively gone through between 1991 and 1994. However, in 1994, the turnover growth of the top 200 manufacturing firms was higher than in 1993, representing the first increase in the rate of annual turnover growth since 1990. This improvement is mainly explained by two factors: (1) the economic recovery that occurred in most European countries in 1994 which was however less vigorous than predicted, and (2) the acceleration in the growth of the US economy which reached a peak level in 1994, before slowing down in 1995. The sales of the largest European manufacturing firms benefited at the same time from the recovery in Europe and the strong expansion of the US economy as most of the European growth was export-led before the dollar started to depreciate rapidly in late 1994.

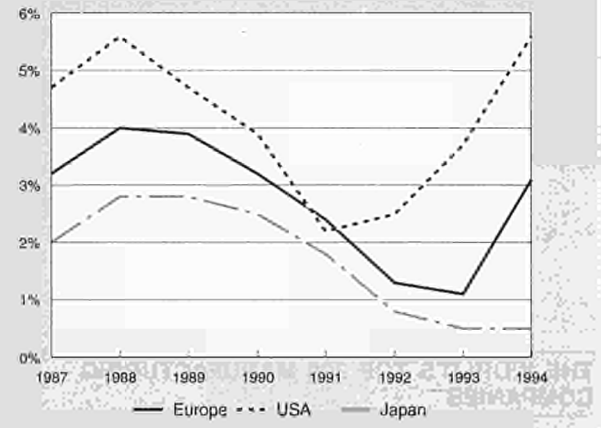
Despite the marked improvement in the turnover growth of the top European and American firms in 1994, the best performance over the 1991-1994 period was recorded by the largest companies in Japan and from the rest of the world (mostly South Korean firms). Between 1991 and 1994, the

Figure 1: The 200 largest industrial groups in the world
Turnover share by region



Source: DABLE

Figure 2: The 200 largest industrial groups in the world
Net profit / turnover



Source: DABLE

turnover of the largest manufacturing firms in Japan (that are included in the top 200 list) has increased at an average annual rate of 12.8%, compared to 4.6% and 0.6% respectively for the largest US and European firms. The top companies in Japan have seen their share of the total turnover generated by the world's largest 200 companies grow from 21.1% in 1991 to 25.9% in 1994 in spite of the recessionary environment characterising Japan during that period (see Figure 1). This increase is in fact mostly explained by the rise in the number of Japanese firms in the world top 200 ranking, from 46 in 1991 to 53 in 1994 (see Table 1). However, to some extent, the increase of Japan's share in total turnover of the world's largest 200 companies reflects the appreciation of the Yen between 1990 and 1994 on exchange rate markets. Indeed, the strong appreciation of the Yen since between 1990 and 1994 against the ECU has translated into stronger growth of the turnover of Japanese firms in ECU terms than that observed in local currency, therefore more or less compensating the negative effect of the evaluation of the Yen on the turnover of Japanese firms through a loss of their export competitiveness on world's markets.

In comparison to Japanese firms, the share of turnover represented by the top European companies has followed an opposite course: it has dropped from 39.0% in 1991 to 34.1% in 1994, most of the decline occurring between 1991 and 1993. As shown in Table 1, this is clearly due to the important decline in the number of European firms in the world's top 200 ranking between 1991 (77) and 1994 (69). Thus, all of the improvement in Japan's position seems to have been realised at the expense of European firms. The weak relative sales performance of European firms reflects the severity of the recession that plagued Europe in 1992 and 1993. The recession strongly affected demand for manufactured products in Europe and compelled many large firms to massively rationalise and restructure. Corporate rationalisation and restructuring moves have been characterised by the selling of non-strategic businesses in order to concentrate on core activities, and heavy cost reductions, in particular labour cost reductions.

Looking at the trend in turnover of the top American firms, we find that the number of US firms in the world's top 200 ranking has stayed stable between 1991 and 1994, while the share of turnover represented by these companies has declined slightly, from 34.8% in 1991 to 34.1% in 1994. This is a huge improvement compared to the 1988-1991 period which saw the number of US firms in the top 200 ranking fall from 71 to 64 and their share of turnover decrease by four percentage points (38.8% to 34.8%). The halt in the severe deterioration of the relative performance of the largest US firms since 1991 is evidently indicative of the rapid growth recorded by the US economy from 1991 onwards. This evolution combined with the weak performance of European firms has allowed the largest US firms to completely close the gap that existed between them and their European rivals since 1991 in terms of the share of total turnover generated by the largest 200 companies (see Figure 1).

As for the performance of the largest firms from non-Triad regions, it is mainly representative of the significant increase in the number of Korean firms in the world top 200 ranking (from 3 in 1991 to 8 in 1994). In 1994, the largest Korean firms represented 74.0% of the turnover accounted for by the largest non-Triad manufacturing companies, compared to a share of 25.0% in 1991.

The analysis of the trend of profitability of the largest 200 companies by region over the period 1988-1994 reveals a very interesting pattern. The asynchronous course of the business cycles in the Triad region (Europe, US and Japan) since 1991 is clearly reflected in the profitability performance of their largest manufacturing firms (see Figure 2). Indeed, whereas the net profit to turnover ratios were distinctively oriented downward between 1988 and 1991 in all regions of the Triad, the average profit ratio of top companies in each region displays quite different evolutions from 1991 onwards.

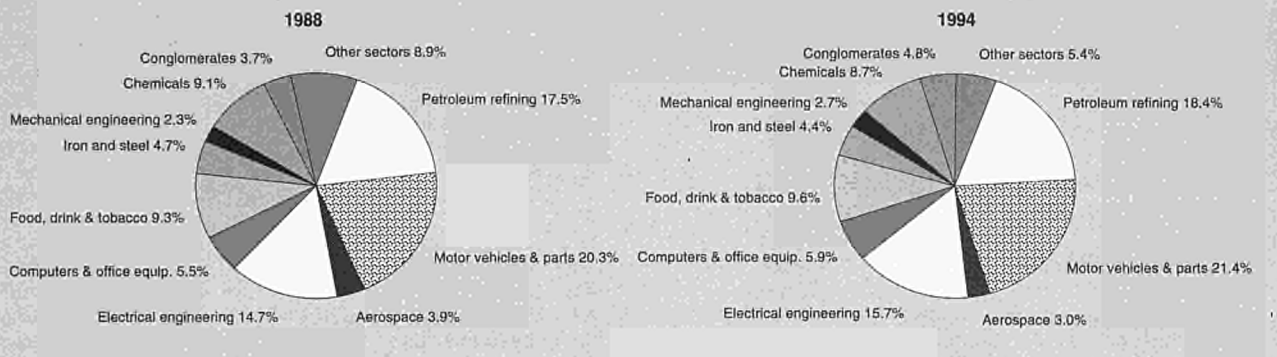
Focusing on the top European firms, their average profit ratio has increased in 1994 for the first time since 1988, finally ending a six year worrying downward trend. Before rebounding to a level of 3.1% in 1994, the rate of return on sales of the top European firms had constantly decreased after 1988, falling from 4% in that year to just above 1% in 1993. In parallel, the number of European companies showing a loss decreased substantially after reaching a peak level in 1992. In that year, 21 of the largest European firms reported a loss. That number was reduced to 18 in 1993 and 10 in 1994 (see Table 2). Thus, it emerges from the analysis that the number of European firms in the top 200 ranking has decreased over the period 1991-1994, but the ones remaining are more profitable. This of course reflects the beneficial impact of the economic recovery that occurred in most European countries in 1994. Nonetheless, the improvement in the net profitability of European companies in 1994 is also an indication that the severe cost-cutting measures undertaken by major European firms during the recession years have started to bear their fruits.

Table 1: The top 200 industrial groups at world level

(number)	1987	1988	1989	1990	1991	1992	1993	1994
Europe	74	76	76	79	77	76	71	69
USA	74	71	72	68	64	63	65	64
Japan	40	43	40	40	46	49	52	53
Other countries	12	10	12	13	13	12	12	14

Source: DABLE

Figure 3: The 200 largest industrial groups in the world
Turnover share by sector



Source: DABLE

As for the top American firms, their profitability continued to improve considerably in 1994. Their average profitability ratio increased to 5.6% in 1994 which is almost twice that of the largest European firms. The profit ratio of the largest American companies has been on an upward trend since 1991, after having fallen significantly from 1988 to 1991. It has more than doubled between 1991 and 1994, riding on the booming US economic growth that has followed the recession years of 1990 and 1991. At the same time, the number of American firms in the top 200 ranking which are showing a loss has dwindled from 18 in 1991 (representing 28% of the number of US firms) to just 2 in 1994. Therefore, while the number of American firms in the top 200 list has stayed the same between 1991 and 1994 (64), their profitability has remarkably improved. Apart from the beneficial impact of the strong expansionary conditions characterising the US economy during that period, this improvement shows, as in the case of European firms, that US firms have been successful in implementing restructuring measures that had as a goal to cut cost and restore profitability.

For Japan, a much different picture is unravelled. In 1994, the financial performance of the major Japanese firms continued to deteriorate, albeit at a slower pace than in 1993 and 1994. The net profit to turnover ratio of Japanese firms has been on a downtrend trend since 1988, falling as low as 0.5% in 1994 which is a five fold decline from 1988. Thus, even though Japanese companies traditionally operate with smaller margins than their US and European counterparts, this squeeze in margins since the late 1980s is clearly worrisome. Moreover, the number of Japanese firms reporting a loss rose from 4 in 1991 to 13 in 1993, though decreasing to 10 in 1994. Therefore, whereas the number of Japanese firms in the top 200 list has increased significantly since 1991, their profitability has dramatically fallen. This negative evolution reflects the impact of the very slow growth recorded by the Japanese economy from 1991 to 1994, and which, contrary to European economies did not recover in 1994 as it continued to be handicapped by the steady appreciation of the Yen. The evaluation of the Yen contributed to significantly damaged the export competitiveness of Japanese firms abroad, while promoting competition at home from cheaper imports coming from South-East Asia developing countries (e.g. Malaysia, Korea, Taiwan, etc.) which have their currency pegged to the dollar. The end result has been a severe deterioration of the profitability of the largest Japanese firms.

Looking at the breakdown of turnover of the world's largest 200 manufacturing firms by broad industrial sector (See Figure 3), it can be observed that the ranking has stayed more or less the same between 1988 and 1994 in terms of sectoral share. The motor vehicles and parts sector was still in 1994 the sector with the highest turnover share within the world's top 200 list (21.4%), followed by petroleum refining (18.4%) and electrical engineering (15.7%). Next came food, drink and tobacco (9.6%), chemicals (8.7%) and computers and office equipment (5.9%). In 1994, more than 55% of the total turnover of the largest 200 manufacturing firms was accounted for by only three sectors: motor vehicles and parts, petroleum refining and electrical engineering. Moreover, 16 of the 20 largest firms in the world in 1994 belonged to one of these sectors. Only three industries saw their turnover share decrease over the period 1988-1994: aerospace, chemicals and iron and steel. The aerospace sector recorded the most important decline in sectoral share (from 3.9% in 1988 to 3.0% in 1994) as it suffered a brutal worldwide downturn from 1991 to 1994

Table 2: Groups showing a loss

Year	Total	Europe	USA	Japan	Others
1987	9	6	2	1	0
1988	7	4	3	0	0
1989	7	2	5	0	0
1990	15	6	7	2	0
1991	36	12	18	4	2
1992	45	21	12	11	1
1993	38	18	6	13	1
1994	22	10	2	10	0

Source: DABLE

Table 3: The largest industrial groups in the world, 1994

	The 25 largest profit earners		Net income (million ECU)
1	Royal Dutch Shell	EUR	5 249
2	General Motors	USA	4 772
3	Ford Motor	USA	4 476
4	Exxon	USA	4 301
5	General Elctric	USA	3 985
6	Philip Morris	USA	3 984
7	Chrysler	USA	3 131
8	IBM	USA	2 548
9	Merck & Co	USA	2 527
10	E.I.du Pont De Nemours	USA	2 300
11	Coca-Cola	USA	2 154
12	British Petroleum	EUR	2 036
13	Unilever	EUR	2 012
14	Nestlé	EUR	2 005
15	Procter & Gamble	USA	1 936
16	Intel	USA	1 929
17	Roche Holding	EUR	1 764
18	Glaxo Wellcome	EUR	1 708
19	Petroleos De Venezuela	VEN	1 698
20	Johnson & Johnson	USA	1 675
21	ENI	EUR	1 671
22	B.A.T. Industries	EUR	1 556
23	Bristol-Myers Squibb	USA	1 553
24	Amoco	USA	1 509
25	Pepsico	USA	1 504
	Number of representatives:	EUR	8
		USA	16
		Japan	0
		Others	1

	The 25 most profitable		Net income/ turnover (%)
1	Glaxo Wellcome	EUR	23.0
2	Merck & Co	USA	20.0
3	Intel	USA	19.9
4	Roche Holding	EUR	19.4
5	American Home Products	USA	17.0
6	Abbott Laboratories	USA	16.6
7	Coca-Cola	USA	15.8
8	Pfizer	USA	15.7
9	Bristol-myers Squibb	USA	15.4
10	Johnson & Johnson	USA	12.7
11	Sandoz	EUR	10.9
12	Emerson Electric	USA	10.5
13	B.A.T. Industries	EUR	10.3
14	Hanson	EUR	9.8
15	General Electric Company	EUR	9.7
16	BTR	EUR	9.6
17	Petroleos De Venezuela	VEN	9.1
18	Philip Morris	USA	8.8
19	Minnesota Mining & Mfg	USA	8.8
20	Ciba-Geigy	EUR	8.7
21	Anheuser-busch	USA	8.6
22	Volvo	EUR	8.5
23	Petrobras	BRA	8.3
24	E.I. Du Pont De Nemours	USA	8.0
25	Compaq Computer	USA	8.0
	Number of representatives	EUR	9
		USA	14
		Japan	0
		Others	2

	The 25 richest	Net worth (million ECU)	
1	Royal Dutch Shell	EUR	57 570
2	Toyota Motor	JPN	40 404
3	Exxon	USA	31 551
4	Matsushita Electric	JPN	26 856
5	Hitachi	JPN	25 025
6	General Electric	USA	22 252
7	Petroleos De Venezuela	VEN	21 166
8	Ford Motor	USA	19 846
9	IBM	USA	19 744
10	Pemex	MEX	18 666
11	Petrobras	BRA	15 850
12	Mobil	USA	14 459
13	British Petroleum	EUR	14 275
14	Chevron	USA	12 309
15	Amoco	USA	12 128
16	Elf Aquitaine	EUR	11 628
17	General Motors	USA	11 194
18	E.I.du Pont De Nemours	USA	10 813
19	Philip Morris	USA	10 782
20	Siemens	EUR	10 563
21	Daimler-Benz	EUR	10 452
22	Nestle	EUR	10 451
23	Fiat	EUR	10 305
24	ENI	EUR	10 170
25	Roche Holding	EUR	10 129
	Number of representatives	EUR	9
		USA	10
		Japan	3
		Others	3

	The 25 biggest employers		(employees)
1	General Motors	USA	692 800
2	Pepsico	USA	471 000
3	Siemens	EUR	382 000
4	Ford Motor	USA	337 778
5	Hitachi	JPN	331 673
6	Daimler-Benz	EUR	330 551
7	Unilever	EUR	304 000
8	IRI	EUR	292 695
9	Matsushita Electric	JPN	265 397
10	Philips Electronics	EUR	253 032
11	Fiat	EUR	248 180
12	Volkswagen	EUR	242 318
13	General Electric	USA	221 000
14	Ibm	USA	219 839
15	Nestle	EUR	212 687
16	ABB Asea Brown Boveri	EUR	207 557
17	Alcatel Alsthom	EUR	196 900
18	Samsung Group	KOR	191 303
19	Toshiba	JPN	190 000
20	B.A.T. Industries	EUR	173 475
21	United Technologies	USA	171 500
22	Hoechst	EUR	165 671
23	Philip Morris	USA	165 000
24	Robert Bosch	EUR	156 464
25	NEC	JPN	151 069
	Number of representatives	EUR	13
		USA	7
		Japan	4
		Others	1

Source: DABLE

(the worst since World War Two) which combined a sharp decrease in military and civil turnover.

Table 3 shows the 25 largest profit earners in the world in 1994, the most profitable and the richest firms, along with the world's 25 biggest employers. As in 1992 and 1993, the firm at the top of the list was an European company: Royal Dutch Shell, the British/Dutch petroleum refining company. However, the list is clearly dominated by US firms which held 12 of the first 15 positions in terms of highest net income in 1994. The US motor vehicle industry is well represented at the top of the list as the Big Three members, General Motors, Ford Motor and Chrysler, are amongst the top seven largest profit earners in the world. Exxon, the largest US petroleum refining firm, which was second in 1993, was relegated to fourth in 1994, being outperformed by General Motors and Ford Motor. The second European company ranked by profit in 1994 was only in 13th place: British Petroleum of the UK. In total, there were 8 European companies in the list of the top 25 largest profit earners, compared to 16 from the US, one from a non-Triad country (Venezuela) and none from Japan. Compared to 1993, five companies were newcomers to the list in 1994. Three were from the petroleum refining sector (British Petroleum of the UK, ENI from Italy and Petroleos de Venezuela) and two from the chemical sector (Du Pont de Nemours and Protect & Gamble, both from the US).

The comparison of the list of largest profit earners with that of the most profitable companies (measured by net income over turnover) at world level reveals some interesting features. First, there were no Japanese amongst the 25 most profitable companies in 1994, as it was the case with the 25 largest profit earners. Secondly, eleven of the world's biggest profit earners were also in the list of the world's 25 most lucrative firms. Five of them are pharmaceutical firms or companies having activities in the pharmaceutical sector (Glaxo Wellcome of the UK, Roche Holding of Switzerland, and Merck & Co, Bristol-Myers Squibb and Johnson & Johnson of the US). The others belong to the agro-alimentary sector (Coca-Cola of the US, Philip Morris of the US and B.A.T. Industries of the UK), petroleum refining (Petroleos de Venezuela), chemicals (Du Pont de Nemours of the US) and electronics (Intel of the US).

Firms producing pharmaceutical goods overwhelmingly dominate the ranking of the world's most profitable firms as they held in 1994 eight of the first ten positions in terms of net income to turnover ratio. This is mainly explained by the fact that pharmaceutical firms across the world have continued to record high profit levels in the recession environment of the early 1990s while financial results of firms operating in most other industrial sectors deteriorated. The pharmaceutical sector has been less vulnerable to the recession as it benefited and will continue to benefit from rising standards of living in industrialised countries and growing concerns for health by the ever more ageing world population None of the US motor vehicles and parts companies which were at the top of the ranking of the largest profit earners are amongst the most profitable firms. The only representative of the motor vehicles industry in the list of most lucrative firms is Volvo of Sweden which is ranked 22nd. Finally, it is very interesting to note that the only two petroleum refining companies in the list are from developing countries of Latin America: Petroleos de Venezuela and Petrobras of Brazil. None of the five oil companies from Europe (Royal Dutch Shell, British Petroleum and ENI) and the US (Exxon and Amoco) which are in the ranking of the 25 largest profit earners are in the list of most profitable companies.

Figure 4: Petroleum refining

Turnover in 1988 (million ECU)		
Exxon	USA	67 227
Royal Dutch Shell	EUR	66 224
Mobil	USA	40 728
British Petroleum	EUR	39 012
Texaco	USA	28 345
ENI	EUR	21 366
Chevron	USA	21 291
Elf Aquitaine	EUR	17 922
Amoco	USA	17 872
Atlantic Richfield	USA	14 894
Petrobras	BRA	12 539
Nippon Oil	JPN	12 317
Total	EUR	11 838
Pemex	MEX	11 060
Kuwait Petroleum	KWT	10 229
Idemitsu Kosan	JPN	9 832
Phillips Petroleum	USA	9 552
Showa Shell Sekiyu K.K.	JPN	8 125
Petroleos de Venezuela	VEN	8 052
Petrofina	EUR	8 049
USX-Marathon	USA	7 490
Unocal	USA	7 481
Sun	USA	7 277
Repsol	EUR	6 775
Ashland Oil	USA	6 553
Statoil	EUR	5 912
Nippon Mining	JPN	5 827
Neste	EUR	5 386

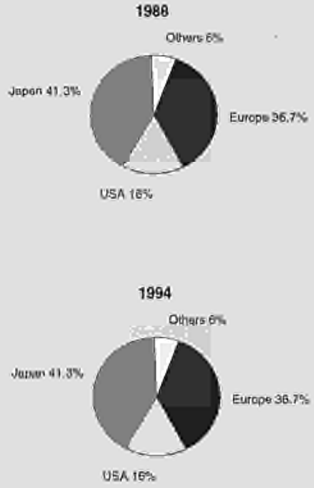
Turnover in 1994 (million ECU)		
Exxon	USA	84 061
Royal Dutch Shell	EUR	79 874
Mobil	USA	49 749
British Petroleum	EUR	42 753
Elf Aquitaine	EUR	31 577
ENI	EUR	29 320
Texaco	USA	27 440
Chevron	USA	25 585
Pemex	MEX	23 703
Amoco	USA	21 966
Nippon Oil	JPN	21 897
Total	EUR	20 792
Petroleos de Venezuela	VEN	18 685
Japan Energy	JPN	15 412
Sunkyong	KOR	15 297
Ssangyong	KOR	14 981
Petrobras	BRA	14 588
Petrofina	EUR	14 094
Cosmo Oil	JPN	13 101
Atlantic Richfield	USA	12 679
Showa Shell Sekiyu K.K.	JPN	12 516
USX-Marathon	USA	10 758
Repsol	EUR	10 549
Phillips Petroleum	USA	10 358
Statoil	EUR	10 011
Mitsubishi Oil	JPN	9 216
Sun Company	USA	8 279
Ashland	USA	8 148
Neste	EUR	7 990
Yukong	KOR	7 607

Source: DABLE

Figure 5: Iron and steel

Turnover in 1988 (million ECU)

Nippon Steel	JPN	16 102
Thyssen	EUR	14 097
Usinor Sacilor	EUR	11 211
NKK	JPN	8 513
Aluminum Co of America	USA	8 277
Kobe Steel	JPN	7 943
Broken Hill Proprietary	AUS	7 580
British Steel	EUR	7 505
Metallgesellschaft	EUR	7 350
Sumitomo Metal Industries	JPN	7 118
Kawasaki Steel	JPN	7 106
Degussa	EUR	6 564
LTV	USA	6 190
USX-US Steel	USA	5 912
Mitsubishi Materials	JPN	5 746



Turnover in 1994 (million ECU)

Nippon Steel	JPN	23 769
Thyssen	EUR	18 163
NKK	JPN	14 866
Usinor-Sacilor	EUR	12 082
Kobe Steel	JPN	11 019
Sumitomo Metal	JPN	10 969
Hoesch-Krupp	EUR	10 601
Broken Hill Proprietary	AUS	10 478
Mitsubishi Materials	JPN	9 498
Kawasaki Steel	JPN	9 477
Sumitomo Electric	JPN	9 240
Aluminum Co of America	USA	8 352
Pohang Iron & Steel	KOR	8 193
Thyssen Handelsunion	EUR	8 058
Degussa	EUR	7 180
Alcan Aluminium	CAN	7 118

Source: DARLE

Below, we will look at the overall performance of the world's top 200 manufacturing firms by main sector of activity. The last section will then focus on the relative performance of the largest European companies (including services companies), both by country of origin and by sector.

Sector profiles

Petroleum refining

The petroleum refining sector at world level is dominated by very large companies, many of them being fully state-owned or largely controlled by government. However, a long-term trend towards the withdrawal of government control in state-owned firms seems to be developing in Europe. This trend began with the privatisation of British Petroleum in the 1980s, and more recently with the disengagement of the French government in Elf Aquitaine and Total. Healthy demand growth during the late 1980s has led to a gradual increase in the number of petroleum refining firms in the world's top 200 companies. It stabilised in the early 1990s due to falling oil prices and weakening demand for refined oil products. In 1994, there where 30 petroleum refining groups in the top 200 ranking, the highest number of firms from any industrial sector.

The firms which held the first four positions in 1988 were still at the top of the list in 1994. They are Exxon with a turnover of 84.0 billion ECU, followed by Royal Dutch Shell, Mobil and British Petroleum. It is to note that the difference in turnover between Exxon and Royal Dutch Shell has widened by 3.2 billion ECU between 1988 and 1994. Elf Aquitaine of France, which was the eight largest petroleum refining firm in 1988, climbed to the fifth position in 1994 by outperforming ENI of Italy and Chevron and Texaco of the US. The latter American firm actually saw its turnover declined from 1988 to 1994. Overall, the top US petroleum refining firms seem to have suffered the most from the difficult market conditions relating to oil consumption in the early 1990s. Their share of total turnover of the world's largest 30 petroleum refineries was at 38.3%, well below the 1988 figure of 46.8%. Over that period, the turnover of the top US petroleum refineries increased yearly by 2.1% on average compared to an annual rate of 5.5% for the top European oil producers.

Despite this solid growth rate, the share of the largest European petroleum refining firms in the total turnover of the world's top oil producers has remained stable between 1988 and 1994, at around 37%. This is mainly due to the arrival of three Korean firms (Sunkyong, Ssangyong and Yukong) in the ranking of the world's largest oil producers and the impressive increase in turnover recorded by the top Japanese petroleum refining firms between 1988 and 1994. Korean and Japanese companies now account for close to 17% of the total turnover of the largest petroleum refining firms, compared to a share of 7.4% in 1988. The petroleum refining sector is also the industry which has the highest number of companies from non-Triad countries in its list of top performers ranked by turnover. They consist of the three above mentioned Korean firms and three state-owned petroleum refining firms from Latin America (Pemex of Mexico, Petrobras of Brazil and Petroleos de Venezuela).

Finally, it is interesting to note that from 1993 to 1994, the combined turnover of the top US and European petroleum refining firms (19 firms in total in both years) actually declined by 1.0% while their profit increased by 12.0%. This is clearly indicative that following the slowdown in demand growth of the early 1990s, the top oil producers from these two regions were still actively involved in the rationalisation of refining capacity in 1994, therefore leading to the improvement of the viability of their refineries remaining in operation.

Iron and steel

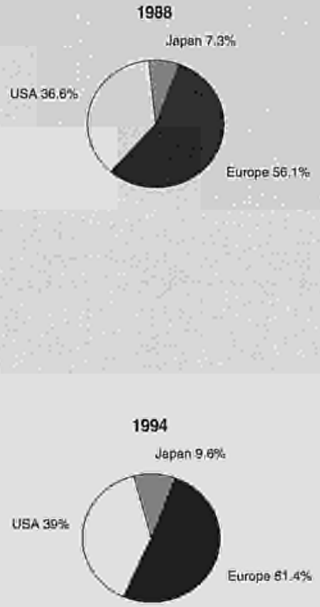
The world ranking of the largest metal producers in terms of turnover is dominated by Japanese and European firms. Within the list of the top 16 producers in the world in 1994, seven were Japanese and five were European. The remaining places being taken by the US (Aluminum Co of America), Korea (Pohang Iron & Steel), Australia (Broken Hill Proprietary) and Canada (Alcan Aluminium). The Japanese producers respectively held the 1st (Nippon Steel), 3rd (NKK) and 5th place (Kobe Steel). Thyssen of Germany which is the largest European metal producers ranked second in the world, while Usinor-Sacilor of France retroceded from the 3rd to the 4th place over the period 1988-1994. In 1994, Japanese firms represented almost half (49.6%) of the turnover generated by the world's top iron and steel makers, up from a level of 41.3% in 1988. Turnover growth of Japanese firms between 1988 and 1994 has been, however, inflated by the appreciation of the Yen against the ECU.

The financial performance of the largest iron and steel manufacturers deteriorated significantly in the early 1990s due to a depressed steel market in most industrialised countries. During that period, demand for steel weakened substantially in all major end-markets for steel, i.e. motor vehicles, construction and production machinery, as investment activities in these sectors decreased considerably. In 1993, nine out of

Figure 6: Chemicals

Turnover in 1988 (million ECU)

E.I.du Pont de Nemours	USA	27 596
BASF	EUR	20 462
Hoechst	EUR	19 746
Bayer	EUR	19 507
ICI	EUR	17 607
Procter & Gamble	USA	16 137
Dow Chemical	USA	14 097
Ciba-Geigy	EUR	10 214
Rhone-Poulenc	EUR	9 286
Montedison	EUR	9 179
Norsk Hydro	EUR	7 800
Johnson & Johnson	USA	7 605
Akzo	EUR	7 102
Union Carbide	USA	7 034
Monsanto	USA	7 008
Asahi Chemical Industry	JPN	6 836
Sumitomo Chemical	JPN	5 922
Sandoz	EUR	5 875
Baxter International	USA	5 798
Solvay & Cie	EUR	5 797
Fuji Photo Film	JPN	5 671
Bristol Myers Squibb	USA	5 047
Roche Holding	EUR	5 030



Turnover in 1994 (million ECU)

E.I.du Pont de Nemours	USA	28 707
Procter & Gamble	USA	26 524
Hoechst	EUR	25 812
BASF	EUR	22 711
Bayer	EUR	22 579
Dow Chemical	USA	16 878
Ciba-Geigy	EUR	13 599
Johnson & Johnson	USA	13 137
Rhone-Poulenc	EUR	13 123
Merck & Co	USA	12 624
ICI	EUR	11 863
Mitsubishi Chemical	JPN	11 056
Akzo Nobel	EUR	10 299
Sandoz	EUR	9 788
Roche Holding	EUR	9 096
Norsk Hydro	EUR	8 533
Sumitomo Chemical	JPN	7 967
Smithkline Beecham	EUR	7 838
Occidental Petroleum	USA	7 789
Abbott Laboratories	USA	7 721
American Home Products	USA	7 561
Toray Industries	JPN	7 429
Glaxo Wellcome	EUR	7 415
Henkel	EUR	7 316
L'Oréal	EUR	7 241
Dainippon Ink & Chemicals	JPN	7 010
Monsanto	USA	6 976

Source: DABLE

the world's top 16 ferrous metal producers reported a loss. However, in the course of 1994, the steel market reverted to a new upward phase as both demand and prices started to grow in the second half of the year. In consequence, some European steelmakers reported strongly improved financial results in 1994. This was the case for Usinor-Sacilor which reported in 1994 a profit for the first time since 1990, after a staggering loss of 920 million ECU in 1993. Japan's steelmakers, on the other hand, continue to all report losses (except one) as they were still suffering in 1994 from recessionary conditions on the Japanese market.

Chemicals

The chemical sector is an industrial branch of very heterogeneous character. It is made up of three main product segments: (1) basic chemicals, which include basic organic and inorganic chemicals, fertilisers, plastic in primary form and synthetic rubber, (2) pharmaceutical products, and (3) speciality chemicals, which include pesticides and other agrochemical products, paints, varnishes, soaps and detergents, cleaning and polishing preparations, perfumes, toilet preparations, and man-made fibres.

Europe is a major player in the world chemical industry, with half of the largest chemical firms being European in 1994, representing 51.5% of the total turnover of the world's top chemical producers. However, the first and second position in the ranking of the world's largest chemical companies are held by two American firms: Du Pont de Nemours and Procter & Gamble. The latter US firm was particularly successful between 1988 and 1994 as it gained four places in the ranking. The turnover of Procter & Gamble expanded rapidly mainly as a result of a series of important acquisitions. This is also the case for Merck & Co and American Home Products which are new entrants in the ranking of the world's largest chemical firms thanks to their respective purchase of Medco and American Cyanamid.

In general, the US chemical firms have fared much better in terms of turnover growth than their European rivals from 1988 to 1994. During that period, turnover of the top US firms increased on average by 6.9% per year, compared to a rate of 4.3% for European-based companies. In consequence, the chemical sector is the only industry for which the US firms have increased their share of total sectoral turnover while the share held by European firms has simultaneously decreased. This is explained by the fact that the US chemical industry has enjoyed a recovery since 1992 whereas European chemical firms have faced a long period of recession from 1990 to mid-1994 characterised by depressed prices for chemical products and huge production overcapacity.

The performance of the chemical sector as a whole conceals very different patterns between pharmaceutical firms and companies from the basic chemicals and other speciality chemicals segments. From 1988 to 1994, pharmaceutical firms have posted much faster growth in turnover and higher profitability than the rest of the chemical firms due to rising demand for health care products caused by an ageing population and higher standard of living in industrialised countries. In the early 1990s, pharmaceuticals production was still on an upward trend while sales and profitability of basic chemical firms were plagued by weakening demand for key chemical products.

Electrical and electronic engineering

The number of electrical and electronic engineering companies in the ranking of the world's top 200 firms has come down to 26 in 1994 from 28 in 1988. Despite this reduction in its number of representatives, the share of global turnover of the 200 largest companies in the world which is accounted for by the electrical and electronic engineering sector has increased from 14.7% to 15.7% over the period 1988-1994. From 1988 to 1994, the total turnover of the leading firms in the sector grew from 412.9 billion ECU to 577.7 billion ECU, a 5.7% average annual growth.

Figure 7: Electrical and electronic engineering

Turnover in 1988 (million ECU)		
Hitachi	JPN	43 210
General Electric	USA	41 756
Matsushita Electric	JPN	37 154
Siemens	EUR	28 645
Philips Electronics	EUR	24 019
Samsung	KOR	23 193
Mitsubishi Electric	JPN	18 339
Alcatel-Alsthom	EUR	18 187
Asea	EUR	14 824
Daewoo	KOR	14 610
Sony	JPN	14 481
BBC Brown Boveri	EUR	14 388
Thomson	EUR	10 635
Westinghouse Electric	USA	10 562
Electrolux	EUR	10 209
General Motors Cl H	USA	9 296
General Electric Company	EUR	8 991
Sharp	JPN	8 498
Sanyo Electric	JPN	8 089
Motorola	USA	6 971
Raytheon	USA	6 922
AEG	EUR	6 450
Honeywell	USA	6 040
TRW	USA	5 900
Emerson Electric	USA	5 569
Victor Co of Japan	JPN	5 541
Texas Instruments	USA	5 319
Matsushita Electric Works	JPN	5 160

Turnover in 1994 (million ECU)		
Hitachi	JPN	62 636
Matsushita Electric	JPN	57 322
General Electric	USA	50 619
Samsung Group	KOR	45 811
Siemens	EUR	43 966
Sony	JPN	32 863
Daewoo	KOR	30 018
Philips Electronics	EUR	28 279
Mitsubishi Electric	JPN	26 820
Alcatel Alsthom	EUR	25 490
ABB Asea Brown Boveri	EUR	24 011
Motorola	USA	18 759
Sanyo Electric	JPN	13 972
Sharp	JPN	13 345
Electrolux	EUR	11 817
Thomson	EUR	11 316
Intel	USA	9 715
LM Ericsson	EUR	9 032
Texas Instruments	USA	8 698
Schneider	EUR	8 510
LG Electronics	KOR	7 889
Northern Telecom	CAN	7 508
Westinghouse Electric	USA	7 461
General Electric Company	EUR	7 419
Emerson Electric	USA	7 416
Fuji Electric	JPN	7 065

Source: DABLE

This overall growth rate masks highly different performance trends between the many segments which compose this sector. Indeed, the electrical and electronic engineering industry is a diversified sector made up of a very large product spectrum: electric wires and cables, electrical machinery (motors, generators, transformers, turbines), electrical equipment for industrial use, electric domestic appliances, electronic components (semiconductors), telecom-munications equipment and consumer electronics. The rise of turnover has been particularly high in electronic components and telecommunications equipment (especially the mobile telephone segment) which are two of the world's fastest expanding sectors. Slower growth has been registered in the areas of electrical machinery, domestic electrical appliances and consumer electronics.

These contrasted performances have yielded notable changes in the ranking of the world's top electrical and electronic engineering firms between 1988 and 1994. A new entrant is Intel of the US, the largest semiconductor producer in the world, which ranked 17th in 1994. Another US semiconductor producer that made remarkable progress is Texas Instruments, climbing from the 27th to the 19th place thanks to an average annual turnover growth of 8.5% from 1988 to 1994. In the telecommunications segment, new entrants are LM Ericsson of Sweden and Northern Telecom of Canada, while Motorola of the US jumped from the 20th to 12th place over the 1988-1994 period on the back of booming sales of mobile phone equipment. On the other side of the spectrum, Westinghouse Electric, the US producer of domestic appliances and electrical machinery, lost 10 places in the ranking, falling to the 23rd place in 1994.

Despite these important movements within the world ranking of top electrical and electronic engineering firms, it is still dominated by Japanese and Korean firms. In 1994, they represented 51.5% of the total turnover generated by the world's largest companies in the sector, up from a level of 43.2% in 1988. Hitachi of Japan is on top of the list, followed by its Japanese rival Matsushita Electronics, which passed in front of General Electric of the US from 1988 to 1994. After General Electric, the next US firm in the ranking is Motorola which is in 12th place. Most of the Japanese and Korean firms significantly improved their position in the ranking, with for instance Daewoo rising from 10th to 7th place between 1988 and 1994, and Sony rising from 11th to 6th place on the back of a twofold increase in turnover from 1988 to 1994.

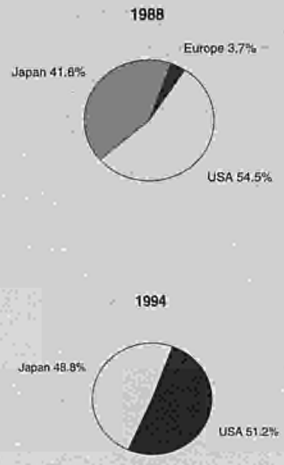
Computers and office equipment

The world computer and office equipment sector is dominated by only two countries: the US and Japan. Olivetti of Italy, which ranked 8th at world level in 1988, has since disappeared from the list of world's top computer manufacturers based on turnover. Olivetti's poor sales performance since 1990 has eliminated it from the world top 200 manufacturing companies, and thus explains why it does not appear in Figure 8 in 1994.

The total turnover of the largest firms in this sector is more or less evenly distributed between the American and Japanese firms. The world leader is still IBM of the US with a turnover of 54.0 billion ECU in 1994, followed by three Japanese firms: Toshiba, NEC and Fujitsu. IBM's position as world leader has been definitely under challenge since 1988. While during that year, IBM's turnover of 53.6 billion ECU was 96.0% higher than that of number two Toshiba, this percentage gap has been reduced to 36.0% in 1994. The erosion of IBM's predominant position is explained by the combination of: (1) drastic restructuring measures which has reduced IBM's size in terms of employment and turnover and (2) spectacular growth rates achieved by most of its Japanese and American rivals. For instance, Hewlett-Packard of the US jumped from 7th to 5th place over the 1988-1994 period on the back of a 159.0% growth in turnover. Strong growth was also achieved

Figure 8: Computer and office equipment

Turnover in 1988 (million ECU)		
IBM	USA	50 432
Toshiba	JPN	25 656
NEC	JPN	20 809
Fujitsu	JPN	16 115
Digital Equipment	USA	9 577
Unisys	USA	8 367
Hewlett-packard	USA	8 239
Olivetti	EUR	5 465
NCR	USA	5 062



Turnover in 1994 (million ECU)		
IBM	USA	54 014
Toshiba	JPN	39 524
NEC	JPN	31 097
Fujitsu	JPN	26 876
Hewlett-packard	USA	21 363
Canon	JPN	15 969
Xerox	USA	15 042
Digital Equipment	USA	11 705
Compaq Computer	USA	9 163
Apple Computer	USA	7 917

Source: DABLE

by Toshiba (54.0%), NEC (49.4%) and Fujitsu (66.7%). On the other hand, Digital Equipment of the US went from 5th to 8th place as it posted much weaker turnover growth (22.2%).

Newcomers in the list of the largest computer and office equipment manufacturers since 1988 are Compaq Computer and Apple Computer, two fast growing US computer makers, along with Xerox of US and Canon of Japan which increased their presence in this market from being more traditional electrical equipment suppliers.

Motor vehicles and components

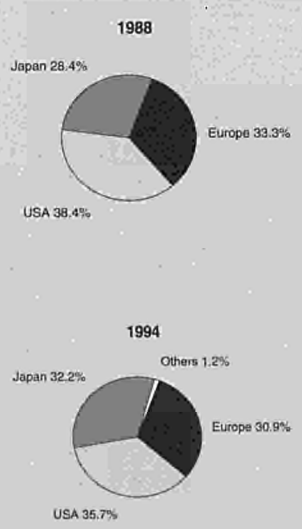
The Triad's dominance of the world automotive and components market is beginning to be somewhat challenged by Korea. In 1994, Hyundai Motor of Korea was a new entrant in the list of world's largest motor vehicle manufacturers (see Figure 9). Despite its relative small size compared to the largest car manufacturers in the US and Europe, Hyundai (along with Kia and Daewo to a lesser extent) has become a player to be reckoned with in the world car market as it is establishing distribution capacities in many countries.

There has been few changes in the ranking of the world's top 20 motor vehicles manufacturers from 1988 to 1994. The six largest motor vehicles producers all maintained their position during that period. General Motors remains the world's largest automotive producer in 1994, with a total world-wide turnover of 126.9 billion ECU, ahead of number two Ford Motor, whose turnover amounted to 108.3 billion ECU in the same year. The other member of the US Big Three, Chrysler, is in sixth position, but has recorded stronger annual turnover growth (6.1%) from 1988 to 1994 than General Motors (3.5%) and Ford Motor (5.5%).

Two Japanese firms, Toyota Motor and Nissan Motor, respectively occupied the 3rd and 5th place in the ranking. Toyota Motor has considerably reduced its distance from Ford Motor in terms of turnover from 1988 to 1994 as it recorded a spec-

Figure 9: Motor vehicles and components

Turnover in 1988 (million ECU)		
General Motors	USA	102 937
Ford Motor	USA	78 118
Toyota Motor	JPN	45 027
Daimler-Benz	EUR	35 428
Nissan Motor	JPN	32 479
Chrysler	USA	29 975
FIAT	EUR	28 800
Volkswagen	EUR	28 547
Honda Motor	JPN	23 552
Renault	EUR	22 943
Peugeot	EUR	19 678
Mitsubishi Motors	JPN	14 753
Robert Bosch	EUR	13 341
Volvo	EUR	13 339
Mazda Motor	JPN	12 963
BMW	EUR	9 965
Isuzu Motors	JPN	7 844
Nippondenso	JPN	7 724
Suzuki Motor	JPN	6 483
Saab-Scania	EUR	5 865
Audi	EUR	5 559
Daihatsu Motor	JPN	5 083



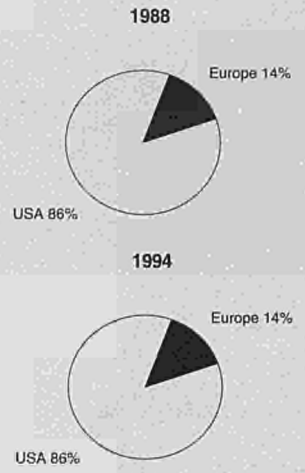
Turnover in 1994 (million ECU)		
General Motors	USA	126 991
Ford Motor	USA	108 310
Toyota Motor	JPN	86 309
Daimler-Benz	EUR	54 121
Nissan Motor	JPN	48 136
Chrysler	USA	42 785
Volkswagen	EUR	41 623
FIAT	EUR	33 925
Honda Motor	JPN	32 721
Mitsubishi Motors	JPN	28 172
Renault	EUR	27 147
Peugeot	EUR	25 270
BMW	EUR	21 906
Mazda Motor	JPN	18 184
Robert Bosch	EUR	17 929
Volvo	EUR	17 053
Isuzu Motors	JPN	13 945
Nippondenso	JPN	11 538
Suzuki Motor	JPN	10 381
Hyundai Motor	KOR	9 508
MAN	EUR	9 429
Fuji Heavy	JPN	9 102
TRW	USA	7 663

Source: DABLE

Figure10: Aerospace

Turnover in 1988 (million ECU)

United Technologies	USA	15 285
Boeing	USA	14 333
McDonnell Douglas	USA	12 734
Allied Signal	USA	10 063
Rockwell Intl	USA	10 003
Lockheed	USA	8 949
British Aerospace	EUR	8 487
General Dynamics	USA	8 071
Textron	USA	6 151
Aérospatiale	EUR	5 431



Turnover in 1994 (million ECU)

Lockheed Martin	USA	19 316
Boeing	USA	18 488
United Technologies	USA	17 875
McDonnell Douglas	USA	11 111
Allied Signal	USA	10 808
Rockwell International	USA	9 584
British Aerospace	EUR	8 193
Textron	USA	8 165
Aérospatiale	EUR	7 384

Source: DABLE

tacular growth in sales of 11.4% per year. In general, most Japanese companies have posted higher turnover growth than their American and European rivals, therefore explaining the rise in Japan's share of the total turnover generated by the top motor vehicles manufacturers (from 28.4% in 1988 to 32.2% in 1994). However, while most American and European motor vehicles producers considerably improved their financial results from 1993 to 1994, the profitability performance of the Japanese firms remained mediocre as they were still suffering from the strong appreciation of the Yen and sluggish demand on their national market. The only two firms to record losses in 1994 were Japanese: Nissan Motor and Mazda Motor.

The largest European producer, Daimler-Benz, was ranked 4th in 1994 with a turnover of 54.1 billion ECU, less than half that of General Motors and Ford Motor. Volkswagen of Germany and Fiat of Italy respectively held the 7th and 8th place. The fastest growth in turnover over the six year period was achieved by BMW of Germany which more than doubled its sales to 21.9 billion ECU. However, much of this remarkable performance is the consequence of BMW's acquisition of Rover of the UK. Another firm which posted very fast growth is Mitshubishi Motors of Japan, with 11.3% per year, allowing it to move in front of Renault and Peugeot of France in the ranking.

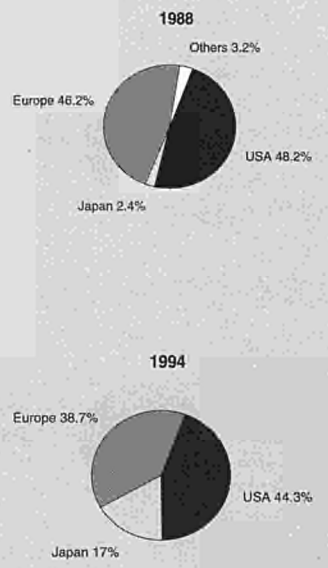
Aerospace equipment

The world ranking of the largest aerospace firms has seen a lot of movements at the top over the period 1988-1994. This is the result of the mega-merger in 1994 between Lockheed and Martin Marietta of the US. The Lockheed Martin merger created a giant which is now the world's largest aerospace firm in terms of turnover (ECU 19.3 billion) just in front of

Figure 11: Food, drink and tobacco

Turnover in 1988 (million ECU)

Unilever	EUR	26 539
Nestlé	EUR	23 548
Philip Morris	USA	21 852
Ferruzzi Finanziaria	EUR	16 177
RJR Nabisco	USA	14 328
B.A.T.industries	EUR	11 885
Pepsico	USA	10 991
Kraft General Foods	USA	10 222
Conagra	USA	10 008
Grand Metropolitan	EUR	8 944
Sara Lee	USA	8 699
Barlow Rand	ZAF	7 809
IBP	USA	7 661
Anheuser-Busch	USA	7 541
Coca-Cola	USA	7 046
Dalgety	EUR	6 580
Snow Brand Milk Products	JPN	6 202
Borden	USA	6 121
American Brands	USA	6 114
BSN	EUR	5 995
Allied-Lyons	EUR	5 891
Archer-Daniels-Midland	USA	5 674
Eridania Zuccherifici Nazionali	EUR	5 498
Hillsdown Holdings	EUR	5 341
H.T. Heinz	USA	5 061



Turnover in 1994 (million ECU)

Philip Morris	USA	45 348
Unilever	EUR	38 302
Nestlé	EUR	35 091
Japan Tobacco	JPN	28 895
Pepsico	USA	24 010
Conagra	USA	19 165
B.A.T. Industries	EUR	15 070
Kirin Brewery	JPN	14 030
Coca-Cola	USA	13 638
Sara Lee	USA	13 519
RJR Nabisco Holdings	USA	12 958
Ferruzzi Finanziaria	EUR	11 729
Groupe Danone	EUR	11 680
Montedison	EUR	10 521
IBP	USA	10 183
Anheuser-Busch	USA	10 165
Archer Daniels Midland	USA	9 958
Snow Brand Milk Products	JPN	9 575
Grand Metropolitan	EUR	9 064
Asahi Breweries	JPN	8 884
Eridania Beghin-Say	EUR	7 722

Source: DABLE

Table 4: The world's 200 largest industrial groups, 1994

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on Assets (%)	Major sector of Activity
1	General Motors	USA	126 991	4 772	11 194	692 800	3.2	Motor Vehicles & Parts
2	Ford Motor	USA	108 310	4 476	19 846	337 778	2.5	Motor Vehicles & Parts
3	Toyota Motor	JPN	86 309	1 348	40 404	142 645	1.6	Motor Vehicles & Parts
4	Exxon	USA	84 061	4 301	31 551	86 000	5.8	Petroleum Refining
5	Royal Dutch Shell	UK/NL	79 874	5 249	57 570	106 000	5.8	Petroleum Refining
6	Hitachi	JPN	62 636	940	25 025	331 673	1.3	Electrical Engineering
7	Matsushita Electric	JPN	57 322	747	26 856	265 397	1.1	Electrical Engineering
8	Daimler-benz	D	54 121	548	10 452	330 551	1.1	Motor Vehicles & Parts
9	IBM	USA	54 014	2 548	19 744	219 839	3.9	Computers & Office Equip.
10	General Electric	USA	50 619	3 985	22 252	221 000	2.4	Electrical Engineering
11	Mobil	USA	49 749	1 483	14 459	58 500	4.2	Petroleum Refining
12	Nissan Motor	JPN	48 136	-1 370	8 503	145 582	-2.4	Motor Vehicles & Parts
13	Samsung Group	KOR	45 811	464	6 489	191 303	1.1	Electrical Engineering
14	Philip Morris	USA	45 348	3 984	10 782	165 000	9.0	Agro-alimentary
15	Siemens	D	43 966	919	10 563	382 000	1.8	Electrical Engineering
16	Chrysler	USA	42 785	3 131	9 018	112 000	7.6	Motor Vehicles & Parts
17	British Petroleum	UK	42 753	2 036	14 275	66 550	5.1	Petroleum Refining
18	IRI	I	42 363	-913	3 844	292 695	-0.9	Conglomerate
19	Volkswagen	D	41 623	77	5 711	242 318	0.2	Motor Vehicles & Parts
20	Toshiba	JPN	39 524	369	9 230	190 000	0.8	Computers & Office Equip.
21	Unilever	UK/NL	38 302	2 012	6 718	304 000	8.8	Agro-alimentary
22	Nestlé	CH	35 091	2 005	10 451	212 687	7.3	Agro-alimentary
23	Fiat	I	33 925	526	10 305	248 180	1.1	Motor Vehicles & Parts
24	Veba	D	33 798	717	8 100	126 875	2.3	Conglomerate
25	Sony	JPN	32 863	-2 420	8 314	138 000	-7.0	Electrical Engineering
26	Honda Motor	JPN	32 721	508	8 394	92 800	2.1	Motor Vehicles & Parts
27	Elf Aquitaine	F	31 577	-5	11 628	89 500	0.0	Petroleum Refining
28	NEC	JPN	31 097	291	6 524	151 069	0.9	Computers & Office Equip.
29	Daewoo	KOR	30 018	640	6 755	80 600	1.5	Electrical Engineering
30	ENI	I	29 320	1 671	10 170	91 544	3.6	Petroleum Refining
31	Japan Tobacco	JPN	28 895	573	9 840	23 208	3.6	Agro-alimentary
32	E.I.Du Pont De Nemours	USA	28 707	2 300	10 813	107 000	7.4	Chemicals
33	Philips Electronics	NL	28 279	950	5 882	253 032	4.3	Electrical Engineering
34	Mitsubishi Motors	JPN	28 172	104	3 700	28 742	0.5	Motor Vehicles & Parts
35	Texaco	USA	27 440	826	8 221	32 500	3.8	Petroleum Refining
36	Renault	F	27 147	553	6 505	138 279	1.7	Motor Vehicles & Parts
37	Fujitsu	JPN	26 876	371	9 078	51 208	1.2	Computers & Office Equip.
38	Mitsubishi Electric	JPN	26 820	347	6 872	110 573	1.3	Electrical Engineering
39	Procter & Gamble	USA	26 524	1 936	7 732	96 500	8.7	Chemicals
40	Hoechst	D	25 812	547	5 835	165 671	2.5	Chemicals
41	Chevron	USA	25 585	1 428	12 309	45 758	4.9	Petroleum Refining
42	Alcatel Alsthom	F	25 490	550	9 090	196 900	1.3	Electrical Engineering
43	Peugeot	F	25 270	472	8 138	139 800	2.3	Motor Vehicles & Parts
44	ABB Asea Brown Boveri	CH/S	24 011	614	3 245	207 557	2.5	Electrical Engineering
45	Pepsico	USA	24 010	1 504	5 782	471 000	7.2	Agro-alimentary
46	RWE	D	23 934	479	4 057	117 958	1.4	Conglomerate
47	Nippon Steel	JPN	23 769	-33	7 081	31 072	-0.1	Metallurgy
48	Pemex	MEX	23 703	828	18 666	119 928	2.6	Petroleum Refining
49	Mitsubishi Heavy	JPN	23 502	643	9 720	43 113	1.9	Mechanical Engineering
50	BASF	D	22 711	668	8 185	106 266	3.2	Chemicals
51	Bayer	D	22 579	1 024	8 633	146 700	4.7	Chemicals
52	Amoco	USA	21 966	1 509	12 128	43 205	6.1	Petroleum Refining
53	BMW	D	21 906	360	4 099	109 362	1.8	Motor Vehicles & Parts
54	Nippon Oil	JPN	21 897	172	5 237	2 764	0.8	Petroleum Refining
55	Hewlett-packard	USA	21 363	1 367	8 485	98 400	8.2	Computers & Office Equip.
56	Total	F	20 792	522	8 011	51 803	2.6	Petroleum Refining
57	Lockheed Martin	USA	19 316	890	5 132	75 900	5.8	Aerospace
58	Conagra	USA	19 165	394	2 683	90 871	4.6	Agro-alimentary
59	Motorola	USA	18 759	1 316	7 670	132 000	8.9	Electrical Engineering
60	Petroleos de Venezuela	VEN	18 685	1 698	21 166	53 627	N/A	Petroleum Refining
61	Boeing	USA	18 488	722	8 180	115 000	4.0	Aerospace
62	Mazda Motor	JPN	18 184	-340	2 539	27 321	-2.9	Motor vehicles & parts
63	Thyssen	D	18 163	28	1 894	129 389	0.2	Metallurgy
64	Robert Bosch	D	17 929	231	4 216	156 464	1.6	Motor Vehicles & parts
65	United Technologies	USA	17 875	493	3 450	171 500	3.9	Aerospace
66	INI	E	17 152	-517	6 414	130 948	-1.6	Conglomerate

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on Assets (%)	Major sector of Activity
67	Volvo	S	17 053	1 447	4 741	75 549	9.5	Motor Vehicles & Parts
68	Dow Chemical	USA	16 878	791	6 944	53 700	3.7	Chemicals
69	Canon	JPN	15 969	256	6 452	67 672	1.4	Computers & Office Equip.
70	Mannesmann	D	15 807	110	3 250	124 914	0.8	Mechanical Engineering
71	Japan Energy	JPN	15 412	-137	1 031	5 392	-1.0	Petroleum Refining
72	Sunkyong	KOR	15 297	78	3 222	23 356	0.5	Petroleum Refining
73	B.A.T. Industries	UK	15 070	1 556	5 923	173 475	3.0	Agro-alimentary
74	Viag	D	15 058	524	2 760	86 018	2.8	Conglomerate
75	Xerox	USA	15 042	670	3 721	87 600	2.1	Computers & Office Equip.
76	Ssangyong	KOR	14 981	129	3 361	31 270	0.9	Petroleum Refining
77	NKK	JPN	14 866	-316	3 217	20 190	-1.2	Metallurgy
78	Petrobras	BRA	14 588	1 204	15 850	54 535	4.9	Petroleum Refining
79	Petrofina	B	14 094	259	3 090	14 013	3.0	Petroleum Refining
80	Hanson	UK	14 084	1 384	5 976	74 000	4.9	Conglomerate
81	Kirin Brewery	JPN	14 030	431	5 684	8 398	3.6	Agro-alimentary
82	Sanyo Electric	JPN	13 972	93	5 926	58 417	0.5	Electrical Engineering
83	Isuzu Motors	JPN	13 945	68	548	14 673	0.6	Motor Vehicles & Parts
84	Coca-Cola	USA	13 638	2 154	4 415	33 000	18.4	Agro-alimentary
85	Ciba-Geigy	CH	13 599	1 180	9 548	83 980	6.0	Chemicals
86	Sara Lee	USA	13 519	204	3 182	146 000	2.0	Agro-alimentary
87	Sharp	JPN	13 345	367	6 910	43 949	2.3	Electrical Engineering
88	Bridgestone	JPN	13 175	263	4 111	15 626	1.9	Rubber Products
89	Johnson & Johnson	USA	13 137	1 675	5 946	81 500	12.8	Chemicals
90	Rhone-Poulenc	F	13 123	402	5 959	81 285	2.2	Chemicals
91	Cosmo Oil	JPN	13 101	108	1 513	3 688	1.1	Petroleum Refining
92	RJR Nabisco Holdings	USA	12 958	644	9 198	66 500	2.4	Agro-alimentary
93	Minnesota Mining & Mfg	USA	12 716	1 115	5 679	86 166	9.8	Instrument Engineering
94	Atlantic Richfield	USA	12 679	775	5 294	23 200	3.7	Petroleum Refining
95	Merck & Co	USA	12 624	2 527	9 393	47 500	13.7	Chemicals
96	International Paper	USA	12 621	364	5 493	70 000	2.4	Paper & Paper Products
97	Showa Shell Sekiyu K.K.	JPN	12 516	113	1 500	2 397	1.5	Petroleum Refining
98	Osterreichische Industrie	A	12 263	-185	1 558	77 731	N/A	Conglomerate
99	Caterpillar	USA	12 083	805	2 455	53 986	6.4	Mechanical Engineering
100	Usinor-Sacilor	F	12 082	269	2 435	69 107	2.3	Metallurgy
101	Preussag	D	12 062	147	1 667	69 712	1.5	Conglomerate
102	ICI	UK	11 863	243	4 823	67 500	2.1	Chemicals
103	Electrolux	S	11 817	528	2 239	114 103	5.7	Electrical Engineering
104	BTR	UK	11 762	1 124	3 473	124 491	9.7	Conglomerate
105	Ferruzzi Finanziaria	I	11 729	-518	628	39 449	-2.6	Agro-alimentary
106	Digital Equipment	USA	11 705	-1 832	2 854	77 800	-19.9	Computers & Office Equip.
107	Groupe Danone	F	11 680	536	5 332	68 181	4.0	Agro-alimentary
108	Nippondenso	JPN	11 538	292	6 998	41 067	2.3	Motor Vehicles & Parts
109	Eastman Kodak	USA	11 432	467	3 387	150 600	3.8	Instrument Engineering
110	Saint-Gobain	F	11 327	551	5 888	80 909	4.0	Building Materials
111	Thomson	F	11 316	-329	-139	99 895	-2.5	Electrical Engineering
112	McDonnell Douglas	USA	11 111	504	3 265	65 760	4.9	Aerospace
113	Mitsubishi Chemical	JPN	11 056	25	3 912	13 877	0.2	Chemicals
114	Kobe Steel	JPN	11 019	-762	1 975	17 821	-3.9	Metallurgy
115	Sumitomo Metal	JPN	10 969	-239	4 065	19 627	-1.2	Metallurgy
116	Allied Signal	USA	10 808	640	2 515	87 500	6.7	Aerospace
117	USX-Marathon	USA	10 758	271	2 887	20 711	2.9	Petroleum Refining
118	Pechiney	F	10 756	-571	1 692	58 234	-5.7	Metal Products
119	Hoesch-krupp	D	10 601	-5	996	66 138	0.0	Metallurgy
120	Repsol	E	10 549	610	3 768	18 727	5.9	Petroleum Refining
121	Montedison	I	10 521	-179	2 396	31 994	-1.1	Agro-alimentary
122	Broken Hill Proprietary	AUS	10 478	718	7 010	49 000	4.1	Metallurgy
123	Suzuki Motor	JPN	10 381	165	2 380	13 455	2.3	Motor Vehicles & Parts
124	Goodyear	USA	10 362	478	2 364	90 712	6.2	Rubber Products
125	Phillips Petroleum	USA	10 358	435	2 786	18 400	4.6	Petroleum Refining
126	Akzo Nobel	NL	10 299	581	2 902	70 400	7.0	Chemicals
127	Tenneco	USA	10 266	381	2 569	55 000	3.6	Mechanical Engineering
128	Michelin	F	10 221	196	1 302	117 776	1.8	Rubber Products
129	IBP	USA	10 183	154	658	30 700	9.8	Agro-alimentary
130	Anheuser-Busch	USA	10 165	870	3 724	42 622	9.3	Agro-alimentary
131	Bristol-Myers Squibb	USA	10 106	1 553	4 810	47 700	14.3	Instrument Engineering
132	Statoil	N	10 011	657	3 369	12 630	6.0	Petroleum Refining
133	Archer Daniels Midland	USA	9 958	424	4 417	16 013	5.5	Agro-alimentary
134	DAI Nippon Printing	JPN	9 841	406	6 072	14 498	3.9	Printing & Publishing
135	Sandoz	CH	9 788	1 069	4 248	60 304	8.9	Chemicals

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on Assets (%)	Major sector of Activity
136	Intel	USA	9 715	1 929	7 815	32 600	16.6	Electrical Engineering
137	Rockwell International	USA	9 584	546	2 891	71 891	6.6	Aerospace
138	Snow Brand Milk Products	JPN	9 575	83	1 103	7 642	1.9	Agro-alimentary
139	Asahi Glass	JPN	9 574	122	5 060	9 273	0.9	Building Materials
140	Hyundai Motor	KOR	9 508	147	1 585	44 083	2.1	Motor Vehicles & Parts
141	Mitsubishi Materials	JPN	9 498	-31	2 305	9 182	-0.3	Metallurgy
142	Kawasaki Steel	JPN	9 477	-262	3 511	15 425	-1.5	Metallurgy
143	MAN	D	9 429	78	1 785	56 997	0.9	Motor Vehicles & Parts
144	Toppan Printing	JPN	9 327	131	4 658	13 879	1.5	Printing & Publishing
145	Sumitomo Electric	JPN	9 240	167	3 390	15 368	1.7	Metallurgy
146	Mitsubishi Oil	JPN	9 216	107	1 877	2 479	1.4	Petroleum Refining
147	Compaq Computer	USA	9 163	731	3 098	21 137	14.1	Computers & Office Equip.
148	Fuji Heavy	JPN	9 102	10	655	15 243	0.2	Motor Vehicles & Parts
149	Roche Holding	CH	9 096	1 764	10 129	61 381	7.9	Chemicals
150	Grand Metropolitan	UK	9 064	585	4 601	64 300	4.6	Agro-alimentary
151	LM Ericsson	S	9 032	432	2 549	76 144	5.5	Electrical Engineering
152	Fuji Photo Film	JPN	8 992	532	9 739	27 565	3.7	Instrument Engineering
153	Asahi Breweries	JPN	8 884	54	2 728	4 551	0.4	Agro-alimentary
154	Kawasaki Heavy	JPN	8 831	84	1 180	17 243	0.9	Mechanical Engineering
155	Weyerhaeuser	USA	8 768	497	3 618	36 665	4.5	Paper & Paper Products
156	Matsushita Electric Works	JPN	8 699	141	3 882	30 579	1.4	Metal Products
157	Texas Instruments	USA	8 698	583	2 563	56 333	10.2	Electrical Engineering
158	Norsk Hydro	N	8 533	467	3 691	32 416	4.2	Chemicals
159	Schneider	F	8 510	103	2 486	89 762	1.2	Electrical Engineering
160	Raytheon	USA	8 444	503	3 313	60 200	8.1	Instrument Engineering
161	Ishikawajima-Harima Heavy Ind.	JPN	8 442	118	1 554	15 903	1.1	Mechanical Engineering
162	Ricoh Company	JPN	8 417	153	3 117	13 363	1.4	Instrument Engineering
163	Kubota	JPN	8 365	166	2 651	N/a	1.6	Mechanical Engineering
164	Aluminum Co of America	USA	8 352	374	3 372	61 700	3.7	Metallurgy
165	Sun Company	USA	8 279	82	1 571	14 500	1.5	Petroleum Refining
166	Pohang Iron & Steel	KOR	8 193	382	5 448	22 033	2.7	Metallurgy
167	British Aerospace	UK	8 193	181	1 131	46 500	1.8	Aerospace
168	Textron	USA	8 165	365	2 430	53 000	2.1	Aerospace
169	Nippon Paper Industries	JPN	8 161	40	2 413	8 288	0.4	Paper & Paper Products
170	Ashland	USA	8 148	170	1 374	31 600	3.4	Petroleum Refining
171	Thyssen Handelsunion	D	8 058	38	371	27 718	1.2	Metallurgy
172	Neste	SF	7 990	220	756	8 195	3.8	Petroleum Refining
173	Sumitomo Chemical	JPN	7 967	48	1 972	7 184	0.4	Chemicals
174	Apple Computer	USA	7 917	267	2 053	14 592	5.8	Computers & Office Equip.
175	LG Electronics	KOR	7 889	451	1 772	31 280	5.8	Electrical Engineering
176	Smithkline Beecham	UK	7 838	116	1 398	52 300	1.2	Chemicals
177	Occidental Petroleum	USA	7 789	-30	3 758	19 860	-0.2	Chemicals
178	Eridania Beghin-Say	F	7 722	184	2 681	22 298	2.8	Agro-alimentary
179	Abbott Laboratories	USA	7 721	1 279	3 415	49 464	17.8	Chemicals
180	Deere & Company	USA	7 719	516	2 187	34 252	5.0	Mechanical Engineering
181	CEA-industrie	F	7 676	203	2 729	42 901	1.0	Uranium
182	TRW	USA	7 663	281	1 536	64 200	5.9	Motor Vehicles & Parts
183	Yukong	KOR	7 607	13	1 783	5 883	0.2	Petroleum Refining
184	Komatsu	JPN	7 581	84	4 748	28 040	0.7	Mechanical Engineering
185	American Home Products	USA	7 561	1 289	3 587	74 009	7.1	Chemicals
186	Northern Telecom	CAN	7 508	345	2 900	57 054	4.6	Electrical Engineering
187	Westinghouse Electric	USA	7 461	65	1 511	84 399	0.8	Electrical Engineering
188	Toray Industries	JPN	7 429	83	3 637	31 949	0.8	Chemicals
189	General Electric Company	UK	7 419	716	4 251	82 251	9.0	Electrical Engineering
190	Emerson Electric	USA	7 416	779	3 741	73 900	11.0	Electrical Engineering
191	Glaxo Wellcome	UK	7 415	1 708	6 611	47 189	16.5	Chemicals
192	Aérospatiale	F	7 384	-73	594	39 556	-0.7	Aerospace
193	Henkel	D	7 316	205	1 904	39 907	3.8	Chemicals
194	L'oréal	F	7 241	450	3 259	38 972	6.6	Chemicals
195	Degussa	D	7 180	81	901	27 202	2.1	Metallurgy
196	Alcan Aluminium	CAN	7 118	83	4 038	42 000	1.0	Metallurgy
197	Fuji Electric	JPN	7 065	32	1 455	13 794	0.5	Electrical Engineering
198	Dainippon Ink & Chemicals	JPN	7 010	53	1 629	24 804	0.6	Chemicals
199	Pfizer	USA	6 983	1 095	3 646	40 800	11.7	Chemicals
200	Monsanto	USA	6 976	525	2 486	29 354	7.0	Chemicals

Source: DABLE

Boeing (ECU 18.4 billion). The Lockheed Martin union has brought into existence an entity which can offer an impressive array of aerospace products that includes military aircraft, avionics and satellite launchers. United Technologies of the US, which was the biggest aerospace firm in 1988, has retroceded to third place in 1994 with turnover of 17.8 billion ECU.

Building on the Lockheed Martin mega-merger, the US firms remained by far the world's largest aerospace equipment producers in 1994. They held the top six positions and accounted for 86.0% of the turnover generated by the world's nine largest aerospace manufacturer. The US firms are favoured by a large civil and military domestic market. The only two European firms in the ranking are British Aerospace and Aérospatiale which occupy respectively the 7th and 9th place. Unlike the US aerospace sector, European firms have the disadvantage of facing a largely fragmented market as Europe's aerospace industry has developed on a national basis in order to guarantee national independence of defence activities.

From 1990 to 1994, the world aerospace industry has been subject to its worst crisis since World War Two. This brutal recession was the consequence of two factors: the drastic cuts in defence spending of NATO countries since the end of the Cold War and the shrinking demand for new aircraft by airline companies which are sluggishly coming out of a severe downturn in air traffic that began in 1990. In consequence, turnover of major aerospace company have been seriously affected. Three aerospace companies on the top 9 list recorded negative growth from 1988 to 1994: McDonnell Douglas (-12.7%), Rockwell International (-4.1%) and British Aerospace (-3.4%).

Food, drink and tobacco

The ranking of the world's top food, drink and tobacco producers has seen notable changes from 1988 to 1994. The largest world producer in this sector in 1994 was Philip Morris of the US, which was in third place in 1988, with a turnover of 45.3 billion ECU. In climbing from the 3rd to the 1st place, Philips Morris outperformed two European firms, Unilever and Nestle, which were respectively ranked first and second in 1988. The performance of Philip Morris is explained by a particularly aggressive position on the cigarette market, pursuing a strategy of price cuts to boost market share, and succeeding at it. Philip Morris also acquired Kraft General Foods Europe and the Swiss chocolate maker Jacobs Suchard in 1993, creating a global multinational in Europe.

In fourth place is a Japanese company, Japan Tobacco, a new entrant in the list with a turnover of 28.9 billion ECU. In 1994, four Japanese companies made the list of the largest food, drink and tobacco producers in the world, compared to only one in 1988 which was only ranked 17th (Snow Brand Milk Products). This has translated into the fast expansion of Japan's share in the total turnover generated by the top food, drink and tobacco producers, from 2.4% in 1988 to 17.0% in 1994.

Companies which made huge progress in the list from 1988 to 1994 are Coca Cola of the US (15th to 9th place), Conagra of the US (9th to 6th place) and Groupe Danone of France (20th to 13th place) thanks to spectacular turnover growth. In the case of Groupe Danone, such a ascent in the ranking is the result of a wave of cross-border acquisitions in western Europe following the launch of the Internal Market Programme as well as other acquisitions in the rest of the world since the early 1990s.

On the other side of the spectrum, three companies suffered a severe fall in the ranking of the world's top food, drink and tobacco producers. They are Ferruzi Finanziara of Italy (4th to 12th place), RJR Nabisco of the US (5th to 11th place) and Grand Metropolitan of the UK (10th to 19th place). RJR Nabisco and Ferruzi Finanziara are the only firms to have recorded negative growth in turnover from 1988 to 1994.

EUROPE'S TOP 200 FIRMS

Overall performance

Table 5 presents Europe's 200 largest manufacturing and services companies by country in 1988 and in 1994 respectively. The most notable trend is the reversal of France and UK's positions between 1988 and 1994 based on turnover. This reflects concentration movements by some of the largest French companies combined with severe downsizing measures undertaken my major British firms in many sectors (aerospace, air transport, energy, telecommunications services, etc.). The share of France's largest companies in Europe's top 200 firms has increased from 20.1% in 1988 to 22.8% in 1994, while that of UK's largest firms went from 23.3% to 18.4% during the same period. The UK decline is also explained partly by the devaluation of the Pound in 1992-1993 which played against the UK companies sales performance when measured in current ECU. The same rationale holds for Italy whose currency also depreciated strongly in 1992-1993 and whose share of Europe's top 200 firms fell from 10.4 in 1988 to 9.1% in 1994.

The sectoral distribution of the European companies in the top 200 list in 1988 and 1994 is displayed in Figure 12. The only manufacturing sector to have increased its sectoral share is motor vehicles and parts which went from 12.8% in 1988 to 13.7% in 1994. This is partly explained by the very strong recovery recorded by the European motor vehicles industry in 1994 after going through dismal years in the early 1990s. All other manufacturing sectors saw their share slightly declined or stay stable. The fastest growing sector from 1988 to 1994 in terms of sectoral share has been telecommunications services, which more than doubled is share of total turnover generated by the top 200 firms in Europe, thanks to rapid growth in demand for telecom services fostered by the deregulation of the sector in Europe.

Table 6 present Europe's 25 largest profit earners, the most profitable and the richest firms, along with Europe's 25 biggest employers. As in the rest of the world, the list of most profitable companies is dominated by firms from the pharmaceutical industry. There is also a strong presence of telecommunications services firms and electricity distributors as most of them can still benefit from a monopoly regime in their respective national markets. Amongst the biggest employers we find a very diverse mix of companies, many of which are fully or partially government owned, and some of which may not keep their place in this ranking in future years as they are on the list of companies to be restructured or privatised in the next few years (most particularly in transport services, energy distribution and telecommunications services).

Below, we look at the relative performance of European firms in each of these sectors over time.

Sectoral performance

Petroleum refining

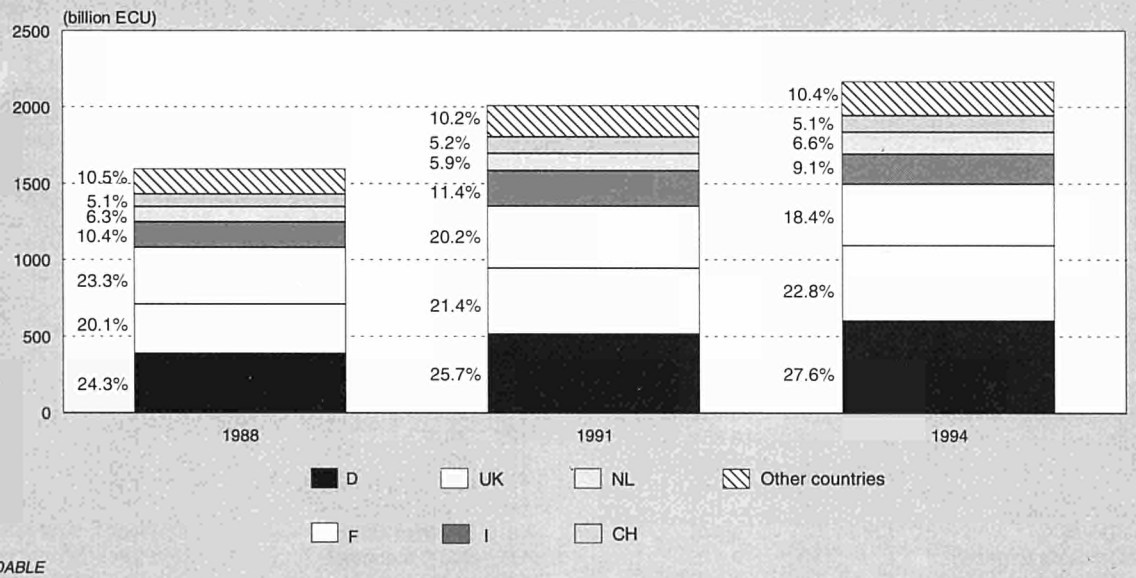
There has been no major change in the ranking of the top European petroleum refining firms in terms of turnover over the period 1988-1994. The 12 companies that made the list in 1988 were still the same in 1994. Royal Dutch Shell and British Petroleum still occupied in 1994 respectively the first two positions in the ranking, but the gap between the two firms widened considerably as the turnover growth of Royal Dutch Shell was much stronger (3.2% on average per year) than that of British Petroleum (1.5% on average per year). The remaining top five places were held by Elf Aquitaine of France (3rd), ENI (4th) and Total of France (5th).

Table 5: The 200 largest companies in Europe by country
Country

	1988			1994		
	Number	Turnover	%	Number	Turnover	%
BR Deutschland	38	388	24.3	41	599	27.6
France	45	320	20.1	48	495	22.8
United Kingdom	54	372	23.3	48	400	18.4
Italia	12	167	10.4	12	198	9.1
Nederland	9	101	6.3	12	144	6.6
Switzerland	11	82	5.1	11	110	5.1
Sverige	15	79	4.9	10	78	3.6
España	5	25	1.6	5	47	2.2
Belgique/België	4	21	1.3	5	38	1.8
Norway	2	14	0.9	2	19	0.9
Suomi-Finland	2	10	0.6	3	18	0.8
Osterreich	2	13	0.9	2	17	0.8
Luxembourg	1	4	0.3	1	5	0.2
Total	200	1596	100.0	200	2169	100.0

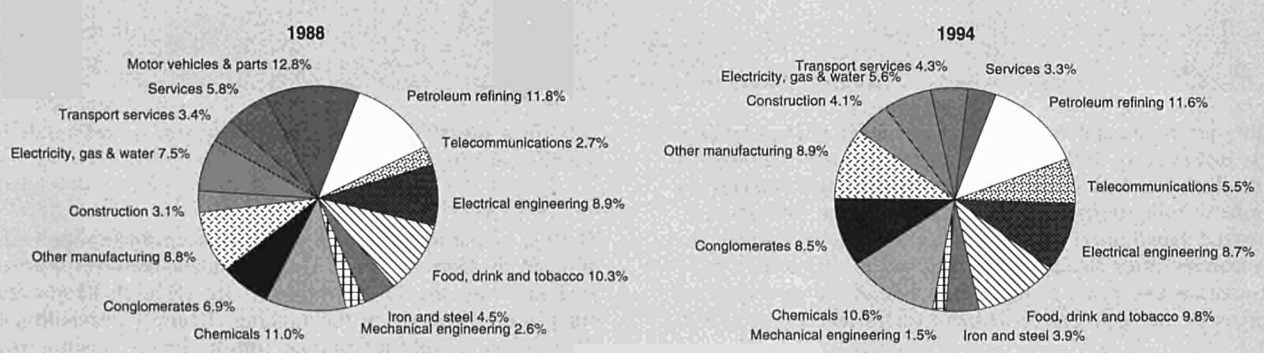
Source: DABLE

Figure 12: The largest European companies
Turnover share by region



Source: DABLE

Figure 13: The 200 largest European companies
Turnover share by sector



Source: DABLE

Table 6: The largest groups in Europe, 1994

The 25 largest profit earners

			Net Income (million Ecu)
1	Royal Dutch Shell	UK/NL	5 249
2	British Telecommunications	UK	2 198
3	British Petroleum	UK	2 036
4	Unilever	UK/NL	2 012
5	Nestlé	CH	2 005
6	Roche Holding	CH	1 764
7	Glaxo Wellcome	UK	1 708
8	ENI	I	1 671
9	B.A.T. Industries	UK	1 556
10	France Telecom	F	1 507
11	Volvo	S	1 447
12	Hanson	UK	1 384
13	Enel	I	1 224
14	Ciba-Geigy	CH	1 180
15	BTR	UK	1 124
16	Sandoz	CH	1 069
17	Bayer	D	1 024
18	Philips Electronics	NL	950
19	Koninklijke PTT Nederland	NL	944
20	Empresa de Electricidad	E	943
21	Siemens	D	919
22	Guinness	UK	828
23	Telecom Italia	I	789
24	Astra	S	743
25	Veba	D	717

The 25 most profitable

			Net income turnover (%)
1	Astra	S	23.4
2	Glaxo Wellcome	UK	23.0
3	Roche Holding	CH	19.4
4	Guinness	UK	18.5
5	Empresa de Electricidad	E	17.4
6	Reed Elsevier	UK/NL	15.4
7	LUMH	F	13.6
8	Powergen	UK	13.4
9	National Power	UK	13.3
10	Electrabel	B	12.6
11	British Telecommunications	UK	12.5
12	Oy Nokia	SF	12.1
13	Koninklijke PTT Nederland	NL	11.4
14	Sandoz	CH	10.9
15	B.A.T. Industries	UK	10.3
16	Sara Lee	NL	9.9
17	Zeneca Group	UK	9.9
18	Hanson	UK	9.8
19	British Steel	UK	9.8
20	General Electric Company	UK	9.7
21	BTR	UK	9.6
22	Bass	UK	8.9
23	Ciba-Geigy	CH	8.7
24	Polygram	NL	8.6
25	Volvo	S	8.5

The 25 richest

			Net worth (million ECU)
1	Royal Dutch Shell	UK/NL	57 570
2	British Gas	UK	24 763
3	France Telecom	F	20 851
4	Deutsche Telekom	D	18 648
5	British Telecommunications	UK	15 234
6	British Petroleum	UK	14 275
7	Enel	I	12 825
8	Elf Aquitaine	F	11 628
9	Telecom Italia	I	11 243
10	Siemens	D	10 563
11	Daimler-Benz	D	10 452
12	Nestle	CH	10 451
13	Fiat	I	10 305
14	Eni	I	10 170
15	Roche Holding	CH	10 129
16	Ciba-Geigy	CH	9 548
17	Telefonica de Espana	E	9 515
18	Alcatel Alsthom	F	9 090
19	Bayer	D	8 633
20	STET	I	8 626
21	BASF	D	8 185
22	Peugeot	F	8 138
23	Veba	D	8 100
24	Total	F	8 011
25	Unilever	UK/NL	6 718

The 25 biggest employers

			(employees)
1	Siemens	D	382 000
2	Deutsche Bahn	D	375 593
3	Deutsche Postdienst	D	340 000
4	Daimler-Benz	D	330 551
5	Unilever	UK/NL	304 000
6	La Poste	F	298 200
7	IRI	I	292 695
8	Philips Electronics	NL	253 032
9	Fiat	I	248 180
10	Volkswagen	D	242 318
11	Deutsche Telekom	D	239 585
12	SNCF	F	215 787
13	Nestlé	CH	212 687
14	Abb Asea Brown Boveri	CH/S	207 557
15	Alcatel Alsthom	F	196 900
16	The Post Office	UK	189 000
17	B.A.T. Industries	UK	173 475
18	Hoechst	D	165 671
19	Robert Bosch	D	156 464
20	France Telecom	F	152 586
21	Lyonnaise Des Eaux	F	151 873
22	Accor	F	147 000
23	Bayer	D	146 700
24	STET	I	144 316
25	Peugeot	F	139 800

Source: DABLE

Falling oil prices and weakening demand for refined oil products in the early 1990s has compelled the major European oil producers to undertake a wave of rationalisation measures in order to bring refining capacities more in line with demand. Increased substitution away from oil towards competing energy commodities (natural gas, coal and electricity) in most end-user sectors apart from transport have led to important changes in the structure of demand for refined oil products.

From 1993 to 1994, the combined turnover of the top 12 European firms fell by 1.6% (despite the increase of oil prices in 1994) while their profit increased by 15.0%. This is clearly the reflection that the top European oil producers were carrying on in 1994 with their rationalisation programmes which translated in a much improved profitability for the refineries remaining in operation.

Iron and steel

The list of the top iron and steel producers in Europe is dominated by German firms. German steelmakers respectively held in 1994, the 1st (Thyssen), 3rd (Hoesch-Krupp) and 4th place (Degussa) in the ranking. Krupp's acquisition of Hoesch has brought it from the 10th to the 3rd position over the 1988-1994 period. Overall, German firms account for almost half (48.3%) of the turnover generated by the top European steel producers. Usinor-Sacilor of France is in second place while British Steel is ranked fifth. Benelux countries

Table 7: Petroleum refining
Turnover

(million ECU)	1988		1994
Royal Dutch Shell	66 224	Royal Dutch Shell	79 874
British Petroleum	39 012	British Petroleum	42 753
ENI	21 366	Elf Aquitaine	31 577
Elf Aquitaine	17 922	ENI	29 320
Total	11 838	Total	20 792
Petrofina	8 049	Petrofina	14 094
Repsol	6 775	Repsol	10 549
Statoil	5 912	Statoil	10 011
Neste	5 386	Neste	7 990
RWE-DEA	3 872	RWE-DEA	6 874
OMV	3 019	OMV	5 023
Compania Española de Petroleos	2 641	Compania Española de Petroleos	4 431

Source: DABLE

have three representatives on the list of the largest European companies. They are Arberd from Luxembourg, Cockerill Sambre from Belgium and Hoogovens from the Netherlands.

The total turnover of the top European iron and steel producers increased by almost 20.0% between 1988 and 1994, representing a 3.0% average annual growth). However, much of it reflected growth through acquisitions as the European steel market was quite morose in the early 1990s due to the negative impact of the economic recession in Europe. After upswings in 1989 and 1990, the production and consumption of steel in Europe declined continuously from 1990 to 1993 due to an increasing use of substitutes for steel (aluminium and plastics) and lower investment activity in all major downstream markets (e.g. motor vehicles, construction, production machinery). In addition to deteriorating market conditions, growing import competition from the East European steel producers further squeezed sales of the larger western Europe steelmakers and, thus, partly account for slow turnover growth after 1990.

All major European steel producers have been drastically rationalising production capacities and shedding workers since the early 1990s, and the trend continued in 1994. The top five European steelmakers have cut their workforce by 7.0% from 1993 to 1994. Hoesch-Krupp, the second largest German producer reduced its workforce by 15.0% in 1994. However, European steelmakers strongly improved their profitability in 1994 which can be attributed to the benefits of their cost-cutting programmes and the recovery of the European steel demand in 1994. Five firms which reported losses in 1993 returned into the black in 1994. They are Usinor-Sacilor, Hoesch-Krupp, Arbed, Cockerill Sambre and Hoogovens.

Chemicals

The European ranking of the largest chemical firms in terms of turnover is dominated by German and Swiss firms. Within the list of the top 15 European chemical producers in 1994, four were German, three of which (Hoechst, BASF and Baker) occupied the top three positions, while Swiss firms held the 4th (Ciba-Geigy), 8th (Sandoz) and 9th place (Roche Holding). The remaining companies in the list are British (ICI, SmithKline Beecham and Glaxo Wellcome), French (Rhône Poulenc and l'Oréal), Dutch (Akzo Nobel), Norwegian (Norsk Hydro) and Belgian (Solvay).

The total turnover of the 15 largest European chemical companies increased by 22.0% over the period 1988-1994, which therefore augmented substantially the average size of the top firms. Much of it reflect growth through acquisitions by several firms along with strong turnover expansion recorded by pharmaceutical firms as they suffered less from the European recession of 1991-1993. However, profitability levels of pharmaceutical firms in Europe in 1993 and 1994 started to be affected by the cost containment measures adopted by European governments in order to keep health care costs under control.

Table 8: Iron and steel
Turnover

(million ECU)	1988		1994
Thyssen AG	14 097	Thyssen	18 163
Usinor Sacilor	11 211	Usinor-Sacilor	12 082
British Steel	7 505	Hoesch-Krupp	10 601
Metallgesellschaft	7 350	Degussa	7 180
Degussa	6 564	British Steel	6 034
Arbed	4 327	Alcatel Cable	5 976
Cockerill Sambre	3 997	Arbed	5 192
Alusuisse-Ionza	3 460	Alusuisse-Lonza	4 625
Hoogovens	3 370	Cockerill Sambre	4 206
Krupp Stahl	3 176	Hoogovens	3 680
Stahlwerke Peine-Salzgitter	2 722	Preussag Stahl	3 211

Source: Dable

The acquisitions and restructuring moves that took place in the European chemical industry has changed the ranking of the top chemical firms from 1988 to 1994. Major acquisitions allowed two British companies to make the top 15 list in 1994. They are SmithKline Beecham which acquired Sterling Health of the US and Glaxo which took over Wellcome of the UK. Glaxo Wellcome is now the largest pharmaceutical group in the world in terms of turnover and market share. The third new entrant in the list is L'Oréal of France which also made a series of important acquisitions. It is to note also that the acquisition of Synthex of the US by Roche allowed the Swiss pharmaceutical group to move from the 10th to the 8th position in the ranking of the largest European chemical firms

Mechanical engineering

The European mechanical engineering sector is much less concentrated than the other manufacturing sectors, such that the largest European producers in this sector are not numerous (five) and rank fairly low in Europe's top 200 companies, except for the leader Mannesmann of Germany which is ranked 35th in 1994. The sector is characterised by a large number of SMEs as the high degree of specialisation required by the market is often best provided by small companies. There is few incentives in the production of mechanical engineering equipment to establish large units in order to achieve economies of scale.

The sector, for which demand is essentially investment driven, had mixed fortunes between 1988 and 1994. A period of fast growth in the second half of the 1980s was followed by weakening sales in the early 1990s due to falling investment in fixed capital in Europe. Despite the negative impact of the recession, Mannesmann posted a turnover growth of 60% over the six year period to 1994, by far the best sales performance of the sector. Mannesmann's turnover is more than three times the size of its closest rival, Agiv of Germany which is a new entrant in 1994 on the list of top European mechanical engineering producer. The third ranked firm is also German, Linde, and is equally a newcomer in the list in 1994.

Electrical and electronic engineering

Concentration in the electrical and electronic engineering sector in Europe is very high. A limited number of large firms which cover nearly all product segments dominate the list of the largest European companies in the sector. The top three firms, Siemens of Germany, Philips of the Netherlands and Alcatel Alsthom of France, accounted in 1994 for half of the turnover generated by the top 13 electrical and electronic companies. The German group Siemens, which is diversified into electrical equipment for industry, telecommunications equipment, domestic electrical equipment and semiconductors, has largely confirmed its first position since 1988 over Philips thanks to a 7.4% average annual growth in turnover compared to 2.7% for Philips. The comparatively slow sales growth recorded by Philips is in part explained by divestment activities and heavy restructuring. This allowed third-ranked Alcatel Ashltom, which registered a 40.0% expansion of sales from 1988 to 1994, to considerably reduce its gap in terms of turnover with Philips.

The strong performance of ex-EFTA firms in the list is noteworthy. In 1994, EFTA countries were represented by ABB Asea Brown Boveri (4th place), Electrolux (5th place), LM Ericsson (7th place) and Nokia (13th place). In 1994, the share of these four firms in total turnover of the top European producers was 25.0%. From 1993 to 1994, Ericsson and Nokia reported spectacular increases in sales and profits as they benefited from the explosive growth of the demand for mobile telephones. These Scandinavian companies are now two of the world's largest suppliers of cellular telephones along with Motorola of the US. Over the entire 1988-1994 period, Ericsson recorded the best performance in turnover growth (13.0% per year), allowing it to jump from the 11th to the 7th place in the ranking.

The 1994 economic recovery in Europe led to much improved financial results for all European producers of electrical and electronic engineering products, except for Thomson of France and AEG of Germany which were still both in the red in 1994. Thomson and General Electric Company of the UK are the only two companies to have recorded negative growth in turnover from 1988 to 1994.

Motor vehicles and components

The European ranking of the largest motor vehicles manufacturers is dominated by German firms. Within the list of the top 16 European motor vehicles producers, 8 were from Germany in 1994, representing almost 60.0% of the turnover of all companies in the ranking. The largest European automotive producer is Daimler- Benz of Germany with a turnover in 1994 of 54.1 billion ECU. Another German firm, Volkswagen was in second place, followed by Fiat of Italy. These two firms have switched places from 1988 to 1994 as Volkswagen showed much faster turnover growth than Fiat.

The rank held by the two French motor vehicles producers, Renault and Peugeot, remained unchanged from 1988 to 1994, as they were still in 4th and 5th place. Most of these leading

Table 9: Chemicals
Turnover

(million ECU)	1988		1994
BASF	20 462	Hoechst	25 812
Hoechst	19 746	BASF	22 711
Bayer	19 507	Bayer	22 579
ICI	17 607	Ciba-Geigy	13 599
Ciba-Geigy	10 214	Rhone-poulenc	13 123
Rhone-Poulenc	9 286	ICI	11 863
Montedison	9 179	Akzo Nobel	10 299
Norsk Hydro	7 800	Sandoz	9 788
Akzo	7 102	Roche Holding	9 096
Sandoz	5 875	Norsk Hydro	8 533
Solvay & Cie	5 797	Smithkline Beecham	7 838
Roche Holding	5 030	Glaxo Wellcome	7 415
Henkel	4 942	Henkel	7 316
DSM	4 335	L'Oreal	7 241
Courtaulds	3 992	Solvay	6 619

Source: DABLE

Table 10: Mechanical engineering
Turnover

(million ECU)	1988		1994
Mannesmann	9 844	Mannesmann	15 807
Hoesch	4 023	Agiv	4 512
Alsthom	3 994	Linde	4 143
Sulzer	3 135	Sulzer	3 724
SKF	2 933	SKF	3 640

Source: DABLE

companies have interests in several segments of the motor vehicles industry, which explain their larger size. For instance, Daimler-Benz, Renault and Fiat are not only car manufacturers, but they are also producing trucks. Peugeot also manufactures mopeds and motorcycles. The fastest growth in turnover from 1988 to 1994 was achieved by BMW of Germany which more than doubled its sales to 21.9 billion ECU. However, much of this exceptional growth is due to BMW's acquisition of Rover of the UK in 1994. On the other hand, Saab-Scania, which sold a big part of its car division to General Motors a couple of years ago, has since disappeared from the list.

After going through some dismal years in 1992 and 1993 which were characterised by declines in sales greater than those following the first oil crisis in the early 1970s, most European car manufacturers entered a phase of manifest recovery in 1994. While most of the industry operated at a lost in 1993, all car manufacturers returned into the black in 1994. Volkswagen, Fiat, Peugeot and Volvo which made a combined lost of 2.6 billion ECU in 1993 reported profits totalling 2.5 billion ECU. The biggest turnaround in profitability was made by Volvo of Sweden which recorded a 1.5 billion ECU in 1994 after a loss of 381 million ECU in 1993. The general improvement in profitability and sales was fuelled by three factors: the general economic recovery in Europe in 1994, the positive impact of government-financed scrapping incentive on old car (in France, Spain and Denmark, and the positive effects of the drastic rationalisation measures undertaken since the late 1980s which have improved productivity and reduced costs.

Food, drink and tobacco

The total turnover of the top 16 European agri-food producers increased by 30.0% between 1988 and 1994, a 4.4% average annual increase. Most of this growth reflect the wave of cross-border acquisitions carried out by many European producers following the launch of the Internal Market programme. Acquisitions is the main external growth strategy for companies in the sector. A clear tendency in this process is that in the late 1980s nearly all acquisitions made by European firms showed a preference for enterprises from their country or another European country. Since 1990, European firms have also expanded their market share in Eastern Europe, North America, South America and Asia through acquisitions of local agri-food producers. In 1993, for example, Groupe Danone of France, Grand Metropolitan of the UK and Cadbury Schweppes of the UK all acquired plants in India and China. Groupe Danone also expanded into Eastern Europe, through the acquisition of the largest dairy products plant in Hungary.

The wave of cross-border acquisitions generated few changes in the ranking of the largest European agri-food producers from 1988 to 1994. Unilever of the UK/Netherlands remains the leader with turnover of 38.3 billion ECU, closely followed by Nestlé of Switzerland. The next in line is BAT Industries of the UK which overtook Ferruzi Finanziara of Italy (now in 4th place) from 1988 to 1994 thanks to its acquisition of American Tobacco and Seratov Tobacco Factory of Russia.

The two fastest growing companies in the ranking were both from France. Groupe Danone went from 7th to 5th place on the back of a 95.0% increase in turnover, while Beghin-Say jumped from 11th to 8th place. UK companies nevertheless continue to dominate the ranking of top agri-food producers in Europe as ten companies out of 16 on the list are from the UK (including Unilever). The UK company which showed the strongest growth in turnover from 1988 to 1994 is Cadbury Schweppes (45.1%). Much of this growth reflects Cadbury's acquisitions of several agri-food companies, among which Bouquet D'Or, a French chocolate producer, and Dr Pepper/Seven-Up and A&W Brands, two US soft drink producers

Table 11: Electrical and electronic engineering
Turnover

(million ECU)	1988		1994
Siemens	28 645	Siemens	43 966
Philips	24 019	Philips Electronics	28 279
Alcatel-alsthom	18 187	Alcatel Alsthom	25 490
ASEA	14 824	ABB Asea Brown Boveri	24 011
BBC Brown Boveri	14 388	Electrolux	11 817
Thomson	10 635	Thomson	11 316
Electrolux	10 209	LM Ericsson	9 032
General Electric Company	8 991	Schneider	8 510
AEG	6 450	General Electric Company	7 419
Nokia	4 415	Thorn EMI	5 497
LM Ericsson	4 320	AEG	5 353
Hawker Siddeley Group	2 811	Nokia	4 900
Matra	2 747	Philips GMBH	4 280
Racal Electronics	2 431	Polygram	3 988

Source: DABLE

Table 12: Motor vehicles and components
Turnover

(million ECU)	1988		1994
Daimler-Benz	35 428	Daimler-Benz	54 121
FIAT	28 800	Volkswagen	41 623
Volkswagen	28 547	FIAT	33 925
Renault	22 943	Renault	27 147
Peugeot	19 678	Peugeot	25 270
Robert Bosch	13 341	BMW	21 906
Volvo	13 339	Robert Bosch	17 929
BMW	9 965	Volvo	17 053
Ford-Werke	9 278	Adam Opel	13 323
Adam Opel	8 436	Ford-Werke	12 167
MAN	7 220	MAN	9 429
Saab-Scania	5 865	Audi	6 997
Audi	5 559	Investor	3 851
GKN	2 991	Valeo	3 505
Lucas Industries	2 691	Lucas Industries	3 251
Valeo	2 342	GKN	3 150

Source: DABLE

Services

The above sections mainly looked at the relative performance of Europe's top manufacturing companies over the period 1988-1994. Below, we briefly review the trend in turnover of Europe's key services companies, in those sectors which are most concentrated: the distribution and production of energy, telecommunications services, transport services and wholesale and retail trade.

Energy

Table 14 presents the top 12 European producers and distributors of energy ranked by turnover. There is a great diversity of companies involved in the production and distribution of energy, including state-owned national energy companies such as Enel of Italy, EDF and GDF of France and large privately-owned national energy companies such as Ruhrgas of Germany, and British Gas and National Power of the UK.

The companies occupying the first two positions in 1994 are state-owned electricity distributors: EDF of France (turnover of ECU 27.8 billion) and ENEL of Italy (turnover of ECU 17.4 billion) which have the monopoly for the generation, transport and distribution of electricity in their national market. British Gas which was privatised in 1986 held third place in 1994 with a turnover of 11.6 billion ECU. Two new entrants occupied 4th and 5th place, Preussenelektra of Germany and Tractebel of Belgium.

The major trend in the European energy sector since the mid-1980s has been the ongoing reduction in the role of the state. Privatisation of state ownership or shareholdings in energy companies have occurred in practically every country in Europe, and are still continuing.

Telecommunications

The European telecommunications services sector is concentrated in the hand of a small number of large national telecom operators which are very large and profitable companies. Since the major players in the industry are telephone carriers operating in a quasi-monopoly regime on their national market, it is not surprising to find that companies are ranked in 1994 according to the size of their respective domestic market. The top telecommunications services firm is Deutsche Telecom

Table 13: Food, drink and tobacco
Turnover

(million ECU)	1988		1994
Unilever	26 539	Unilever	38 302
Nestlé	23 548	Nestlé	35 091
Ferruzzi Finanziaria	16 177	B.A.T. Industries	15 070
B.A.T.Industries	11 885	Ferruzzi Finanziaria	11 729
Grand Metropolitan	8 944	Groupe Danone	11 680
Dalgety	6 580	Montedison	10 521
BSN	5 995	Grand Metropolitan	9 064
Allied-Lyons	5 891	Eridania Beghin-Say	7 722
Eridania Zuccherifici Nazionali	5 498	Allied Domecq	6 270
Hillsdown Holdings	5 341	Associated British Foods	5 865
Beghin-Say	4 802	Hillsdown Holdings	5 502
Sucres et Denrées	4 662	Tate & Lyle	5 295
Associated British Foods	3 819	Cadbury Schweppes	5 202
Jacobs Suchard	3 694	BASS	5 109
Unigate	3 603	Financière Agache	4 828
Cadbury Schweppes	3 584	Tomkins	4 699

Source: DABLE

Table 14: Energy Turnover

(million ECU)	1988		1994
Electricité de France	19 829	Electricité de France	27 876
Electricity Council	17 164	ENEL	17 391
ENEL	13 344	British Gas	11 656
RWE AG	12 736	Preussenelektra	8 192
British Gas	11 512	Tractebel	7 516
Gaz de France	5 399	Ruhrgas	7 174
Nederlandse Gasunie	5 319	Gaz de France	7 167
Ruhrgas	4 153	Nederlandse Gasunie	7 006
CEA Industries	4 150	Empresa Nacional De Electricidad	5 422
Endesa	3 326	Electrabel	5 179
Vereinigte Elektrizitat Westfalen	2 888	National Power	5 019
Intercom	2 787	Vereinigte Elektrizitat Westfalen	4 655

Source: DABLE

Table 15: Telecommunications Turnover

(million ECU)	1988		1994
Deutsche Bundespost	25 310	Deutsche Telekom	31 825
British Telecommunications	16 935	France Telecom	21 680
France Telecom	12 518	British Telecommunications	17 641
STET	11 246	STET	17 551
SIP	8 529	Telecom Italia	15 164
Koninklijke PTT Nederland	5 494	Telefonica de España	9 935
Telefonica de España	4 276	Koninklijke PTT Nederland	8 281
Cable and Wireless	2 347	Cable and Wireless	6 518

Source: DABLE

Table 16: Transport services Turnover

(million ECU)	1988		1994
Deutsche Bundesbahn	11 514	Deutsche Bahn	15 032
SNCF	7 047	SNCF	11 626
British Airways	6 512	Deutsche Lufthansa	9 795
Deutsche Lufthansa	5 710	British Airways	9 113
British Railways	5 113	Air France	8 106
P & O	5 081	British Railways	8 050
Air France	5 039	P & O	7 733
SAS	3 739	KLM	4 296
Alitalia	2 757	Alitalia	4 163
KLM	2 546	SAS	4 036
Swissair	2 356	Swissair	3 789

Source: DABLE

Table 17: Europe's largest distribution companies

Rank	Name	Country	1994 Turnover (million ECU)	1994 Employees	1988 Turnover (million ECU)	1988 Employees
1	Metro	D	39 800	13 000	N/A	N/A
2	REWE Group	D	28 968	117 958	12 377	107 000
3	Tengelmann	D	25 460	196 719	16 872	145 000
4	Spar International	NL	22 472	181 829	14 382	158 000
5	Carrefour	F	20 724	90 300	9 214	42 900
6	Leclerc	F	18 976	58 450	10 516	38 900
7	Intermarche	F	18 413	70 000	9 948	45 000
8	J Sainsbury	UK	14 421	131 298	8 656	88 283
9	Promodes	F	14 396	51 476	6 565	32 124
10	Koninklijke Ahold	NL	13 463	127 668	6 269	80 284
11	Tesco	UK	12 903	108 113	7 194	75 658
12	Otto-Versand	D	12 678	48 000	6 411	28 500
13	Karstadt	D	12 575	108 286	5 965	67 174
14	Kaufhof	D	11 486	69 147	4 871	42 570
15	Stinnes	D	11 440	33 118	6 303	18 825
16	SHV	NL	11 436	57 400	5 224	27 300
17	Pinault-Printemps Redoute	F	10 765	60 843	3 733	30 248
18	Franz Haniel & Cie	D	10 255	24 737	6 139	20 990
19	Asko Deutsche Kaufhaus	D	9 832	65 906	4 242	31 254
20	Migros-Genossenschafts-Bund	CH	9 637	71 455	6 595	64 000
21	Delhaize Frères & Cie Le Lion	B	9 612	83 805	4 818	49 000
22	Casino Guichard Perrachon	F	9 503	52 045	5 043	39 686
23	Marks and Spencer	UK	8 643	63 331	7 834	76 313
24	Thyssen Handelsunion	D	8 056	27 718	5 315	12 481
25	Edeka Zentrale	D	7 997	813	5 775	700
26	Gehe	D	7 905	11 313	1 387	3 000
27	Inchcape	UK	7 756	40 118	3 690	45 247
28	Quelle Schickedanz	D	7 613	37 062	4 838	31 500
29	Argyll Group	UK	7 334	66 187	5 355	63 264
30	Asda Group	UK	6 666	69 366	4 146	50 465
31	Docks de France	F	6 627	32 794	3 281	21 244
32	Systeme U	F	6 518	24 000	3 553	18 200
33	Dalgety	UK	6 496	16 609	6 789	22 820
34	Kingfisher	UK	6 280	73 067	4 031	57 173
35	GIB	B	5 884	46 504	3 897	24 323
36	Office Commercial Pharmaceutique	F	5 091	5 612	2 960	6 086
37	Boots Company	UK	4 945	75 322	4 137	69 967
38	Raab Karcher	D	4 924	26 862	3 369	10 548
39	Vendex International	NL	4 834	78 500	4 362	55 000
40	Booker	UK	4 776	21 049	2 768	17 166
41	ICA Handlarnas	S	4 491	11 449	4 847	17 000
42	Galeries Lafayette	F	4 482	29 069	2 099	16 332
43	Kesko	SF	4 394	5 701	5 285	8 000
44	Wolseley	UK	4 252	19 073	1 925	13 000
45	Comptoirs Modernes	F	3 915	18 820	2 011	14 672
46	AVA	D	3 898	25 305	1 058	7 769
47	Deutsche Sb-Kauf	D	3 818	25 065	5 526	46 000
48	Kwik Save Group	UK	3 646	22 502	1 376	8 423
49	BAYWA	D	3 426	11 952	2 336	11 000
50	Great Universal Stores	UK	3 383	31 659	4 017	32 156

Source: DABLE

of Germany with a turnover of 31.8 billion ECU in 1994. It is followed by France Telecom, British Telecommunications, and the two Italian telecom operators: STET and Telecom Italia. The fastest growth in turnover between 1988 and 1994 was achieved by Cable & Wireless of the UK, whose sales grew by 177% during that period. However, this spectacular growth in turnover did not allow it to climb in the ranking.

The progressive liberalisation of the European telecom services which is set to be completed in 1997 is producing profound changes in the industrial organisation of the sector. Except in the UK, which privatised British Telecom in the 1980s, telecom operators in Europe still remain state-controlled, but will be progressively privatised within the coming years. Europe's public telecom carriers have been mobilising themselves for several years to tackle new competitors in their national market. European traditional telecom operators are engaged in a deep restructuring process and in increasing their productivity. Many carriers are changing their organisation in order to focus on emerging services and markets and be more flexible and nearer to the customer. Some telecom carriers, like British Telecom and Telecom Italia have set up new companies for operating in specialised markets, like mobile com-

munications, multimedia or data network markets. In consequence, this process will undoubtedly lead to many changes in the ranking of top firms in this sector in the coming years.

Transport services

The list of the largest transport companies in Europe is dominated by airlines. Among Europe's top 11 companies in 1994, seven were airlines, three were railways and one was a shipping company (P&O of the UK). However, despite the large number of airlines in the list, three of the four top positions were occupied by railway companies: Deutsche Bahn (1st), SNCF (2nd) and British Railways (4th). These railway transport companies are much bigger in size than airlines as they are single national operators benefiting from the absence of competition on their respective market. However, spearheaded by the UK, some European countries are slowly moving towards the privatisation of their rail operator.

On the other side of the coin, airlines have been facing the progressive liberalisation of European skies since 1993 which has spurred competition on the one hand between European airlines, and on the other hand between European airlines and major airlines from other geographical blocks (mainly the US). Lufthansa is the largest European airline with a turnover of 9.8 billion ECU in 1994, in front of British Airways and Air France. The other airlines in the list are KLM of the Netherlands, Alitalia of Italy, SAS of Scandinavia and Swissair of Switzerland.

The deregulation of European skies which should be completed by 1997 will generate an increasing number of privatisation of national 'flag-carriers' and the consolidation of the airline industry through mergers and acquisitions in order for airlines to remain competitive within Europe and at world level. Hence, the number of major European airlines is expected to decline in the future.

Distribution

Europe's top 50 distribution companies in 1994 are presented in Table 17. The list is clearly dominated by German and French firms. In 1994, there were 17 German firms and 11 French distributors in the list, accounting respectively for 41.4% and 23.5% of the turnover generated by the top 50 distribution companies in Europe. The UK had 13 representatives in the ranking, but they only represented 18.0% of the turnover of the top 50 companies. Metro of Germany is the leading European distributor with a turnover of 39.8 billion ECU in 1994, far in front of REWE Group and Tengelmann (also of Germany). Spar International of the Netherlands held fourth place, while three French firms occupied the 5th, 6th and 7th place. They are Carrefour, Leclerc and Intermaché. UK's first representative is Sainsbury which held 8th place.

Although a lot of cross-European concentration movements have taken place in this sector since the late 1980s, the size of the top players is still mainly determined by the importance of their national markets. The exception is Spar International of the Netherlands which is ranked 4th at European level. The relative concentration of the distribution sector in the Netherlands is evidenced by the fact that this country has four companies in the top 50 list, three of which are in the top 20. Belgium had two distribution companies in the list, Delhaize Frères and GIB, ranked respectively 21st and 35th.

Written by: DRI Europe based on information from DABLE
Graphs and listings by Hubertus Kal
DABLE is a project of the Directorate-General III, Industrial Affairs, coordinated by Startext.

Table 18: Europe's 200 largest groups, 1994

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on assets (%)	Major sector of activity
1	Royal Dutch Shell	UK/NL	79 874	5 249	57 570	106 000	5.8	Petroleum Refining
2	Daimler-Benz	D	54 121		548	10 452	330 551	1.1Motor Vehicles & Parts
3	Siemens	D	43 966		919	10 563	382 000	1.8Electrical Engineering
4	British Petroleum	UK	42 753	2 036	14 275	66 550	5.1	Petroleum Refining
5	IRI	I	42 363		-913	3 844	292 695	-0.9Conglomerate
6	Volkswagen	D	41 623		77	5 711	242 318	0.2Motor Vehicles & Parts
7	Unilever	UK/NL	38 302	2 012	6 718	304 000	8.8	Agro-alimentary
8	Nestlé	CH	35 091	2 005	10 451	212 687	7.3	Agro-alimentary
9	FIAT	I	33 925		526	10 305	248 180	1.1Motor Vehicles & Parts
10	Veba	D	33 798		717	8 100	126 875	2.3Conglomerate
11	Deutsche Telekom	D	31 825		670	18 648	239 585	0.8Telecommunications
12	Elf Aquitaine	F	31 577		-5	11 628	89 500	0.0Petroleum Refining
13	ENI	I	29 320	1 671	10 170	91 544	3.6	Petroleum Refining
14	Philips Electronics	NL	28 279		950	5 882	253 032	4.3Electrical Engineering
15	Electricité de France	F	27 876		191	3 345	117 575	0.2Energy
16	Renault	F	27 147		553	6 505	138 279	1.7Motor Vehicles & Parts
17	Hoechst	D	25 812		547	5 835	165 671	2.5Chemicals
18	Alcatel Alsthom	F	25 490		550	9 090	196 900	1.3Electrical Engineering
19	Peugeot	F	25 270		472	8 138	139 800	2.3Motor Vehicles & Parts
20	ABB Asea Brown Boveri	CH/S	24 011		614	3 245	207 557	2.5Electrical Engineering
21	RWE	D	23 934		479	4 057	117 958	1.4Conglomerate
22	Cie Générale Des Eaux	F	23 521		509	5 238	N/A	1.5Building/civil Engineering
23	BASF	D	22 711		668	8 185	106 266	3.2Chemicals
24	Bayer	D	22 579		1 024	8 633	146 700	4.7Chemicals
25	BMW	D	21 906		360	4 099	109 362	1.8Motor Vehicles & Parts
26	France Telecom	F	21 680	1 507	20 851	152 586	3.4	Telecommunications
27	Total	F	20 792		522	8 011	51 803	2.6Petroleum Refining
28	Thyssen	D	18 163		28	1 894	129 389	0.2Metallurgy
29	Robert Bosch	D	17 929		231	4 216	156 464	1.6Motor Vehicles & Parts
30	British Telecom	UK	17 641	2 198	15 234	137 500	8.1	Telecommunications
31	STET	I	17 551		606	8 626	144 316	1.6Telecommunications

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on assets (%)	Major sector of activity
32	ENEL	I	17 391	1 224	12 825	105 211	2.5	Energy
33	INI	E	17 152	-517	6 414	130 948	-1.6	Conglomerate
34	Volvo	S	17 053	1 447	4 741	75 549	9.5	Motor Vehicles & Parts
35	Mannesmann	D	15 807	110	3 250	124 914	0.8	Mechanical Engineering
36	Lyonnaise des Eaux	F	15 200	161	1 984	151 873	0.7	Building/civil Engineering
37	Telecom Italia	I	15 164	789	11 243	99 161	2.4	Telecommunications
38	B.A.T. Industries	UK	15 070	1 556	5 923	173 475	3.0	Agro-alimentary
39	VIAG	D	15 058	524	2 760	86 018	2.8	Conglomerate
40	Deutsche Bahn	D	15 032	94	6 547	375 593	0.4	Transport
41	Deutsche Postdienst	D	14 824	130	3 364	340 000	1.2	Postal Service
42	Petrofina	B	14 094	259	3 090	14 013	3.0	Petroleum Refining
43	Hanson	UK	14 084	1 384	5 976	74 000	4.9	Conglomerate
44	Ciba-Geigy	CH	13 599	1 180	9 548	83 980	6.0	Chemicals
45	Adam Opel	D	13 323	160	950	47 335	2.8	Motor Vehicles & Parts
46	Ruhrkohle	D	13 260	103	1 049	107 440	0.7	Coal Mining
47	Rhone-Poulenc	F	13 123	402	5 959	81 285	2.2	Chemicals
48	La Poste	F	12 736	30	1 264	298 200	N/A	Postal Service
49	Osterreichische Industrie	A	12 263	-185	1 558	77 731	N/A	Conglomerate
50	Ford-Werke	D	12 167	352	720	43 970	7.7	Motor Vehicles & Parts
51	Usinor-Sacilor	F	12 082	269	2 435	69 107	2.3	Metallurgy
52	Preussag	D	12 062	147	1 667	69 712	1.5	Conglomerate
53	ICI	UK	11 863	243	4 823	67 500	2.1	Chemicals
54	Electrolux	S	11 817	528	2 239	114 103	5.7	Electrical Engineering
55	BTR	UK	11 762	1 124	3 473	124 491	9.7	Conglomerate
56	Ferruzzi Finanziaria	I	11 729	-518	628	39 449	-2.6	Agro-alimentary
57	Groupe Danone	F	11 680	536	5 332	68 181	4.0	Agro-alimentary
58	British Gas	UK	11 656	529	24 763	69 971	1.5	Energy
59	SNCF	F	11 626	-1 284	5 437	215 787	-3.2	Transport
60	Saint-Gobain	F	11 327	551	5 888	80 909	4.0	Building Materials
61	Thomson	F	11 316	-329	-139	99 895	-2.5	Electrical Engineering
62	Bouygues	F	11 010	87	1 420	N/A	0.8	Building/civil Engineering
63	Pechiney	F	10 756	-571	1 692	58 234	-5.7	Metal Products
64	Hoesch-Krupp	D	10 601	-5	996	66 138	0.0	Metallurgy
65	Repsol	E	10 549	610	3 768	18 727	5.9	Petroleum Refining
66	Montedison	I	10 521	-179	2 396	31 994	-1.1	Agro-alimentary
67	Akzo Nobel	NL	10 299	581	2 902	70 400	7.0	Chemicals
68	Michelin	F	10 221	196	1 302	117 776	1.8	Rubber Products
69	Statoil	N	10 011	657	3 369	12 630	6.0	Petroleum Refining
70	Telefonica de España	E	9 935	709	9 515	99 203	2.3	Telecommunications
71	Deutsche Lufthansa	D	9 795	152	1 893	57 798	1.6	Transport
72	Sandoz	CH	9 788	1 069	4 248	60 304	8.9	Chemicals
73	Bertelsmann	D	9 564	282	1 236	51 767	5.5	Printing & Publishing
74	MAN	D	9 429	78	1 785	56 997	0.9	Motor Vehicles & Parts
75	British Airways	UK	9 113	317	2 654	53 060	2.8	Transport
76	Roche Holding	CH	9 096	1 764	10 129	61 381	7.9	Chemicals
77	Grand Metropolitan	UK	9 064	585	4 601	64 300	4.6	Agro-alimentary
78	LM Ericsson	S	9 032	432	2 549	76 144	5.5	Electrical Engineering
79	Swiss PTT	CH	8 565	186	1 158	60 208	1.0	Postal Service
80	Norsk Hydro	N	8 533	467	3 691	32 416	4.2	Chemicals
81	Schneider	F	8 510	103	2 486	89 762	1.2	Electrical Engineering
82	Koninklijke PTT Nederland	NL	8 281	944	6 211	N/A	7.7	Telecommunications
83	British Aerospace	UK	8 193	181	1 131	46 500	1.8	Aerospace
84	Preussenelektra	D	8 192	369	2 854	25 687	2.3	Energy
85	Air France	F	8 106	-432	558	47 343	-5.1	Transport
86	Matra Hachette	F	8 059	123	779	40 314	1.4	Printing & Publishing
87	British Railways	UK	8 050	-433	1 149	100 264	N/A	Transport
88	Neste	SF	7 990	220	756	8 195	3.8	Petroleum Refining
89	Smithkline Beecham	UK	7 838	116	1 398	52 300	1.2	Chemicals
90	WPP Group	UK	7 764	61	-142	19 198	2.8	Business Services
91	P & O	UK	7 733	308	3 426	61 467	3.7	Transport
92	Eridania Beghin-Say	F	7 722	184	2 681	22 298	2.8	Agro-alimentary
93	CEA-Industrie	F	7 676	203	2 729	42 901	1.0	Uranium
94	The Post Office	UK	7 581	405	3 353	189 000	6.2	Postal Service
95	Tractebel	B	7 516	271	2 173	36 309	1.7	Energy
96	General Electric Company	UK	7 419	716	4 251	82 251	9.0	Electrical Engineering
97	Glaxo Wellcome	UK	7 415	1 708	6 611	47 189	16.5	Chemicals
98	Aérospatiale	F	7 384	-73	594	39 556	-0.7	Aerospace
99	Henkel	D	7 316	205	1 904	39 907	3.8	Chemicals

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on assets (%)	Major sector of activity
100	L'Oréal	F	7 241	450	3 259	38 972	6.6	Chemicals
101	Degussa	D	7 180	81	901	27 202	2.1	Metallurgy
102	Ruhrgas	D	7 174	432	1 814	11 115	7.6	Energy
103	Gaz de France	F	7 167	206	1 317	25 538	1.7	Energy
104	Nederlandse Gasunie	NL	7 006	37	186	1 747	1.4	Energy
105	Audi	D	6 997	11	902	32 215	0.3	Motor Vehicles & Parts
106	SGE	F	6 965	44	625	63 366	0.8	Building/civil Engineering
107	Solvay	B	6 619	194	2 317	39 900	2.9	Chemicals
108	Cable and Wireless	UK	6 518	320	4 239	41 124	3.2	Telecommunications
109	Finmeccanica	I	6 301	1	2 260	59 041	0.0	Aerospace
110	Allied Domecq	UK	6 270	423	3 035	68 786	5.3	Agro-alimentary
111	KNP BT	NL	6 097	151	1 295	27 811	3.5	Paper & Paper Products
112	British Steel	UK	6 034	590	5 155	39 800	7.5	Metallurgy
113	Alcatel Cable	F	5 976	225	1 464	28 062	3.8	Metallurgy
114	Associated British Foods	UK	5 865	400	2 716	50 241	9.6	Agro-alimentary
115	Zeneca Group	UK	5 784	572	2 175	30 800	9.5	Chemicals
116	Havas	F	5 740	116	1 496	18 324	2.7	Business Services
117	Holderbank Financiere Glarus	CH	5 616	250	2 161	37 523	3.1	Building Materials
118	Thomson-CSF	F	5 533	-146	2 016	46 823	-1.6	Instrument Engineering
119	Philipp Holzmann	D	5 504	56	1 072	44 927	0.7	Building/civil Engineering
120	Hillsdown Holdings	UK	5 502	131	845	40 473	4.8	Agro-alimentary
121	Thorn EMI	UK	5 497	135	741	33 547	3.3	Electrical Engineering
122	Empresa de Electricidad	E	5 422	943	5 518	16 338	7.2	Energy
123	Huels	D	5 413	-100	1 072	30 633	-2.3	Chemicals
124	AEG	D	5 353	-188	687	44 769	-3.5	Electrical Engineering
125	Stora Kopparbergs Bergslags	S	5 349	223	2 640	26 858	3.4	Paper & Paper Products
126	Tate & Lyle	UK	5 295	222	1 022	15 450	6.7	Agro-alimentary
127	Eiffage	F	5 210	47	496	43 040	0.7	Building/civil Engineering
128	Cadbury Schweppes	UK	5 202	348	1 935	40 506	7.7	Agro-alimentary
129	Arbed	L	5 192	9	1 618	42 981	0.1	Metallurgy
130	Electrabel	B	5 179	652	5 296	17 290	5.6	Energy
131	Continental	D	5 136	37	761	49 244	1.0	Rubber Products
132	BASS	UK	5 109	454	4 655	75 845	5.5	Agro-alimentary
133	Saint Louis	F	5 104	148	1 553	22 986	2.5	Paper & Paper Products
134	Pirelli	I	5 091	57	1 496	40 588	1.1	Rubber Products
135	Cordiant	UK	5 043	18	-459	10 913	1.4	Business Services
136	OEMV	A	5 023	46	1 123	10 435	1.0	Petroleum Refining
137	National Power	UK	5 019	667	3 235	5 097	11.4	Energy
138	Lafarge	F	4 993	338	3 291	33 233	4.5	Building Materials
139	Accor	F	4 943	72	1 780	147 000	0.8	Hotel Trade
140	Oy Nokia	SF	4 900	594	1 763	28 000	13.1	Electrical Engineering
141	Trafalgar House	UK	4 891	39	909	33 153	1.1	Building/civil Engineering
142	Financière Agache	F	4 828	156	958	21 453	1.0	Agro-alimentary
143	Montaigne	F	4 828	153	525	21 467	1.0	Luxury Goods
144	L'Air Liquide	F	4 828	373	3 160	24 600	5.9	Chemicals
145	GTM-Entrepose	F	4 762	31	413	68 201	0.5	Building/civil Engineering
146	RMC Group	UK	4 748	174	1 157	27 371	4.8	Building Materials
147	BICC	UK	4 743	90	772	35 708	2.8	Building/civil Engineering
148	Tomkins	UK	4 699	262	1 245	46 096	9.5	Agro-alimentary
149	Olivetti	I	4 683	-353	987	33 867	-5.6	Computers & Office Equip.
150	VEW	D	4 655	93	907	14 053	1.4	Energy
151	Repola	SF	4 648	194	1 298	26 927	3.4	Paper & Paper Products
152	Alusuisse-lonza	CH	4 625	128	1 095	26 303	3.3	Metallurgy
153	Machines Bull	F	4 549	-298	188	27 902	-8.8	Computers & Office Equip.
154	AGIV	D	4 512	55	538	41 272	1.3	Mechanical Engineering
155	Guinness	UK	4 467	828	5 096	23 774	8.2	Agro-alimentary
156	Co Espanola de Petroleos	E	4 431	113	1 116	8 841	3.7	Petroleum Refining
157	Comp. Fin. Richemont	CH	4 395	319	1 741	N/A	5.3	Agro-alimentary
158	Christian Dior	F	4 387	252	3 011	19 335	1.7	Chemicals
159	KLM	NL	4 296	220	1 759	29 206	2.9	Transport
160	Philips Gmbh	D	4 280	-4	163	21 100	-0.2	Electrical Engineering
161	The Boc Group	UK	4 279	148	1 962	39 421	2.9	Chemicals
162	LVMH	F	4 252	579	4 504	18 779	6.0	Luxury Goods
163	Deutsche Babcock	D	4 244	18	217	36 157	0.5	Metal Products
164	Cockerill Sambre	B	4 206	20	1 528	26 409	0.5	Metallurgy

Rank	Name	Country	Turnover (million ECU)	Profit (million ECU)	Net worth (million ECU)	Employees	Return on assets (%)	Major sector of activity
165	Alitalia	I	4 163	-163	323	26 092	-4.4	Transport
166	DSM	NL	4 163	244	2 031	19 113	5.5	Chemicals
167	Linde	D	4 143	112	1 477	29 618	2.9	Mechanical Engineering
168	Skanska	S	4 106	294	1 098	28 868	4.5	Building/civil Engineering
169	Rolls-Royce	UK	4 083	105	1 603	43 500	2.6	Aerospace
170	Marine - Wendel	F	4 036	93	808	32 524	1.6	Metal Products
171	SAS	S	4 036	154	1 085	28 425	4.0	Transport
172	Heineken	NL	3 995	280	2 019	26 197	6.8	Agro-alimentary
173	Polygram	NL	3 988	342	1 117	11 117	9.3	Electrical Engineering
174	Sanofi	F	3 969	202	2 639	27 833	3.7	Chemicals
175	Reed Elsevier	UK/NL	3 918	604	1 832	26 900	10.1	Printing & Publishing
176	Investor	S	3 851	308	2 020	27 503	4.5	Motor Vehicles & Parts
177	United Biscuits	UK	3 842	113	934	39 691	4.4	Agro-alimentary
178	Aegis Group	UK	3 834	17	-149	1 764	2.4	Business Services
179	Swissair	CH	3 789	14	1 797	31 577	0.2	Transport
180	Burmah Castrol	UK	3 788	178	798	21 866	6.4	Petroleum Refining
181	Carnaudmetalbox	F	3 785	165	1 871	30 290	3.8	Metal Products
182	Arjo Wiggins Appleton	UK	3 763	189	1 659	18 466	5.5	Paper & Paper Products
183	Sulzer	CH	3 724	120	1 279	27 449	2.8	Mechanical Engineering
184	Svenska Cellulosa	S	3 684	61	2 143	24 152	1.2	Paper & Paper Products
185	Hoogovens	NL	3 680	170	1 065	18 967	4.7	Metallurgy
186	SKF	S	3 640	137	1 080	41 732	3.9	Mechanical Engineering
187	Powergen	UK	3 639	489	2 371	4 171	11.0	Energy
188	Bollore Technologies	F	3 509	15	222	21 575	0.7	Transport
189	Valeo	F	3 505	151	1 415	28 100	5.0	Motor Vehicles & Parts
190	Pilkington	UK	3 381	-410	1 049	37 100	-10.7	Building Materials
191	Suedzucker	D	3 274	78	446	12 597	2.6	Agro-alimentary
192	SDV	F	3 267	70	340	19 963	3.5	Transport
193	Heidelberger Zement	D	3 256	111	1 098	24 169	2.4	Building Materials
194	Lucas Industries	UK	3 251	-218	813	46 196	-7.8	Motor Vehicles & Parts
195	Tarmac	UK	3 241	93	1 232	20 571	3.0	Building/civil Engineering
196	Preussag Stahl	D	3 211	32	501	13 965	1.6	Metallurgy
197	Redland	UK	3 187	229	1 962	21 545	5.1	Petroleum Refining
198	Astra	S	3 183	743	2 549	14 377	19.2	Chemicals
199	Sara Lee/de	NI	3 171	314	922	21 379	13.1	Agro-alimentary
200	GKN	UK	3 150	119	1 033	32 520	3.9	Motor Vehicles & Parts

Source: DABLE

European Competitiveness: the importance of management practices

To improve living standards and create more jobs, European companies must become more competitive. Companies must innovate more effectively, maximise their operating efficiency and make the necessary structural adjustments. Many of the critical success factors which underpin these drivers of competitiveness are "modern management practices". There is stong evidence that successful and competitive companies are those that adopt them; in particular, the "soft" management practices covering the management of people and the exploitation of markets.There are two major areas in which policy changes are needed: a strengthening of the forces that drive change and a reduction in the obstacles to change. Such policy changes will help companies (their management, their employees and their trade unions) to improve their competitiveness, increase living standards and create more jobs.

INTRODUCTION

Europe faces a crisis of rising unemployment and crumbling social cohesion. More jobs need to be created, and living standards need to rise. To achieve these twin objectives, Europeans companies must become more competitive.

This note begins with a brief review of the national competitiveness debate, and the links between the competitiveness of companies and the competitiveness of countries. It then considers some of the primary drivers of competitiveness within companies and the critical success factors which underpin them. Finally, it uses case study evidence to examine, in detail, one particular group of critical success factors, i.e. organisational management practices.

EUROPE, COMPETITIVENESS AND COMPANIES

The Competitiveness Debate

Does Europe "compete" with other parts of the world, in the way that Volkswagen competes with Fiat? For many commentators the answer is clear; it does not. They base their views on the obvious fact that countries, unlike companies, cannot go bankrupt (see Paul Krugman, competitiveness, 1994).

These criticisms have helped re-orientate the competitiveness debate. The argument that companies can win or lose in a "zero sum game" has been replaced by the concept of "relative performance". Economies only compete in the sense that some do better than others at delivering rising living standards (and employment) to their citizens, whilst exposed to an open trading environment. This is, in itself, a form of competitive analysis. It provides policy-makers with a set of analytical tools for: identifying economies that are more ancompetitivean than their own; analysing the reasons for superior performance; and developing new policy options.

Much has been gained from this new approach. It has, for example, helped policy-makers gain important insights into what drives superior performance in an economy. This has led to a switch in the direction of industrial policy away from support for specific industries towards creating a business environment which helps companies become more competitive, encourages foreign investment, and nurtures entrepreneurship (OECD observer December 1995, April 1994). It has also provided a framework for benchmarking economic performance, the business environment, and government policies.

In part, this shift in policy reflects three important conclusions that policy makers have drawn about companies. Firstly, they have concluded that it is the competitive performance of companies and the ways companies interact with each other which ultimately determines the extent to which living standards improve and jobs are created. Secondly, they have realised that, for companies, competitiveness is more than cutting costs (and hence reducing employment); non-price factors are also important. Finally, they have become aware that a key condition for increasing living standards and employment is to improve the competitive performance of companies in all parts of the economy, particularly in service sectors and SMEs.

Europeans Competitive Performance

There is no single measure of European competitiveness. However, two key measures indicate that it has declined over time: the rate of growth in real gross domestic product (GDP) per head (the standard of living) and the level of unemployment.

In the 1970s, Europe grew faster than the rest of the OECD countries in terms of real GDP per head. In the 1980s, it grew marginally more slowly, but in the 1990s Europe has grown much more slowly. Europeans employment performance is similar. Unemployment in Europe was close to the OECD average until 1975, but European unemployment has grown much faster since then. This is linked closely to the poor rate of job creation in the private sector in Europe. Job growth in the private sector in Europe has averaged 0.3 per cent per annum over the last 25 years, compared with 1.0 per cent per annum in Japan and 1.8% per annum in the USA.

Competitive Companies

Overcoming these problems depends, primarily, upon improving the competitiveness of European companies throughout the economy. UNICE has defined the competitiveness of individual companies as: "The ability of a company, on a sustainable basis, to satisfy the needs of its customers more effectively than its competitors, by supplying goods and services more efficiently, in terms of price and non-price factors than its competitors."

Figure 1: Criteria for success in the future business environment

Innovation

- Minimising antime-to-marketanGaining access to technologies, know-how, and ideas.
- Tailoring products and services to meet customer needs.
- Minimising the cost of development and commercialisation.
- Operating flexibly within the company to link together functional expertise.

Maximising Operating Efficiency

- Achieving world-class levels of unit costs
- Achieving world-class levels of quality and flexibility
- Investing in modern equipment
- Managing the supply chain collaboratively
- Investing in the motivation and training of staff
- Introducing new operating practices (particularly anlean operationsan)

Making Structural Adjustments

- Focusing upon flexibility and change as a continuous activity
- Providing effective leadership
- Focusing upon core competencies and outsourcing non-core activities
- Minimising the costs of change
- Developing organisational structures capable of implementing decisions quickly

Source: UNICE

Within this definition are two key concepts; differentiation and sustainability. Companies must be able to do things differently from their competitors, which are relevant to their customers. They must also be able to develop a competitive position which is sustainable over time. Sustainability depends upon companies acquiring a small number of critical capabilities which are common to most successful companies.

Capabilities which are essential to long-term success include the ability of companies:

- to innovate - to develop and exploit new products, services, and operating processes;
- to maximise operating efficiency - to produce products and services of the highest quality at the lowest cost with maximum flexibility;
- to make structural adjustments - to respond effectively to major changes in the competitive environment.

Such capabilities are only acquired by companies that are able to meet a series of critical success factors (CSFs). Some of the most important are summarised below (Figure 1).

Many of these CSFs are modern management practices. Successful and competitive companies are those that adopt them.

MANAGEMENT PRACTICES AND COMPETITIVE COMPANIES

Management Practices and Business Performance: the importance of "soft" management practices

Management thinkers draw a distinction between two types of management practices; "hard" and "soft". "Hard" practices are associated, for example, with corporate planning, financial control and information technology; they tend to be quantitative. "Soft" factors, by comparison, are often linked to the management of people and the exploitation of markets; they tend to be qualitative.

Five major studies demonstrate the links between the use of modern management practices and superior business performance.

Many of the modern management practices described in the five studies are, in fact, "soft". A frequent theme is organisational innovation and the management of people. Understanding these practices, and why companies adopt them, is central to understanding the competitiveness of companies.

Perhaps the most influential of these five studies is MIT's study of the vehicle assembly industry. Over five years, MIT examined most major vehicle assembly plants in Europe, Japan, and the USA. They developed a wide range of performance benchmarks which enabled them to review all major dimensions of plant-level performance and to make comparisons between plants. They concluded that Japanese plants were the highest performers and that the principal reason for this was the adoption by Japanese companies of "lean manufacturing", a series of management practices.

Another major study involving manufacturing industry was carried out by London Business School and IBM Consulting. They examined more than 600 manufacturing sites in four European countries. For each plant, data was collected which identified operational performance and the extent to which each plant used a series of modern management practices. The study concluded that there was a clear link between the use of modern management practices and superior operational performance. It also drew the conclusion that the best European plants were operating to world standards. However, it also concluded that Europe had a long "tail" of plants which were achieving standards which were neither world class nor sustainable.

UNICE also carried out a major study Working with Ernst & Young, it undertook a pan-European survey of CEOs to examine the use of modern management practices and company performance. The study highlighted the differences in business priorities between successful and unsuccessful companies. It found that successful companies believe that a large number of activities are very important in improving performance,

especially in the softer areas related to customers and staff. By comparison, unsuccessful companies have fundamentally different priorities (Figure 2).

This tendency for successful companies to focus on ansofteran areas of management practice is reinforced by evidence from the fourth study. The European Foundation for Entrepreneurial Research identified 500 of Europeans fastest growing SMEs, and then carried out research which included an examination of their critical competencies. As much emphasis was placed on "soft" factors, such as managing people and marketing, as on "hard" ones, such as production (Figure 3).

For example, on a five point scale, almost 60% of the dynamic entrepreneurs rated the customer-orientation of their employees as "extremely important" for further growth (point 5 on a five point scale).

Finally, the McKinsey Global Institute carried out extensive work examining the relative productivity performance of a range of manufacturing and service sectors in Europe, USA and Japan. They focused on explaining the continued leadership in productivity enjoyed by the USA in most business sectors. On the basis of extensive fieldwork with companies they drew a number of important conclusions. They concluded that there is clear evidence that the use of certain management practices is important for improving business productivity. In their opinion, the decision to use such practices lies with managers, who frequently face obstacles to achieving change. Those managers who overcome the barriers are those who face the most powerful external pressures - competitive intensity.

The remainder of this paper sets out: the changes in the business environment driving organisational innovation; organisational initiatives undertaken by some companies; the benefits such initiatives bring; obstacles to adopting such innovations; and the policy implications for improving the use of new forms of organisation amongst European companies.

ORGANISATIONAL BEST PRACTICES AND COMPETITIVE COMPANIES

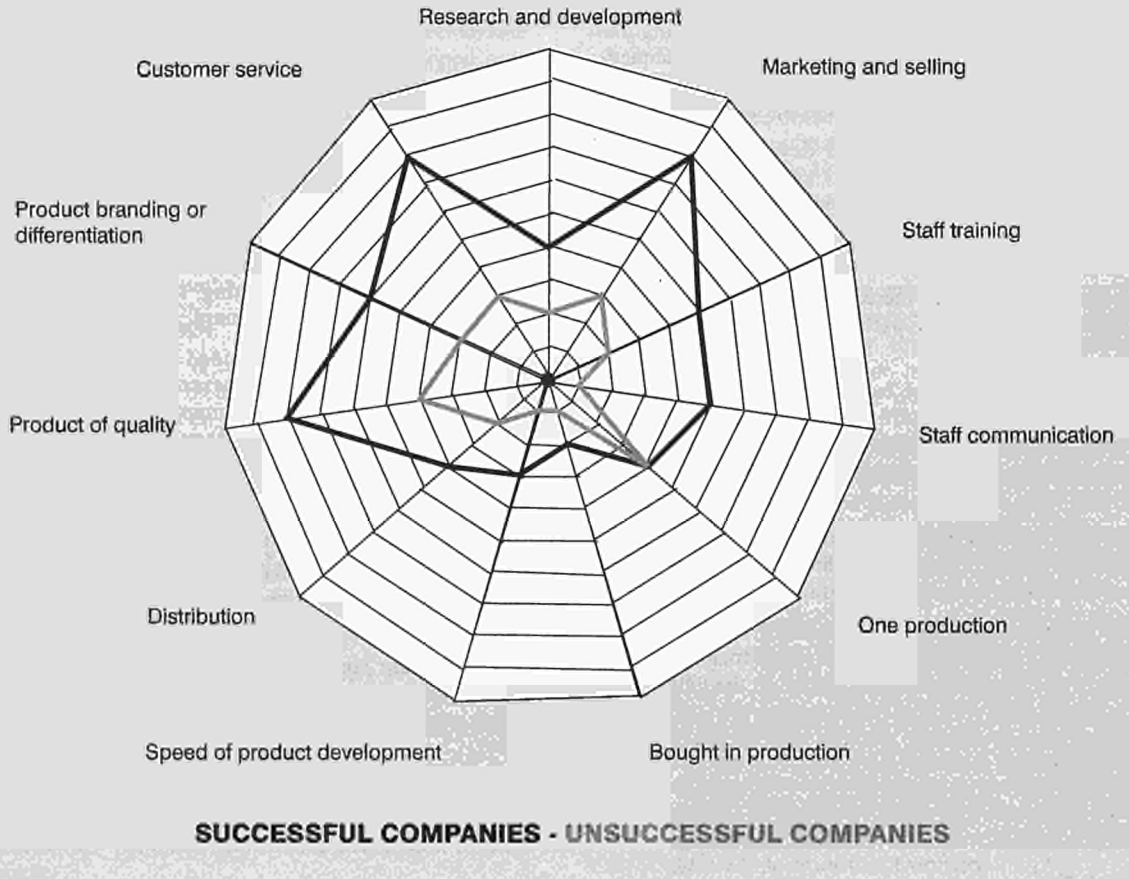
Reasons for Change - An Evolving Business Environment

A number of long-term trends are changing the environment within which European companies compete. Amongst the most important trends are: market maturity in OECD countries; market liberalisation and globalisation; and, changes in product and process technology.

Whilst OECD markets have become more and more fragmented with little growth, the level of competition facing European companies is increasing. Market liberalisation has reduced product market barriers and opened up sectors previously reserved for state-owned enterprises. At the same time, the Single Market programme has reduced barriers to trade within the European Union. Furthermore, European companies are affected by the globalisation of business activity and by global competition. Trans-national companies, for example, optimise their performance on a global basis in, for example, research and development, production, administration and marketing. In addition, European companies face competition from low wage economies (in labour intensive sectors) and from OECD economies (in technology intensive sectors).

European companies also face a revolution in product and process technologies. Information and communication technologies, for example, offer companies new ways to satisfy customers and change the way that goods and services are produced. At the same time, "leading edge" companies are exploiting new forms of work organisation to set new standards of cost, quality and customer responsiveness, many of that

Figure 2: Impact of mangement and business practices



having direct implications on overall industry structure and changes the links and organisation of relationships between companies.

Business Response to Change - New Strategies, New Management Practices

Increasingly, the basis of competition between companies is shifting away from "hard" factors (such as scale economies or R & D) towards "soft" factors (such as core competencies, speed to market, reputation, and service). Companies are, in addition, increasingly taking account of the wider objectives of their stakeholders, such as the need to improve the level of employment for young people and the unskilled.

Faced with such changes, successful companies have adopted new strategies. They have sought to differentiate themselves on the basis of added value and high quality rather than cost, and by maximising flexibility. Yet at the same time, such companies have sought to match global standards of cost. Achieving these goals has required major (tangible and intangible) investments, increased focus on a core business, the creation of comprehensive networks throughout the "value chain" (involving co-operation with their suppliers, and customers, and public-private partnerships), and organisational innovation. Successful companies have also focused on building new forms of organisation that unlock the skills, creativity and commitment of their work-force. This has involved the extensive use of new, ansoftan, management practices.

The main changes in management practices have been in the following areas:

- New Organisational Structures have been introduced: including process-based organisations, market-based organisations, multi-skilled teams, and flatter, decentralised structures;
- New Techniques and Best Practices have been introduced: including continuous improvement, knowledge-based IT systems, closer relationships with suppliers and customers, and quality management;
- Education and Training have been improved: including improved job skills, and the introduction of wider management-type skills throughout the organisation such as problem-solving, group working, and learning skills;
- New Corporate Cultures have been developed: including more participation, greater personal autonomy, better alignment of employee and business objectives, increased consultation, increased focus on the customer, and greater focus on quality;
- Internal Flexibility has been increased: including more flexible working time, working patterns, job groups, and job content;
- New Working Practices have been implemented: including greater internal flexibility, multi-skilling, greater use of temporary and part-time workers, new management models based on coaching, more devolved responsibility, and empowerment;
- New Reward Systems have been adopted: including payments for knowledge, performance bonuses, profit-sharing schemes, and share ownership programmes.

Below, we present examples of successful organisational change introduced in three types of areas: large manufacturing companies, service organisations and SMEs. In the latter case, emphasis is put on analysing how SMEs have grown to become major players in their market through appropriate internal organisation and staff motivation.

Examples of Organisational Change in Manufacturing Companies

In the past, European companies have tended to organise their activities using "scientific management" techniques as described by Taylor and used by Ford. This had its origins in the introduction of mass production into manufacturing industry. It maximises productivity and reduces costs through complex, hierarchical organisational structures and an extensive division of labour, but with simple jobs and a rigid separation of "thinking" and "doing". It focuses on production and volume, and upon the standardisation of work within strong functional and technical structures.

The following case studies illustrate that new forms of work organisation have evolved which challenge these principles. They are based on teamwork, decentralisation, personal autonomy, anflatan organisational structures, and more complex jobs requiring a wide range of skills. Communication and co-ordination take place both horizontally and vertically, and the focus of the organisation is upon the customer, continuous improvement, learning, and flexibility. New forms of remuneration complement the overall approach.

The first case study is the Baxi Partnership which illustrates the introduction of new forms of work organisation and training to cope with significant changes in the competitive environment.

BAXI PARTNERSHIP

Baxi Partnership is a major competitor in the UK domestic heating appliance market. Founded as a family firm over a century ago, ownership was transferred to the work-force in the 1980ans. With a turnover of ECU 108 million, Baxi has 1,400 employees.

In the late 1980's, Baxi faced four key problems: declining demand, a more competitive market, rising overheads; and recurring quality problems. Baxi needed to make fundamental changes to survive.

Baxi undertook a major restructuring of the company. Key features include:

- reorganisation of the business into customer-focused strategic business units and the creation of self-governing teams. These teams are multi-skilled and empowered to schedule their own work;
- a reduction in the number of management levels from five to three;
- the introduction of continuous improvement programmes;
- major investments in training, including the creation of an on-site Open Learning Centre.

As a result, Baxi has maintained profitability and increased market share throughout the severe recession of the 1990ans. The pace of innovation has improved significantly and manufacturing cycle times have been dramatically reduced. Productivity has increased by over 20%. The level of participation and commitment amongst the work-force is high. Individual companies have their own employee directors and elected councils. The majority of jobs have been protected, manpower numbers now being similar to those a decade ago. Reductions in manufacturing have been offset by increases in R&D and investments in new products.

The next case study, Brabantia illustrates the use of new organisational structures and a new corporate culture to improve productivity, increase employee satisfaction and protect jobs.

BRABANTIA

Brabantia is a leading European producer of household consumer goods. It has a turnover of ECU 450 million and 1000 employees, mostly based in three plants in the Dutch province of Brabant.

Faced with increasing competitive pressure, Brabantia needed to improve innovation, increase operating efficiency and improve staff motivation. Since its foundation in 1919, co-operation had been the key to success. It was recognised, however, that further improvements in productivity and quality depended on harnessing the creativity and skill of the work-force.

Brabantia have restructured the company and developed a new corporate culture. Key features include:

- A new organisational structure, based on semi-autonomous work teams with significant responsibility and freedom to make decisions.
- A decrease in the number of functions from 14 to 4.
- A re-design of the information systems to provide teams with relevant information.
- A shift towards a quality focus and continuous improvement.
- A revision in the employee assessment system to reflect the new ways of working.

Improved operating efficiency has enhanced the competitive position of Brabantia. Quality has increased and lead times on new products have decreased substantially. Staff motivation has improved. Sickness rates have, for example, reduced by a third. Sales have grown significantly and jobs have been protected.

Examples of Organisational Change in Service Organisations

The use of "scientific management" has not been confined to manufacturing companies, nor to the private sector. Work organisation in the service sector, and in parts of the public sector, has been heavily influenced by its principles.

As the following case studies illustrate, innovative service sector and public sector organisations have developed new forms of work organisation to overcome the inadequacies of "scientific management". These innovations emphasise continuous learning, complex jobs, work flexibility, teamwork, horizontal co-ordination and communication, anflatan structures, personal autonomy, and new forms of remuneration.

The case of Karolinska Hospital shows the use of new organisational methods in the health sector to reduce costs, improve service antl improve the quality of working life.

KAROLINSKA HOSPITAL

Karolinska Hospital (KH) is a Stockholm hospital with an international reputation for medical excellence. It has approximately 1 100 beds, 4 100 employees and a budget of ECU 200 million.

The main issues facing KH in the 1990s were similar to those facing public health services throughout the world: growing pressure to reduce public expenditure, taxation and public sector budget deficits; and ensuring that activities in the state sector became more responsive to customer needs.

KH introduced major organisational changes, including:

- restructuring of clinical departments. Forty seven separate departments, headed by medical specialists, were reduced to eleven clusters, only half of which were headed by doctors.
- improved internal communication. The frequency of "management meetings" between the CEO and the heads of departments has increased from twice per annum to once a fortnight.
- improvements in the process of diagnosing and treating patients. Targets have been set for each stage and for the total process. Better team working has been encouraged, throughout the process.
- As a result, costs have been reduced and service has been improved. The new organisational practices have also improved the quality of working life for the vast majority of staff.

The Nationale Nederlanden case illustrates the role of employee participation in the change process and the importance of effective support through IT, and training.

NATIONALE NEDERLANDEN

Nationale Nederlanden (NN), a subsidiary of ING (the International Netherlands Group), is the market leader in the insurance sector in The Netherlands. With a turnover of ECU 6 billion, it employs 4 000 people in two main Divisions: Life Insurance and General Insurance. This case describes changes made in the General Insurance Division, employing 2,000 staff with a turnover of ECU 1 billion.

Historically most sales were made through a network of insurance intermediaries. In 1990, the company identified threats from competitors selling directly and from fast-changing customer needs.

The principal changes introduced were:

- a move from a traditional product-based organisation (with clear separation of responsibilities between different groups) to a market-based structure which integrates field and support staff.
- a reduction in the number of levels of management.
- a change in staff responsibilities. More employees now deal more quickly with a wider range of customer needs. They also have more authority to solve problems and to seize opportunities.
- a fundamental re-design of the IT systems to make them knowledge-based and user-friendly.
- heavy investment in large-scale training programmes for employees, team leaders and managers.

A critical feature of the process of change was its participative nature. Employees, managers, the Board of NN and the Works Council were actively involved throughout. Sufficient time was allowed to obtain understanding and commitment at every stage.

As a consequence, NN has improved its relationships with its customers, and independent insurance intermediaries, through shorter processing periods, lower fault percentage and improved productivity. Employment has grown by 2.5% in 1995 and job satisfaction has improved due to wider job responsibilities and greater accountability.

Examples of Organisational Change in SMEs

As the following case studies illustrate, a number of fast-growing SMEs have developed organisations based on continuous learning, teamwork, job complexity, anflatan structures, new forms of remuneration, personal autonomy and work flexibility.

The Netwerke Service case illustrates how new forms of organisation, working practices and reward systems facilitate fast growth.

NETWERKE SERVICE

Netwerke Service Gmbh (NSG) is a fast-growing company in the information technology and telecommunications market in Germany. Founded in 1989 by its current CEO, it now has a turnover of ECU 60 million, and employs 700 people at 22 different locations in Germany.

NSG faced the problem of managing fast growth. It has focused on: keeping fixed costs under control; managing working capital; keeping up-to-date with rapid developments in technology; and responding to fast-changing customer needs. To do this, it has used flexible and participative forms of organisation.

Key features include:

- a non-hierarchical structure. There are only three levels between the CEO and the customer.
- "Multi-skill teams" throughout the organisation, including multi-skill training with key suppliers.
- a system of "internal job posting", under which employees can apply for jobs in new areas and at new levels, with appropriate training. Only "new-to-company" skills are recruited from the market.
- a "profit-sharing scheme" and additional incentive and bonus schemes for individuals and teams.
- strong staff participation and communication in the decision-making process.

As a result, customer responsiveness is high, and NSG has a loyal, well-trained, multi-skilled staff who are highly motivated. Substantial growth in turnover, profitability, and employment has been achieved. Turnover has increased by a factor of 35 since 1989. There has been considerable growth in "high tech" jobs. Employee numbers have increased by a factor of 8 over the last six years.

The Telepizza case illustrates how devolved responsibility and new remuneration techniques can harness the entrepreneurial talents of staff, with exceptional results for sales and jobs.

TELEPIZZA

Telepizza, a Spanish retailer of take-away food, is one of Europeans fastest growing companies. Established in 1988, it has 200 outlets in Spain and 50 elsewhere. It has pioneered the development of the Spanish pizza home deliveries market. With a turnover of ECU 40 million, it employs 1600 people.

The fast food market in Spain is expanding rapidly. The key issue facing the company was how to grow quickly whilst continuing to meet high standards of quality and service at acceptable levels of cost.

Telepizza recognise that staff motivation is critical to their success. Therefore, they have

- built a corporate culture based on decentralisation, empowerment and minimum bureaucracy; and,
- ensured that front line people are embued with entrepreneurial spirit and rewarded appropriately. For example, delivery staff are given direct responsibility for building business within a small geographic area. They are rewarded for their success through sales incentives and bonus packages.

Telepizza has created a highly motivated team with a strong entrepreneurial spirit. The company has achieved phenomenal growth, with a thirty-fold increase in turnover over the last five years. Employment has grown from just 50 employees in 1989 to over 1600 in 1994.

Scottish Radio Holdings illustrates the use of imaginative remuneration policies to attract and retain creative people, one of the keys to success in a media business.

SCOTTISH RADIO HOLDINGS

Scottish Radio Holdings (SRH) is a fast growing media company. It launched Radio Clyde in 1974, and subsequently acquired other Scottish commercial radio stations. With a turnover of ECU 20 million in 1994, it now employs 205 staff, compared with less than 100 in 1990.

SRH faced the problem of managing growth in a creative business. Its remuneration policies have been designed to: obtain the right mix of creative staff skills to deliver a range of distinctive programmes; create the conditions in which individual initiative can flourish; and harmonise the cultures of companies acquired by SRH with the culture of SRH itself.

SRH's reward system is strongly influenced by the belief of the founder and CEO that employees, shareholders and the community should benefit financially from business success. Key features include:

Salaries are linked to business performance. They comprise a basic salary (set at a level that is competitive with the rest of the media) and a bonus scheme, which consists of shares and cash.

The extension of this scheme to all the companies acquired by SRH. All staff who have been with the company for more than two years are eligible for a bonus, which is allocated between staff on the basis of their total earnings.

As a result, SRH continues to attract and retain the right mix of staff skills to produce programmes that satisfy its customers. It has managed to closely align the interests of staff with other stakeholders and with the objectives of the business. SRH has succeeded commercially. Four of SRH's radio stations now appear in the top eight UK commercial radio stations, as measured by audience share.

Benefits - Improved Competitiveness

These new forms of work organisation, combined with other strategic initiatives, have helped some European companies improve their cost and non-cost competitiveness. In turn this has led to enhanced performance. Competitiveness has been enhanced through:

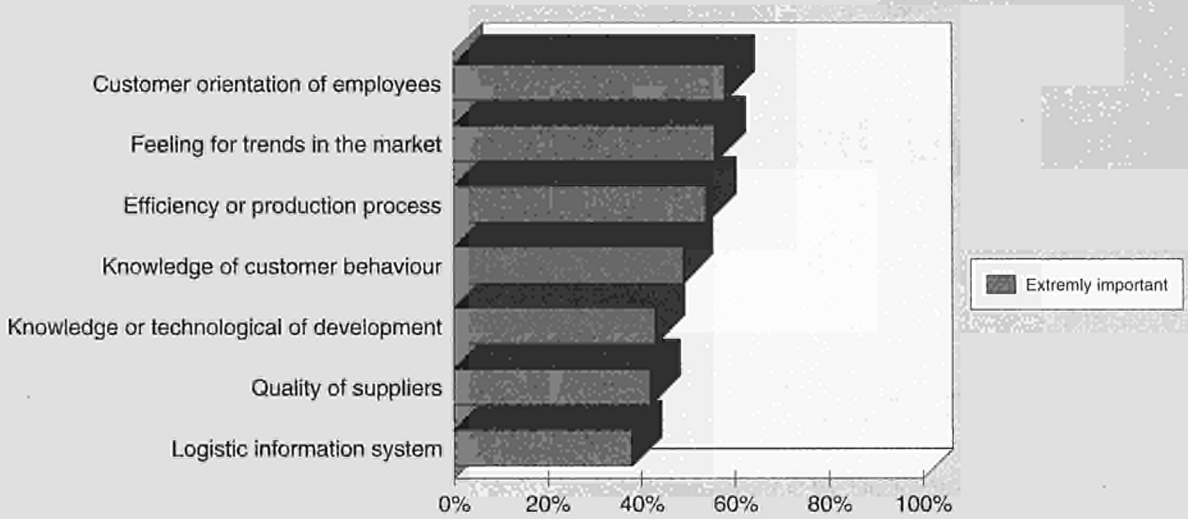
- Improved Innovation of products and processes as a result of lower costs, improved co-operation between departments and greater flexibility.
- Increased Operating Efficiency as a result of improved productivity, reduced costs, higher quality, and increased flexibility.
- Improved Structural Adjustment as a result of greater awareness and acceptance of the need for major changes by employees.
- These improvements in competitiveness by individual companies have generated benefits for the European economy. They have improved its economic performance. Where such changes have taken place, they have contributed to:
- Improved standards of living, increased employment and enhanced job security, through an increase in the volume and the value of sales of existing products and services, and an increase in sales of new products and services.
- Increased employment and enhanced job security, through the substitution of labour for capital and through a slow down in the pace at which capital replaces labour).
- Increased job satisfaction, through an improvement in the scale and the scope of jobs.

Organisational Best Practices: Drivers of Change

Many different types of organisations have introduced new forms of work organisation, and have done so for a wide range of different reasons. However, the three most important drivers of change appear to be:

- Exposure to market-based pressures, particularly "best practice leaders" (i.e. other companies, particularly competitors, who are already gaining benefits from new forms of work organisation).

Figure 3: Critical success factors for further growth



- Supply Chain pressures. This is especially important for SMEs, many of whom supply multi-national companies or other large-scale enterprises.
- Visionary leadership from senior managers, particularly the CEO. This appears to be important in companies of all sizes.

Organisational Best Practices: Obstacles to Change

Companies who have successfully introduced new forms of work organisation have made major improvements in their competitiveness. However, a large number of European companies have failed to make these changes. Why is this?

There appear to be a number of powerful obstacles to change, specifically:

- A lack of awareness amongst certain companies of the new forms of organisation and their benefits.
- The presence of negative attitudes amongst some managers, workers and trade unions that inhibit the adoption of new forms of work organisation.
- The presence of powerful institutional barriers that reinforce negative attitudes, strengthening the hand of those opposed to change and make change both more costly and more difficult to achieve. These barriers include employment regulations (specifically those limiting internal flexibility in areas such as working time, remuneration and atypical work), product market barriers reducing competitive intensity and collective bargaining arrangements favouring central or sectoral negotiations over those at plant level.
- The practical difficulties of implementing the new forms of organisation. It is not easy to introduce innovative ways of working into a company. The antechnologyan is complex and must be adapted to each company. In addition, implementation requires major disruption of existing activities. The programme of change must also continue for a number of years before the benefits are gained.
- The financial costs of implementing the new forms of organisation. It requires major expenditure to take advantage of these new methods of organising work. Companies must spend money on employee training, the acquisition of know-how, programme design, and implementation support. There are also the opportunity costs of diverting management from other activities.
- The inability of companies, particularly SMEs, to introduce new organisational techniques because they lack the capacity and resources to make the necessary changes. Deficiencies include: lack of skills amongst managers and staff; and a lack of management time or financial resources.

Introducing Organisational Best Practices - Policy Implications

Just as there is no single driver of change, there is also no single obstacle to change. Nor is there a single "right" model for change. However, from the above analysis it is possible to construct a framework for achieving change. Our conclusion is that there are two major areas in which policy changes are needed: strengthening the forces that drive change and reducing or eliminating existing obstacles to change. Consequently, the major policy implications are that governments should:

- Increase the exposure of companies to market place pressure. Fierce competition between companies is a major spur for management to take key decisions, including those related to organisational reform.
- Encourage anpartnershipan relationships between companies. Supplying companies can be pressurised to improve their performance by their customers, particularly those that have already improved their competitive position by undertaking a major programme of organisational reform.
- Reduce institutional barriers to organisational reform. Such barriers make change more difficult and more costly to achieve. The best companies will overcome the obstacles in almost any business environment, but the majority will either make no attempt or fail in the attempt if the perceived obstacles are too great.
- Help companies, particularly SMEs, to acquire the skills and resources needed to undertake organisational reform.
- Support the efforts of companies to work together to overcome the practical difficulties of undertaking organisational change. The most effective way of overcoming these practical difficulties is through the value chain, where companies with common business interests have the greatest incentive to make organisational changes.

Written by: Business Decisions Limited

The Outlook for Employment by Sector

INTRODUCTION

There were 19 million unemployed in the EU-15 at the end of 1995, close to 11% of the labour force. In 1996, the unemployment rate started decreasing again in most EU countries, but remained well in the two digit range, at close to 10.7% for the EU as a whole. Much of this unemployment is structural: in 1995, the share of "stricto sensu" structural unemployment, defined as the part of the labour force not able to be profitably employed at given wage and price levels, was estimated to be at least 4% of the work force. In other words, close to 40% of the total unemployment in 1995 was structural unemployment.

As the EU economies recover from the present downturn, employment is also expected to recover in most sectors, but not enough to bring the unemployment rate back to a "full employment" level before long. This concern is validated by the fact that the number of unemployed has been following an upward trend in the EU throughout the past twenty years, the upward trend accelerating in each successive recession, and merely stabilising at times of recoveries, except between 1986-90 when real GDP growth in the EU exceeded 3% per year (Figure 1).

While the shift away from manufacturing to services employment will continue, the manufacturing sectors remain key to the EU economy, as they provide the basis for the development of most services activities. By the end of the decade, we forecast the share of employment in manufacturing to have decreased to about 23.5%, from 24.0% in 1995, while the share of employment in services will have risen to close to 70% (50% excluding government services).

Within manufacturing, the employment creating sectors over the second part of the 1990s will be the capital goods producing sectors, which have suffered most from the recent downturn and which should benefit from the pick-up in investment which is expected to take place in the next 3-5 years. Among these are the mechanical engineering, metal products and electrical engineering sectors. Other manufacturing sectors, such as textiles, clothing and footwear, or "other manufacturing products" (including furniture, sporting goods and toys) will continue the structural decline in employment which started years ago, despite the recovery of activity and a moderate slowdown in productivity growth.

Within services, the employment creating sectors will be financial services, retail and wholesale trade, hotels and restaurants, transport services, other market services (including business services) and government services. In total, whereas 37,500 salaried jobs will be created in manufacturing over the next four years (in striking contrast to the 4 million job losses in this sector over the period 1985-95), the services sectors will create more than two million new jobs.

Clearly, these changes in levels and sectoral allocation of employment will have major implications on the skill mix of the working population, with higher demand for qualified, multi-skilled workers in manufacturing and a growing demand for employment in service-related functions throughout the economy. This creates a need for expanding the training and re-training programmes, if the total number of "structurally" unemployed is not to increase.

Below, we describe the trend in employment and productivity over the past 10 years, both at the economy-wide level and at sectoral level, and the relative contribution of the different sectors to the job creation/job destruction trend. We then review the breakdown of employment by types of skills and by sector, and, given future trends in production and productivity by sector in the EU and on-going changes n the skill mix within each sector, we derive a projection of future trends in demand for employment by types of skills. These forecasts are all consistent with the individual sectoral forecasts presented in Part II of this Panorama of EU Industry.

TRENDS IN EMPLOYMENT

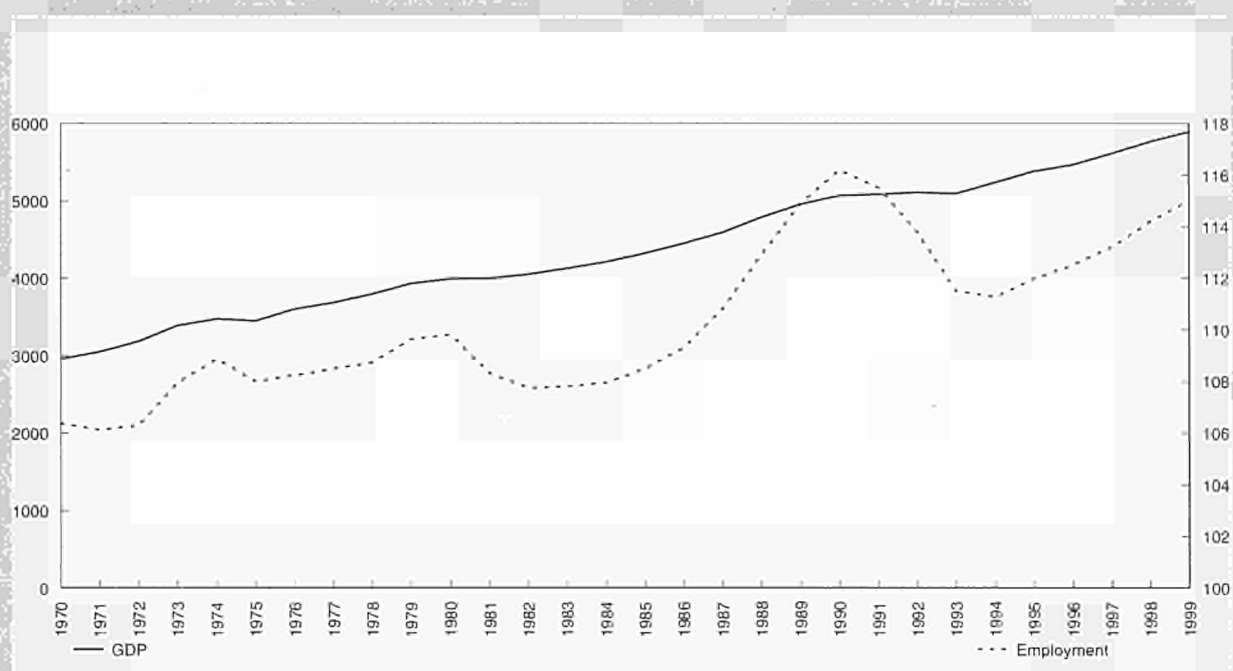
Of the 10.5 million jobs which were created in the EU between 1984 and 1991, 4.4 million were lost in the recession which followed, between 1992 and 1994. The initial strength of the recovery, which started in mid 1994, led to some improvement

Table 1: Net change in EU-15 salaried employment by broad sector of activity (in thousands)

	Net Change in Employment 1990-95	1995-99
Agriculture	-299.1	-40.4
Energy	-225.7	-43.8
Manufacturing	-4 004.6	37.5
Construction	-909.4	145.9
Transport and communication services	-240.4	106.8
Other market services	1 831.6	1 866.0
Government services	463.7	309.8
Total all sectors	-3 383.9	2 381.8

Source: DRI

Figure 1: Real GDP and employment trend over the 1970-1999 period



Source: DRI

in labour market conditions and to a slow rise in employment but, when economic activity started weakening again and business confidence began to falter towards the end of 1994, employment growth slowed again and the unemployment rate resumed an upward trend, until the middle of 1996.

Figure 2 shows that non-salaried employment is more cyclical than salaried employment. Between 1990 and 1993, salaried employment in the EU decreased slower than total employment, as the early stages of the recession first hit independent workers and liberal professions (including services to households, which were cutting back on expenditures due to growing unemployment and falling confidence). In 1994-95, there was a slight recovery of employment for both categories of workers, though with a faster rise in total employment than in salaried employment, indicating a faster recovery of non-salaried employment. As Figure 2 also indicates, throughout the period, the net change in unemployment has been less than the total change in employment, reflecting fluctuations in labour force participation. The number of discouraged workers indeed increases at times of mounting unemployment and decreases when employment recovers - hence dampening the observed fluctuations in the number of unemployed.

A direct implication of this is that, when employment starts to recover in the second half of the 1990s, the decrease in the number of unemployed will be less than the net job creation figure, since the labour force will itself be inflated by the present "discouraged" unemployed who will return to the labour market.

Trends in salaried employment in manufacturing and services

In 1995, the services sectors (including government services) accounted for two thirds of total EU salaried employment. The largest employer is the government services' sector, with more than one person in five in the EU employed by the public sector, followed by retail & wholesale trade (16% of total EU salaried employment) and "other commercial services" (14%), which covers medical and legal services, accountancy services, architects, construction engineers, and a variety of other business and social services. The share of employment in construction is also significant, at 6.4%.

Looking at the trend in employment by sector, one finds that most manufacturing sectors have lost between 8-12% of their total employment over the period 1985-1995, as a result of the successive waves of restructuring that took place over the period. Total manufacturing employment fell by 11.4% between 1985 and 1995, implying a loss of 3.4 million jobs in this sector over this 10-year period, while employment increased by 15% in the services sectors, with the creation of 9.6 million jobs (including 2 million jobs over the period 1990-95, when employment was falling throughout the rest of the economy). Overall, thus, employment in the EU increased by 4.9 million over the 10-year period, although with major shifts between sectors.

The contribution of the service sectors to job creation reflects both the overall economic shift towards services and the impact of technology on the composition of employment. The shift towards service activities partly reflects the on-going trend towards a contracting-out of traditional service activities such as advertising, computing, catering, cleaning, and legal services, and the development of new service activities such as software development and environmental services, which are more efficient to outsource than to internalis

Compared with other industrialised economies, however, the EU shows considerable sectoral differences. Part of the EU's weak job creation record over the past decades can be ascribed to higher rates of job losses in agriculture and manufacturing than recorded in other OECD countries. Thus, close to 500 thousand jobs were lost in the agricultural, fishery and forestry sector over the period 1985-95 in Europe, and, while all OECD countries posted significant job losses in manufacturing, in the EU these jobs disappeared at twice the rate observed in North America.

Table 2: The net contribution to employment made by each sector, 1985-1995

	Contribution to employment loss	Contribution to employment gain	Net Contribution
Agriculture, fishery and forestry	9.95	--	-9.88
Fuel and power products	9.46	--	-9.40
Iron and steel	7.18	--	-7.13
Non-ferrous metals	1.31	--	-1.30
Non-metallic mineral products	1.92	--	-1.91
Pharmaceuticals	3.02	--	-3.00
Basic and specialty chemicals	--	0.09	0.18
Metal products	1.33	--	-1.32
Mechanical engineering	7.16	--	-7.11
Office, EDP and precision instruments	--	0.02	0.04
Electrical engineering	7.41	--	-7.36
Motor vehicles	3.91	--	-3.89
Aerospace equipment	1.89	--	-1.88
Food, drink and tobacco	5.93	--	-5.89
Textiles and clothing	20.02	--	-19.88
Paper, printing and publishing	0.23	--	-0.23
Misc. manufacturing industries	9.66	--	-9.59
Rubber and plastics	--	0.36	0.71
Total manufacturing	70.04	--	-69.56
Construction	6.92	--	-6.87
Inland transport	--	1.24	2.47
Maritime and air transport	0.09	--	-0.09
Auxiliary transport services	--	1.20	2.40
Communication services	2.59	--	-2.58
Retail and wholesale	--	15.49	30.88
Hotels and restaurants	--	8.87	17.68
Financial services	--	3.70	7.37
Other market services	--	47.02	93.72
Government services	--	22.00	43.86
Total services		98.19	195.72
Total all sectors		50.17	100.00
Change in employment, in thousands	-4886.20	9806.00	4919.80

Source: DRI

Within manufacturing, only three sectors posted higher employment levels in 1995 than in 1985: these are rubber and plastics, office, EDP equipment and precision instruments, and pharmaceuticals. Of the 28 sectors listed in Figures 5-6 and in Table 2, 18 experienced a decrease in employment over the 10 years to 1995, while 10 posted a net (albeit very low) increase in employment. In seven of these sectors, the decline in employment was really structural, in the sense that employment decreased throughout the period, i.e. even in the rapid growth years which characterised the second half of the 1980s: these seven sectors are agriculture, energy, iron & steel, non-ferrous metals, food, drink & tobacco, textiles & clothing, and other manufacturing products. In most other sectors, the trend in employment was cyclical, with an increase in the first 5-6 years leaving way for a decline in employment in the first part of the 1990s and a recovery in 1995 or 1996.

In contrast, all the sectors in which employment grew fastest over the 10-year period are service sectors. These are retail & wholesale trade services, business services, financial services and government services. Interestingly, despite the very rapid expansion of the communication services sector over the past decade (this sector covering both postal services and other communication services), the deregulation and privatisation of the sector has resulted in a net reduction in employment by about 126 thousand, or 5.5% of the 1985 employment level.

Trends in salaried employment by sector

Agriculture, fishery and forestry

The agricultural sector currently accounts for 2% of total salaried employment in the EU (Figure 6), but has seen this share decrease continuously over time. Since 1985, employment in this sector has been on a continued downward trend, as the low rates of growth of production were more than offset by productivity gains. Overall, employment in this sector decreased by 486 thousand over the 10-year period, 10% of the overall job destruction in the EU-14 over that period (Tables 2 and 4). As most of the employment is the agricultural sector is "low-skilled", many of the people that were displaced from agriculture increased the ranks of the unemployed.

Energy

The energy sector is less labour intensive than agriculture and accounts for less than 1.5% of total EU salaried employment. In this sector also, employment decreased continuously over the past decade and a half, falling from 2.09 million in the EU-14 in 1985 to 1.62 million by 1995, a loss of 462 thousand, nearly as high as that recorded in agriculture, fishery and forestry. Productivity in the energy sector has increased at a rapid rate (5% over the period 1990-95), more than offsetting the growth in production in this essentially capital intensive sector. More than 50% of the persons employed in the energy sector are skilled workers, about one third being professionals (mainly engineers) and technicians. Plant and machine operators, most likely to be displaced due to technological innovation and production automation, account for less than 15% of the sectors' work force, while 5% of employment is in elementary occupations.

Table 3: Change in productivity of EU salaried employment by broad sector of activity (% annual growth)

	Change in productivity 1990-95	1995-99
Agriculture	3.5	1.7
Energy	5	1.6
Manufacturing	3.5	2.4
Construction	1.4	1.7
Market services	1.4	1.7
Government services	1.7	0.7
Total services	1.5	1.6
Total all sectors	2.1	1.7

Source: DRI

Manufacturing

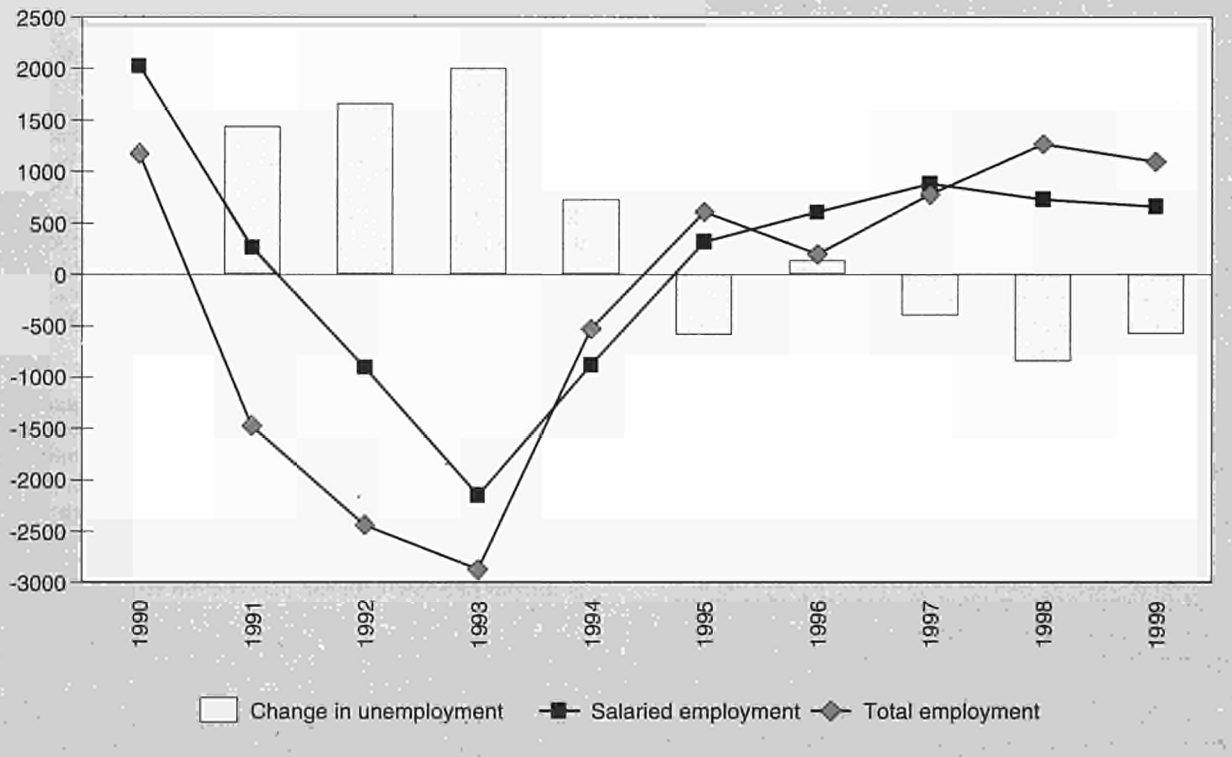
Over the past decade, the iron & steel and non-ferrous metals sectors have posted very slow growth in production (even a net decline, in the case of iron & steel), due to increased import penetration, losses in world market shares and slow growing domestic demand. This, combined with the progressive deregulation of the market and the end of subsidisation, has led to major restructuring moves within the industry, which translated into massive job reduction programmes. As in agriculture and energy, the reduction in employment in these two sectors has been continuous over time and was not even halted by the short-lived acceleration of activity in the later part of the 1980s. Overall, some 350 thousand jobs were lost between 1985-95 in the iron & steel sector (Table 4), and an additional 64 thousand were lost in the non-ferrous metals sector. Together, these two sectors thus contributed to 8.5% of the total reduction in employment between 1985-95. Many of the positions that were eliminated were un-skilled positions, with two thirds of employment in this sector are in craft and related trades workers, plant and machine operators and elementary occupations. Less than 30% of those employed in these two sectors are professionals and technicians, or managers and legislators, generally considered the more skilled occupational categories.

The non-metallic minerals sector, which covers the production of various construction materials such as bricks & clay and cement, but also the production of glass and ceramics, presently contributes to 1.25% of total EU salaried employment. Employment in this sector was on a rising trend throughout 1990, when it peaked at 1.569 million, before starting to fall as a result of the economic slowdown in Europe. Employment then started to recover in 1995, but the number of persons employed in the sector in that year was still 6.3% below the 1985 level, and 11.5% below the 1990 peak. Overall, 94 thousand jobs had disappeared in 1995 compared to 1985. As in the case of the ores and metals sector, many of these were in un-skilled job functions, notably plant and machine operators and elementary occupations.

The trend in the chemical sector (excluding pharmaceuticals) was broadly similar to that of the non-metallic minerals sector, with employment rising in the second half of the 1980s, then turning around in the early 1990s. By 1995, there was yet no sign of a recovery of employment in that sector. In total, some 146,600 jobs were lost in this sector over the 10-year period at EU level, as companies were focusing on cost reductions and rationalisation of product lines in order to keep profits from plunging too deep into the red. As this sector accounts for only 1.2% of total EU salaried employment, however, the decline in employment in the chemical industry only contributed 3% to the overall job destruction at EU-level over the past 10 year period.

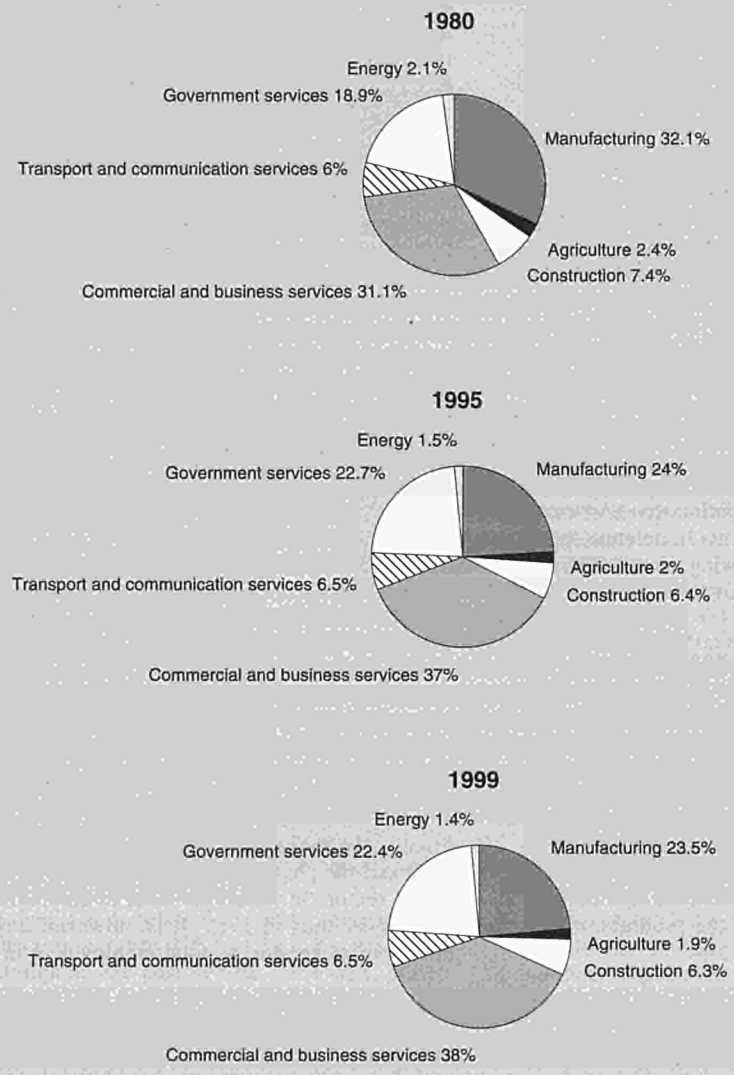
Contrary to the situation in the other chemicals sub-sectors, production in the pharmaceutical sector continued to grow at a rapid pace throughout the period. This is indeed a non-cyclical industry which is driven more by demographic change and technological progress than by conjonctural developments. As a result, employment continued to grow until 1992, after which the slowdown in production growth combined with

Figure 2: Change in total and salaried employment in the EU, and impact on the number of unemployed



Source: DRI

Figure 3: Composition of EU-15 salaried employment by main sectors



Source: Eurostat, DRI forecast

still very high rates of productivity increases did lead to a reduction in the number of persons employed, by 30,800. This brought the employment level in 1995 back to the level of 1987, a 2.6% increase from the 1985 level.

Employment in the metal products and mechanical engineering sectors posted similar trends to one another, growing in line with production between 1985-90, then decreasing in the first part of the 1990s. In 1995, employment started to recover in the mechanical engineering sector but continued to decrease in the metal products sector. As these two sectors are comparatively important in the whole of EU manufacturing and together account for close to 5% of total EU salaried employment, the downturn in employment in these sectors in the first half of the decade contributed about 10% to the overall decline in employment (a figure similar to that of the agriculture and energy sectors - see Table 2). The reduction in employment levels in these two sectors took place on the back of comparatively rapid rates of growth of productivity due to the integration of new technologies and the increased automation of production, so that even when employment recovers the change in the skill mix that has been observed over the past decade and a half will last.

The office, EDP equipment and precision instruments sector is one of the fastest growing sectors at EU level, even if Europe continues to lose world market shares in this area. However, because the maintenance of competitiveness in this sector is conditional upon continued technological developments and innovation and fast gains in productivity, the rapid growth in production observed over the past years has not been matched by similarly rapid growth in employment. Overall, employment levels in 1995 were barely 0.3% higher than in 1985, even if this masks a highly cyclical path over the period, with employment growing from 730 thousand in 1985 to 796 thousand in 1991, then falling back to 696 thousand in 1994 before starting to recover the year after. The sector thus did not contribute much to any of the changes in employment that were observed between 1985-95 - and will contribute little to future job creation.

Another sector in which the decreases in employment have often made the headlines over the past years, mainly because these were the fact of large companies, is electrical engineering. Altogether, the electrical engineering sector contributes approximately 2.5% to the total EU salaried employment, about the contribution as the mechanical engineering or the textiles, clothing & footwear sectors. Production in this sector is, however, highly concentrated in the hands of a few firms, making even small overall percentage changes in employment in this sector much more visible than if they were the result of similar job reductions but spread out over a large number of SMEs. In the second half of the 1990s, as production was growing rapidly, boosted by the positive effects of the Internal Market Programme on the EU economy, employment in the electrical

engineering sector increased by 100 thousand units, from 3,092 thousand to 3,194 thousand in 1990. The subsequent slowdown in activity however reversed the trend, and close to 370 thousand jobs were slashed between 1990 and 1995, close to 12% of the total work force. By 1995, there was yet no sign of a recovery in employment in this sector, which altogether contributed approximately 7.5% to the overall job destruction between 1985-95 (i.e. less than agriculture and energy).

Employment in the automotive sector has fluctuated in line with the manufacturing average, rising between 1985 and 1990 then falling as of 1991, before recovering partly in 1995. The sector, which accounts for 1.8% of total salaried employment in the EU, employs approximately 2 million persons at present, compared to 2.158 million in 1985. As in the electrical engineering sector, the reduction in employment in this sector partly reflects the slowdown in production combined with on-going productivity growth, but partly also results from the integration of new technologies and innovation, which will have long lasting effects both on the level of employment in this sector, and on the skill mix. The same applies to the aerospace sector, where employment decreased by 92,500 between 1985 and 1995, and which should continue to experience job losses in the future as the continued cuts in defence spending will prevent production from growing at a sufficient rate to totally offset the impact of the growth in productivity on employment.

The food and drink sector is the largest employer of all manufacturing sectors considered here, even if the share of employment in that sector has been falling continuously over time. Employment in the food and drink sector is, in fact, on a structural downward trend, which has resulted in the loss of close to 290 thousand jobs between 1985 and 1995, or 6% of the total job destruction over that period. It is unlikely that employment will recover significantly in this sector in the long term, as demand for this sector's products is slow growing, the EU market is mature and exports are limited by distance and the perishable nature of the products which makes them inconvenient (or expensive) to transport over long distances.

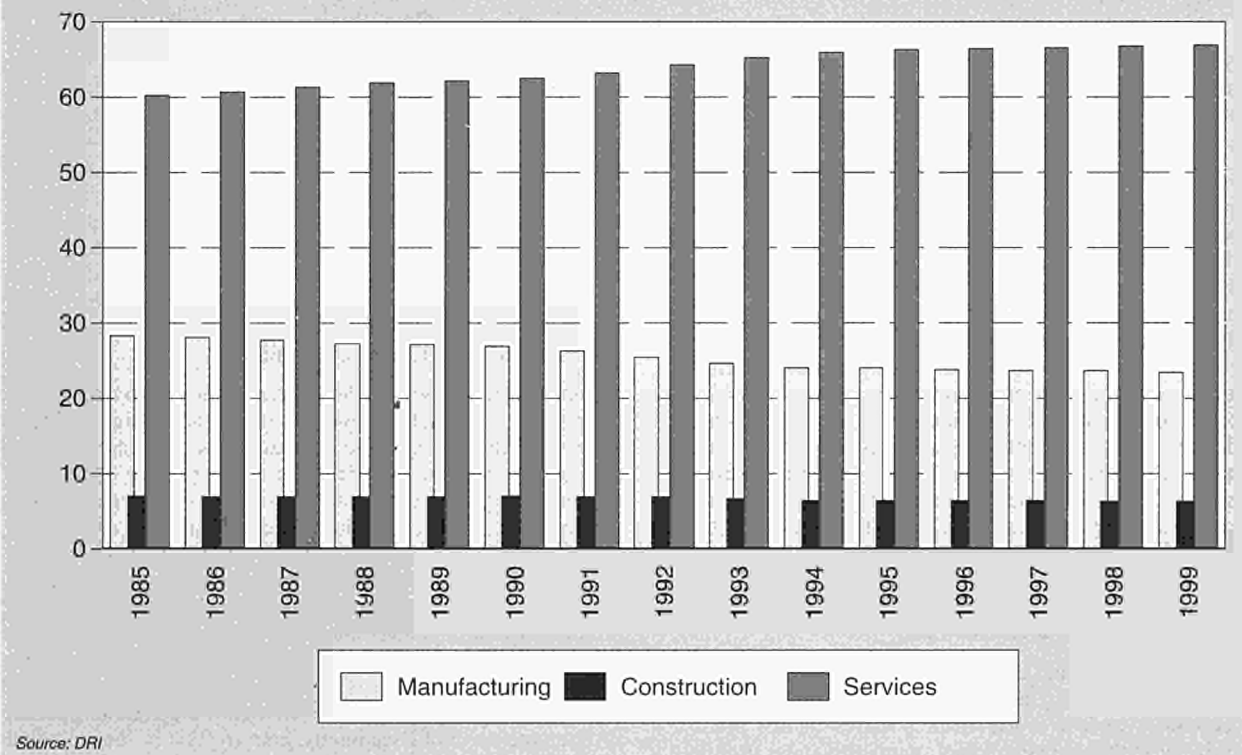
The textiles, clothing and footwear sector is next in line as the largest employer in the EU, among all manufacturing sectors, but will soon lose this place to the mechanical and/or electrical engineering sectors, given the on-going structural downward trend in employment in this sector. Whereas there were still 3.8 million people employed in this sector in 1985, the number had gone down to 2.8 million by 1995, a loss of close to 1 million jobs. The decline in employment in this sector has gone on un-interrupted over the past 10 years, as production itself has suffered from heightening competition at world level and increased outward processing by EU companies trying to remain competitive in the domestic and world markets.

The pulp, paper and printing sector is an essentially capital intensive sector, which contributes to less than 2% of total EU salaried employment. Employment in this sector was about the same level in 1995 as in 1985, having increased between 1985 and 1990, then fell back to 2.05 million by 1994 before recovering somewhat in 1996. Overall, the sector thus had a very small contribution to the overall change in employment in the EU-14 (+ 0.2%).

The same does not hold of the "other manufacturing" sector, a relatively diverse sectoral category which presently accounts for 2% of total EU employment. This sector contributed to 10% of the total employment reduction between 1985-95, due to the loss of 472 thousand jobs between 1985-95 (Table 4). The decline in employment levels has really been structural in nature, and has gone on un-interrupted since 1985, the sector having not benefited sufficiently from the burst in activity which took place in the second half of the 1980s.

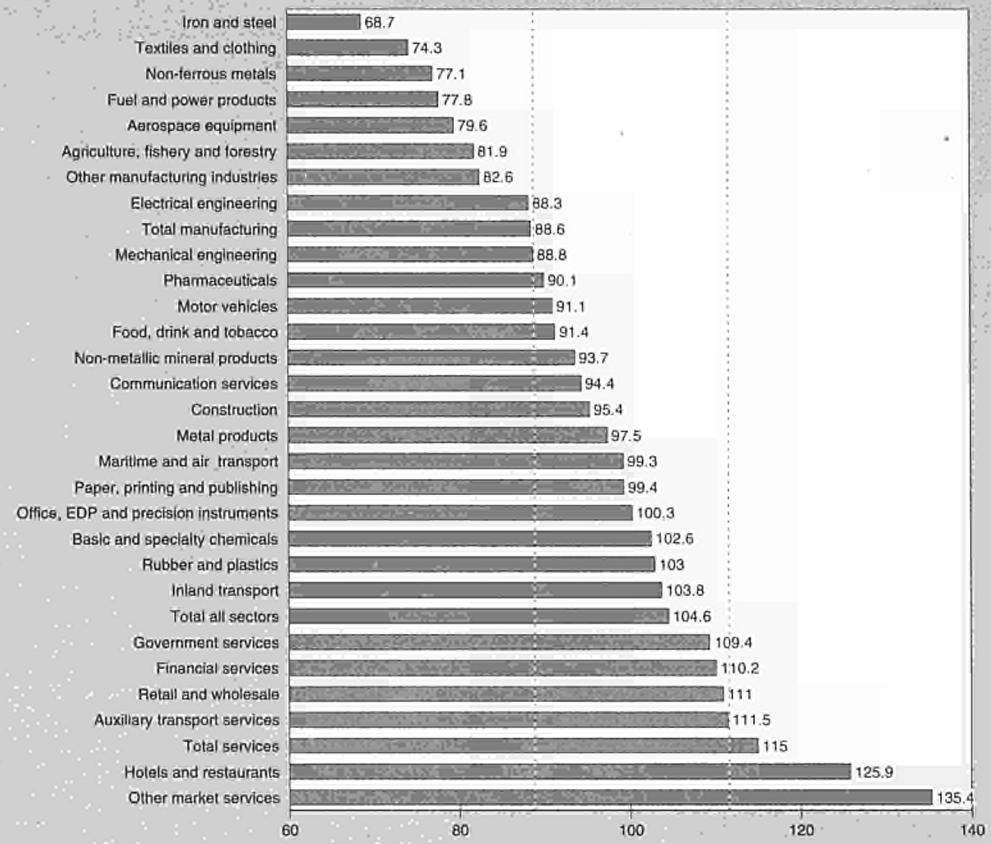
Finally, the rubber and plastics sector is, with the office and EDP and the pharmaceutical sector, one of the few manufacturing sectors in which the level of employment in 1995 was still higher than in 1985. It is, however, a relatively modest employment creator, as total employment in this sector only

Figure 4: Sectoral employment trends in the EU-15, 1985 to 1999 (% of total salaried employment)



Source: DRI

Figure 5: Employment levels by sector in 1995, as a percentage of the 1985 employment level in that particular sector



Source: DRI

accounts for just over 1% of total EU salaried employment. Rubber and plastics is a sector in which activity has expanded at a rapid rate throughout the past decade and a half, pulled by its plastic component as a result of the increased penetration of plastic materials in most segments of the economy, in particular packaging. Employment in the rubber and plastics processing sector increased continuously between 1985 and 1990, before turning around after 1990 as a result of slower growth in production and major ownership restructuring moves, leading to a rationalisation of production in fewer plants. Although there was no sign of a recovery in employment yet in 1995, the reduction in employment levels between 1990 and 1995 did not totally outweigh all the job creation which had taken place in the previous five years, such that the sector created a net 35 thousand jobs overall between 1985-95.

Services

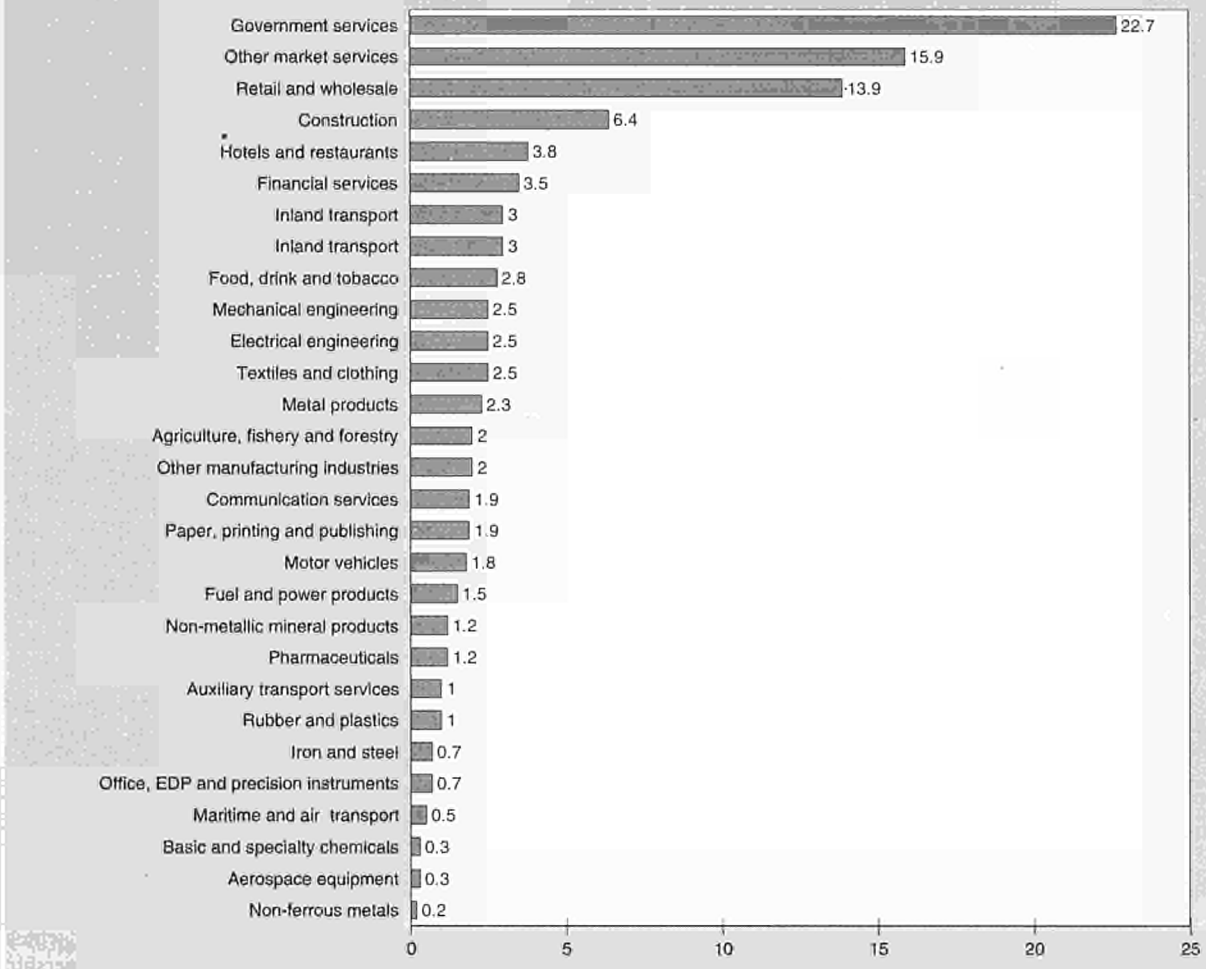
Shifting to the services sector, the construction sector is a large employer, with 6.5% of total EU salaried employment and an important share of EU non-salaried employment. Activity in the construction sector is highly cyclical, and has grown little overall in the past 10 years due to low investment activity in the corporate sector, falling public sector investment and high interest rates combined with slow real income growth dampening investment growth in the personal sector. Overall, thus, the construction sector has contributed negatively to the overall job creation effort between 1985-95, with a loss of 338 thousand job positions over that 10-year period.

The only two other service sectors to have posted a net decline in their work force between 1985 and 1995 are maritime and air transport services, and communication services. The inland transport services sector, which covers both road and rail transport services for passenger and freight transport, accounts for 3% of total EU salaried employment and created 122 thousand new jobs over the ten year period considered here, whereas the maritime and air transport services sector, which are subject to deregulation and have seen major ownership restructuring moves taking place over the past decade or so, have seen total employment decline by 4 thousand over the period. These two later sub-sectors, however, together account for only half a percent of total EU salaried employment, and have seen employment levels rising since 1993, i.e. earlier than in other sectors of the economy.

Communication services account for close to 2% of total EU salaried employment. This is, with construction and maritime and air transport services, one of the few service sectors in which employment has actually fallen between 1985 and 1995: employment in 1995 was 126 thousand units below the 1985 level, as deregulation of the telecommunication services sector and privatisation of several public operators have resulted in a rationalisation of these organisations, and the loss of a large number of jobs. The downturn in employment in this sector is, however, more recent that in most manufacturing sectors, as employment in communication services continued to increase throughout 1991, and only started to decrease significantly from 1992 onwards. By 1995, the level of employment in the communication services sector was 8.1% below the 1991 level, and 5.6% below the 1985 level. The trend remained downward oriented in 1996.

The retail and wholesale trade sector is the second largest EU employer in the list of sectors considered here, with 13.9% of total EU salaried employment. The largest employer on the list is the business services sector, with 15.9% of total EU salaried employment. As the retail and wholesale trade sector is much less cyclical than the investment and intermediate goods producing sectors, employment in retail and wholesale trade has also been more stable despite considerable ownership restructuring following the inception of the Single Market, and has remained on a continuous upward trend since 1985. In total, 1.5 million new jobs were created in wholesale

Figure 6: The share of employment in each sector as a percentage of total EU salaried employment in 1995



Source: DRI

and retail trade over the period considered, nearly half the number of jobs that were lost in manufacturing over that period. In total, the sector thus contributed to 15.5% of the total job creation between 1985-95.

Another service sector which created a significant amount of new jobs over the period 1985-95 is the hotels and restaurants sector, which presently accounts for 3.8% of total EU salaried employment, and for an even higher share of non-salaried employment. This is also a sector in which employment has been rising continuously since 1985 despite the slowdown in economic activity in the first part of the 1990s, allowing the creation of 870 thousand jobs over that 10-year period, close to 10% of the total employment creation by all services sectors. Employment in this sector also remains upward oriented.

The financial sector has been a significant contributor to job creation in the past, and an important employer for un-skilled persons. The average educational requirement for people employed in the financial sector in the 1970s and 1980s was indeed well below that in the rest of the economy. Between 1985-90, the financial sector in the EU contributed to the creation of 403,900 salaried jobs, 5% of all the employment creation over that period. Rationalisation of the sector following market liberalisation in the late 1980s/early 1990s, allied to more difficult economic conditions, then led to a reduction of 41,300 salaried jobs in the sector between 1990 and 1995, such that the net employment creation between 1985-95 was "only" 363 thousand, the same number of jobs that were lost in the electrical engineering sector alone over that same period.

The other market services sector comprises a wide range of heterogeneous activities such as business services, social services (education and health services), cultural and recreational services and personal services (hairdressing, dry cleaning, domestic services, etc.). This is a sector in which employment has been booming over the past decade and a half, as a result of the continued outsourcing trend of a number of service activities by manufacturing companies and others, and the development of new services for households and businesses. Overall, the "other market services" sector presently accounts for close to 16% of total EU salaried employment, and was responsible for half of the total job creation in the services sectors over the period 1985-95. More than 4.6 millions jobs were created in "other market services" sectors over the 10 year period considered, 1.2 million more than were lost in the whole of manufacturing over the same period.

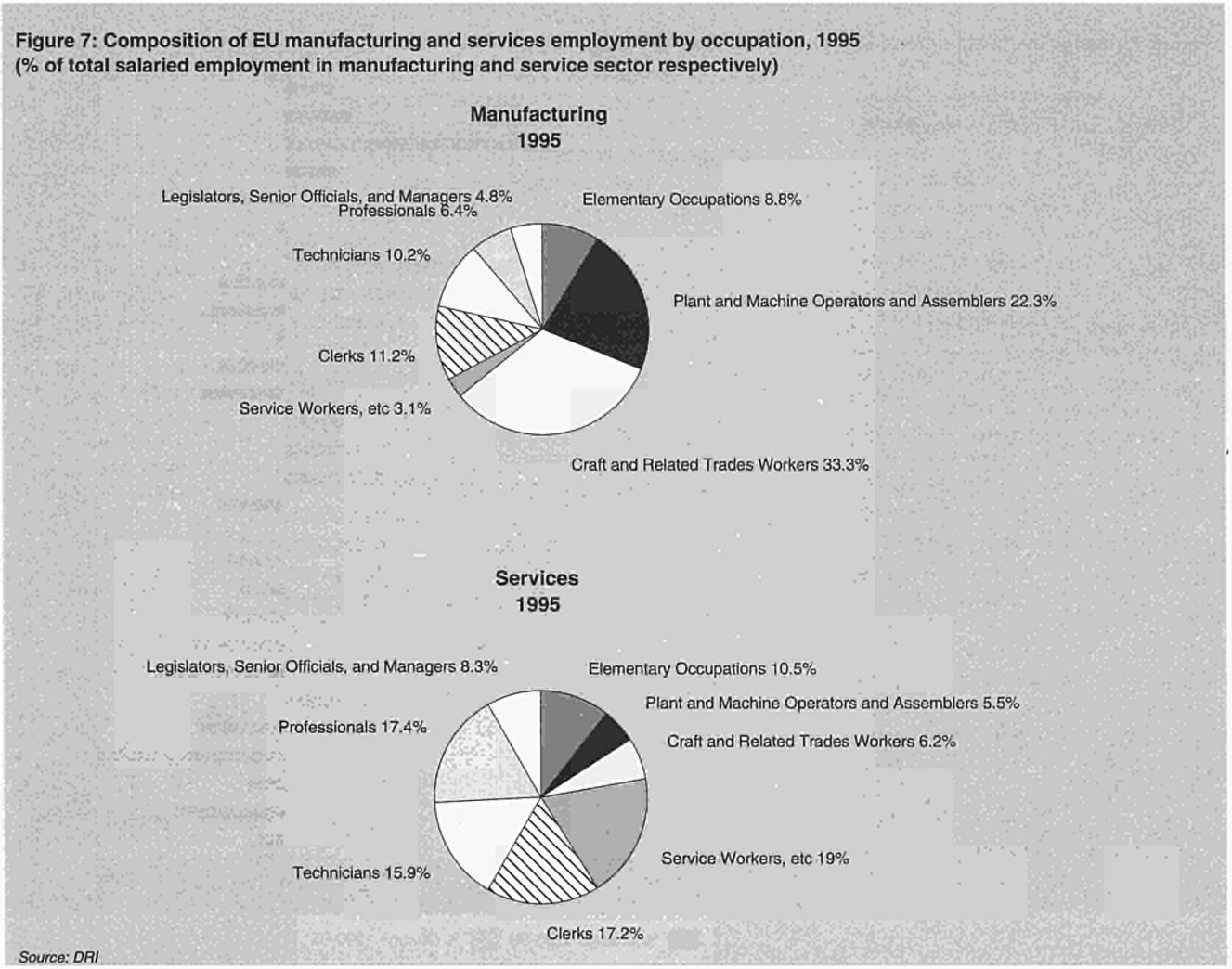
Finally, the government services sector, which accounts for 22% of total salaried employment in the EU, created another 2.2 million jobs or so over the past 10 years, despite much stricter budget policies in all EU Member States and the privatisation of a number of public sector organisations.

In total, thus, there were close to 5 million new jobs created overall in the EU between 1985 and 1995, a 4.6% increase in employment levels compared to 1985.

THE IMPACT OF TECHNOLOGY ON EMPLOYMENT

Technological developments both reduce the demand for certain types of jobs and create new jobs by fostering the development of new activities or services. Although new machines often help to produce more output with fewer workers, the assumption that this results in fewer jobs rather than

Figure 7: Composition of EU manufacturing and services employment by occupation, 1995 (% of total salaried employment in manufacturing and service sector respectively)



Source: DRI

more output is based on the notion that there is only a fixed amount of output and hence of work to go around. Technological progress, however, creates new demand in the economy both by increasing productivity hence real incomes, and by creating new products, services and market opportunities through innovation. When output expands, productivity growth can thus march in step with rising employment.

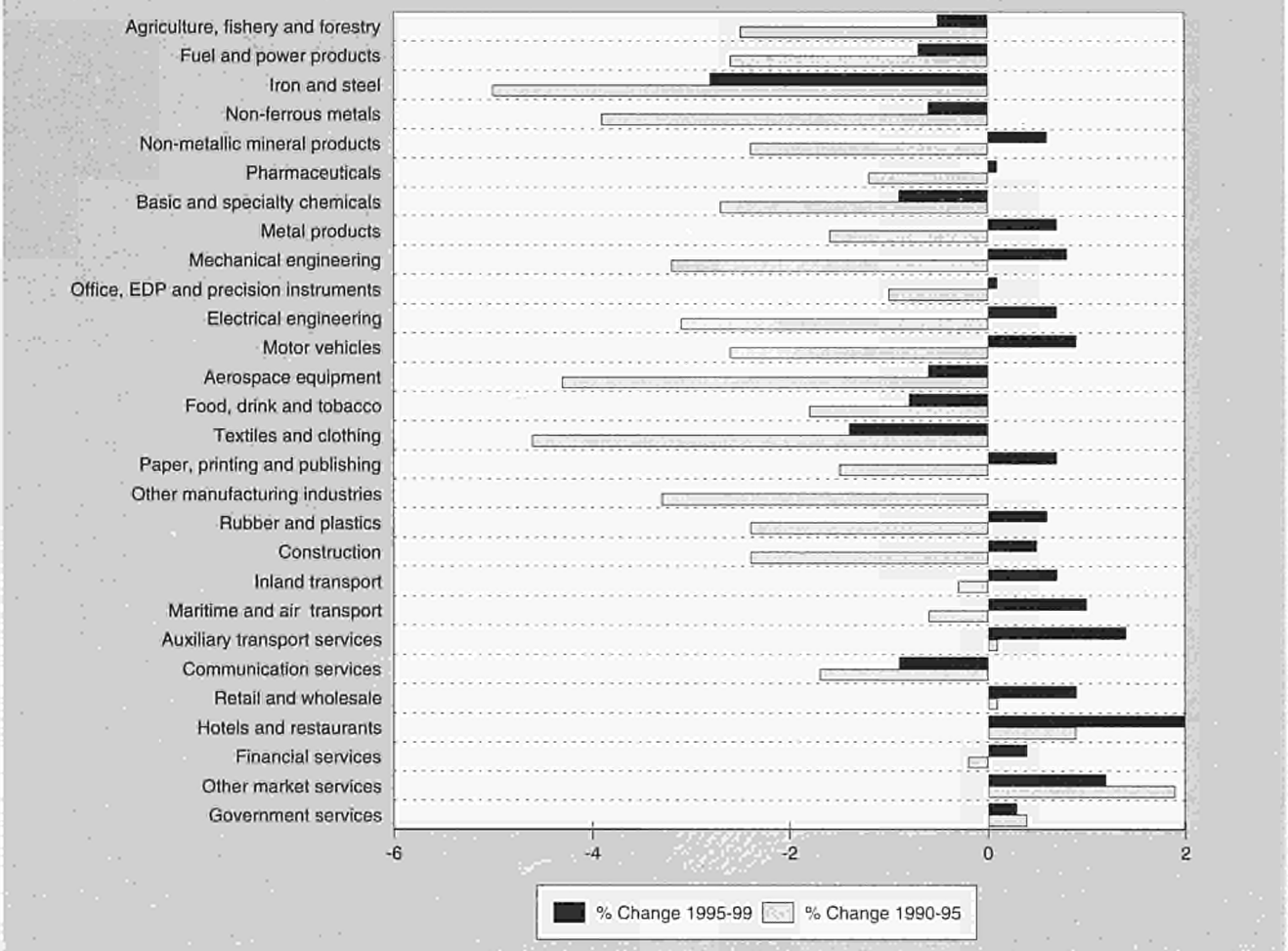
Historical employment trends confirm that technological progress and innovation have not been incompatible with net job creation. Although there have been broad cycles in EU employment over the past 25 years, the upward trend has been positive despite the rapid development of new activities such as telecommunication services, computer programming or software development. Because the pace of technological change has accelerated over the past decade, however, and because technological progress results in changes in the skill mix, many still fear that the rapid integration of the new technologies into economic activities will lead to the creation of fewer new jobs over the coming years, hence to rising levels of structural unemployment.

As a matter of fact, the rising pace of technological change increases demand for skilled labour and for training (and retraining), as the more traditional (repetitive, simple) tasks become automated. Higher productivity and output expansion are also related with a greater workforce participation and responsibility. Both of these phenomenon result in a general trend in terms of skill requirements towards multi-skilling rather than narrow specialisation, and put emphasis on communication skills (enabling both workers and managers to work closely with people from other departments, disciplines, firms and countries) and customer focus (emphasising the service component of products as a competitiveness factor). The supply of these competencies, however, depends on the structure of the labour force: given demographic developments in the EU and the progressive decline in the number of young workers in most Member Sates, this poses a major challenge to the education system.

The manufacturing sectors are impacted by the development of information and communication technologies in several ways. In terms of their impact on activity, technological developments contribute to the implementation of important restructuring processes and create demand for those sectors which produce the technology or equipment. Technological developments also have a direct impact on competitiveness, either by allowing gains in productivity hence reductions in unit costs which make the innovating firms more competitive, or through their impact on non-cost competitiveness factors such as product diversity, quality and/or efficiency.

In terms of employment, the impact of technology diffusion is both qualitative and quantitative. On the quantitative front, technological developments tend to accelerate job destruction in the short run, but can lead to job creation in the longer term. On the qualitative front, technology diffusion accelerates the shift towards more highly trained professionals, technicians and multi-skilled workers, and reduces demand for more basic functions, including elementary occupations. This mainly affects non-skilled workers, which dominate unemployment in manufacturing (Figure 7). In services, in contrast, a much higher proportion of salaried employment at present is in more skilled functions such as legislation and mangers, professionals and technicians.

Figure 8: Change in EU labour productivity over the periods 1990-95 and 1995-99 (in %)



Average annual change
Source: DRI

Before reviewing the forecast for employment by sector and by type of skill, the next section briefly reviews past trends in productivity by sector and discusses the likely future trend in productivity growth, given where we currently stand in terms of company re-organisation, market deregulation and privatisation moves.

TRENDS IN PRODUCTIVITY

Table 3 presents the average rate of growth in productivity by broad sector of activity over the period 1990-95, and compares this to the forecast growth over the period 1995-99. Between 1990 and 1995, labour productivity in most manufacturing sectors and in energy increased rapidly as a result of extensive restructuring moves aimed at reducing costs in view of mounting competition, or at re-organising production along broader lines following the inception of the Internal Market Programme (concentration of production in fewer plants with increased specialisation of each plant in the case of specialty chemicals or food & drink, relocation of some parts of the production process, notably the more labour intensive parts, in cheaper labour cost regions to reduce overall production costs, etc). Productivity growth in manufacturing thus averaged 3.5% per year over the period 1990-1995, a much higher figure than in the US. In the services sectors, the average rate of growth of labour productivity in the first half of the 1990s was less than 2%, still a comparatively high rate compared to "normal" long-term trends. This comparatively fast growth of labour productivity in services was boosted by the rapid integration of new technologies, in particular in trade and transport as well as in financial and communications services.

As many of the restructuring moves (re-engineering, relocation, ownership restructuring, divestments from non-core businesses) that were initiated in the late 1980s/early 1990s are now progressively coming to an end, even with continued rapid technology diffusion in all sectors of the economy, labour productivity growth should slow down slightly over the medium term. In manufacturing, labour productivity is thus expected to grow by 2.4% per year. This, combined with lower productivity growth also in government services (the more productive, capital intensive, activities being progressively moved to the private sector), will bring the overall labour productivity growth in the economy down to about 1.7% per year on average, from a figure of 2.1% over the period 1990-95. Only the commercial services sectors will see a small acceleration in labour productivity growth, reflecting restructuring following market liberalisation and privatisation, and the integration of new technologies.

THE OUTLOOK FOR EMPLOYMENT BY SECTOR

Although productivity growth is expected to accelerate in most service sectors over the coming years, due to market deregulation and privatisation in several areas of the economy, employment in services will still continue to increase, albeit at a slower rate.

In manufacturing, employment is also forecast to grow over the second half of the 1990s, though not enough to compensate

Table 4: Past and forecast changes in EU salaried employment over the period 1985 - 1999(1)

	Level 1995	% Change in level 1985-95	% Change in level 1990-95	% Change in level 1995-99	Change in level 1985-95	Change in level 1995-99
Agriculture, fishery and forestry	2 206	-2.0%	-2.5%	-0.5%	-486.3	-40.4
Fuel and power products	1 622	-2.5%	-2.6%	-0.7%	-462.4	-43.8
Iron and steel	769	-3.7%	-5.0%	-2.8%	-350.6	-82.4
Non-ferrous metals	216	-2.6%	-3.9%	-0.6%	-64.1	-5.1
Non-metallic mineral products	1 388	-0.7%	-2.4%	0.6%	-94.0	30.8
Pharmaceuticals	1 344	-1.0%	-2.7%	-0.9%	-147.6	-50.2
Basic and specialty chemicals	362	0.3%	-1.2%	0.1%	9.0	1.3
Metal products	2 539	-0.3%	-1.6%	0.7%	-65.0	67.5
Mechanical engineering	2 781	-1.2%	-3.2%	0.8%	-350.0	86.9
Office, EDP and precision instruments	732	0.0%	-1.0%	0.1%	2.2	3.6
Electrical engineering	2 729	-1.2%	-3.1%	0.7%	-362.3	78.7
Motor vehicles	1 967	-0.9%	-2.6%	0.9%	-191.2	74.8
Aerospace equipment	356	-2.3%	-19.8%	-0.6%	-92.5	-8.3
Food, drink and tobacco	3 069	-0.9%	-1.8%	-0.8%	-289.7	-99.1
Textiles and clothing	2 831	-2.9%	-4.6%	-1.4%	-978.3	-154.9
Paper, printing and publishing	2 059	-0.1%	-1.5%	0.7%	-11.4	62.4
Misc. manufacturing industries	2 234	-1.9%	-3.3%	0.0%	-471.8	0.7
Rubber and plastics	1 205	0.3%	-2.4%	0.6%	35.0	30.8
Construction	7 072	-0.5%	-2.4%	0.5%	-338.1	145.9
Inland transport	3 319	0.4%	-0.3%	0.7%	121.6	95.6
Maritime and air transport	601	-0.1%	-0.6%	1.0%	-4.2	23.4
Auxiliary transport services	1 141	1.1%	0.1%	1.4%	118.1	66.7
Communication services	2 150	-0.6%	-1.7%	-0.9%	-126.7	-78.9
Retail and wholesale	15 412	1.0%	0.1%	0.9%	1 519.2	576.8
Hotels and restaurants	4 230	2.3%	0.9%	2.0%	869.7	344.3
Financial services	3 932	1.0%	-0.2%	0.4%	362.6	63.1
Other market services	17 624	3.1%	1.9%	1.2%	4 610.8	881.8
Government services	25 219	0.9%	0.4%	0.3%	2 157.8	309.8

(1) Percentage change are average annual growth rates. Change in level in thousands
Source: DRI

the losses of the past years. Overall, the share of employment in manufacturing will continue to decline, from 24% in 1995 to 23.5% by the end of the century, while the share of employment in services increases to close to 70%, 22.4% of this representing employment in government services.

Due to planned cuts in government spending and privatisation, employment in government service activities is expected to grow slower over the coming years than was the case previously. Whereas close to 2.2 million jobs were created in the public sector between 1985-95, of which 464,000 were created between 1990-95, this figure will come down to just over 300,000 by the end of the decade, creating a need for higher job creation in other sectors to offset this weaker job creation in public services sector.

Agriculture and energy

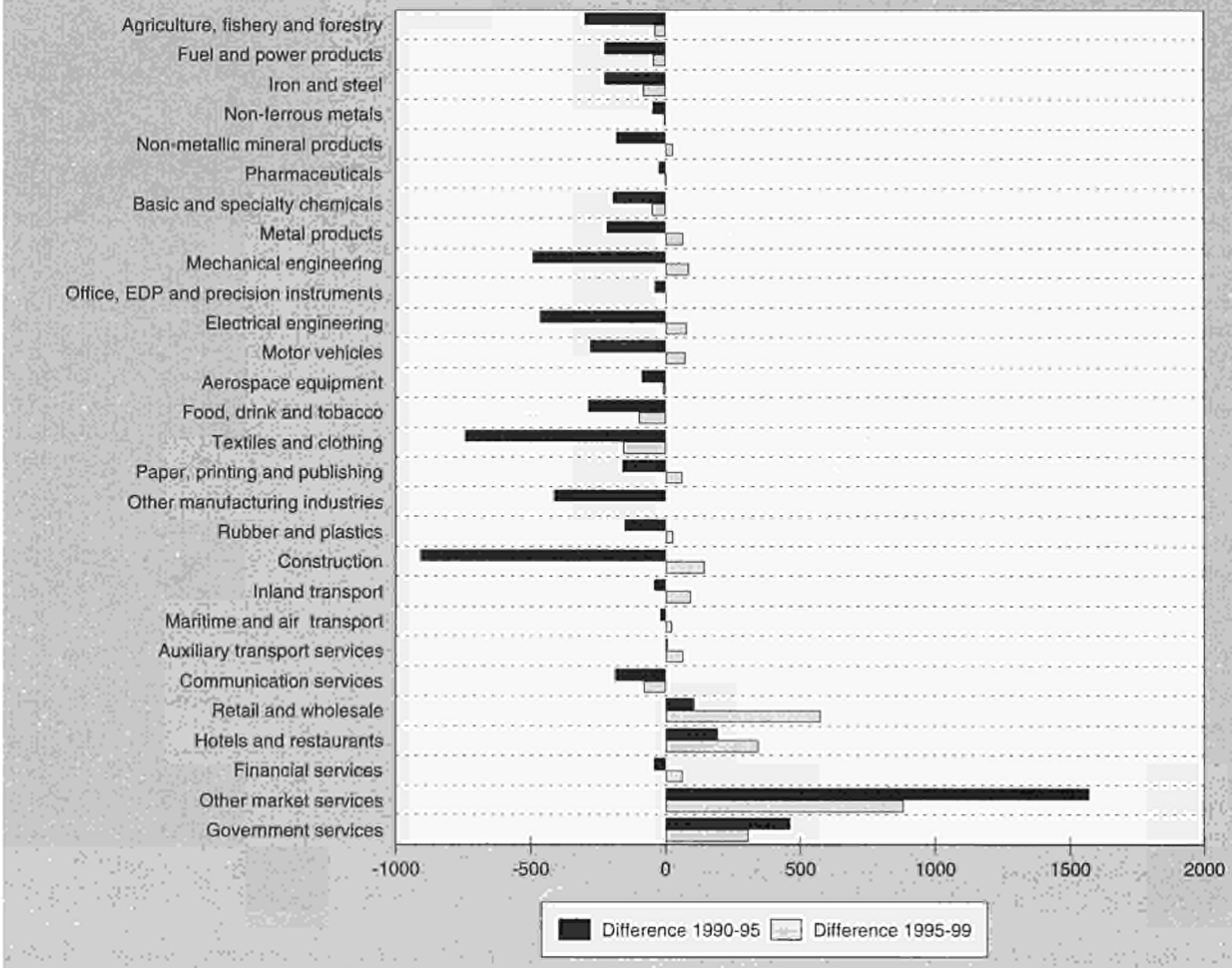
The decreasing trend in employment in agriculture, fishery and forestry which started many years ago is expected to continue, such that by the end of the decade the agriculture sector will account for less than 2% of total EU (salaried) employment. The same holds for the energy sector, which is expected to account for about 1.4% of total EU (salaried) employment by the end of the decade.

Manufacturing sectors

Within manufacturing, most sectors are expected to post a reduction in the average rate of productivity growth from 1995 to 1999 as compared to the 1990-1995 period, as the extensive restructuring moves which took place in the early 1990s and which led to major labour hoarding are now slowly coming to an end. Still, because production growth is not expected to be extremely buoyant, by 1999, only five manufacturing sectors will have higher employment levels than in 1985. These are the pharmaceuticals, metal products, office and EDP (including precision instruments), paper, printing and publishing and rubber and plastics sectors. In all the other sectors, manufacturing employment will remain below the mid-80s level, even at the turn of the century. Among these are the iron and steel, non-ferrous metals, basic and specialty chemicals, aerospace equipment, food, drink and tobacco and textiles and clothing sectors. The forecast growth in these sectors is, despite slower productivity growth, not sufficient to lead to a recovery of employment. Together, these six sectors will account for the disappearance of 400,000 jobs over the next four years. Notably, these are mainly intermediate and consumer goods producing sectors (except for aerospace equipment). The capital goods producing sectors do comparatively much better, as they allow for the creation of 342,000 jobs between 1995-99.

On a net basis, 37,500 salaried jobs will be created in manufacturing between 1995 and 1999. Even if this appears low compared to the total 2.2 million salaried employment creation in the services sectors over the same period, it is nevertheless a major improvement compared to the 4 million salaried jobs that were lost in this sector between 1990 and 1995. The relatively important employment creation in the capital goods producing sectors mainly reflects the recovery of economic activity in these sectors due to the upward trend in the investment cycle at the end of the early 1990s recession, and is also partly related to employment creation in environmental related activities. Employment in environmental sectors is estimated at 1.9 million in 1994, much of this in capital goods producing sectors such as instrument engineering, etc. In 1994, about 20-25% of environmental jobs were in the production of environmental goods in the instrument engineering sector, and 3-5% in recycling activities. The remaining 70-75% of environmental jobs are in service and related activities: waste disposal, sewage, water, and environment services such a en-

Figure 9: Change in EU employment levels over the periods 1990-95 and 1995-99 (in thousands)



Source: DRI

vironment auditing or maintenance activity. Hence, the rapid growth of this sector contributes to some of the reported strong expansion of employment in business services sectors.

Services

The outlook for employment in the market services sectors (i.e. excluding government services) is much more promising than that in the manufacturing sectors, with an expected 1.9 million salaried jobs being created between 1995-99, and an additional 300 thousand jobs expected to be created in government services. All market service sectors except communications services are forecast to post a rise in employment in the second half of the 1990s, the biggest contributors being the retail and wholesale trade sectors, along with other market services (mainly business and personal services).

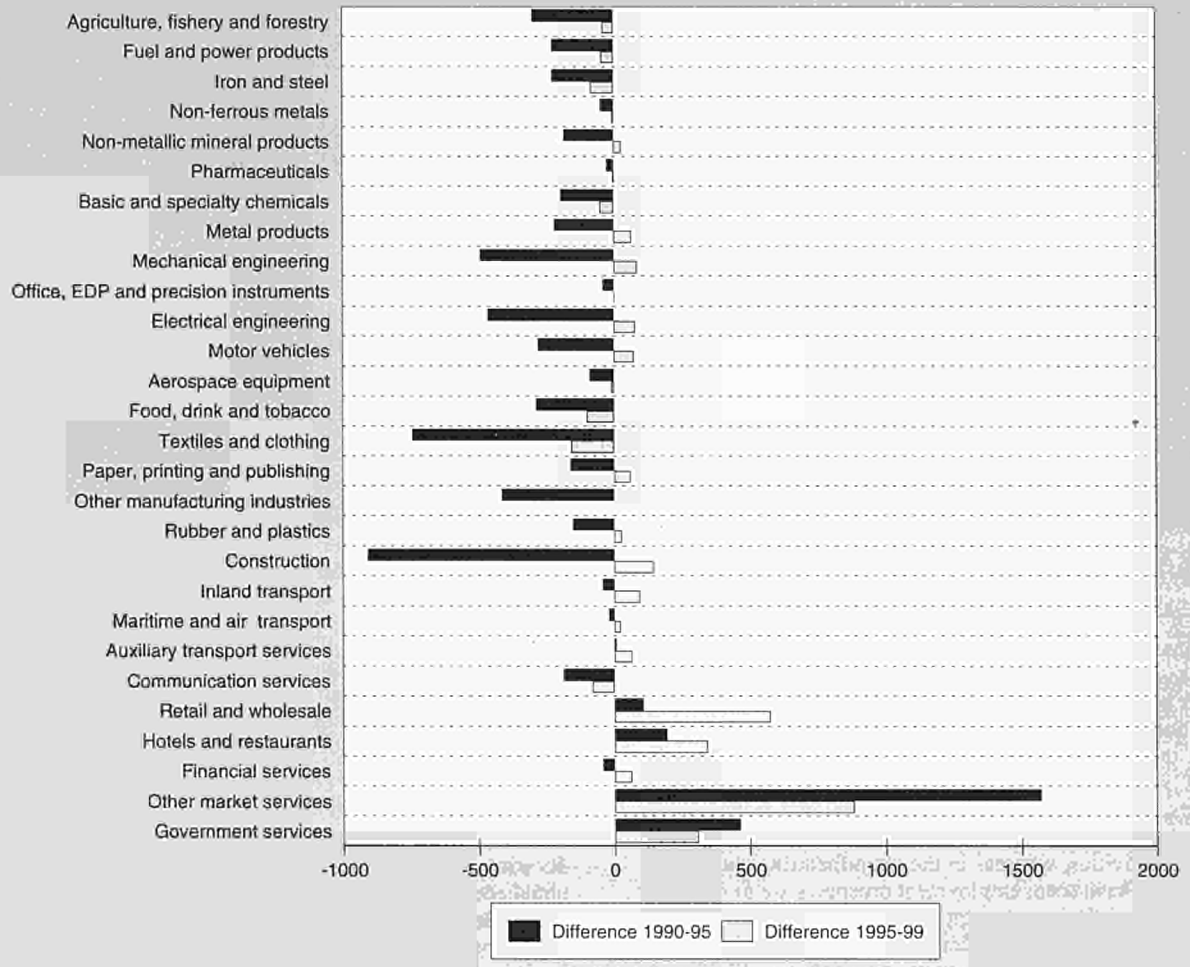
Employment growth is expected to resume in the financial services sector, though at a slower rate than in the past due to mounting competition which will increase the companies' (banks, insurance and others) focus on productivity and efficiency. In some countries, the trend towards productivity improvements will be also influenced by privatisation, whereas more generally the developments in advanced communications will accelerate the rationalisation of traditional financial services branch networks, through the automation of transactions and the opening up of direct routes to the customer. This will foster increases in productivity and will keep employment growth at bay.

As indicated earlier, employment in the hotel, restaurants and catering sector presently accounts for about 4% of total EU salaried employment, and this share is growing rapidly over time. The sector is expected to create some 344,300 new jobs over the next four years due to the rapid development of demand for these services following the slow growth years in the early 1990s. Much of the employment creation will likely originate within SMEs rather than from the traditional large players in the sector, and much of the employment growth will be in the form of low-skilled jobs, notably in services and sales functions.

The outlook for employment in the transport services sector will depend on a combination of effects working in opposite direction: on the one hand, faster growth in economic activity will lead to a rise in the demand for transport services, as the sector's elasticity to GDP is greater than one. On the other hand, the development of advanced communications will substitute some of the growth in physical travel. Increased concern for the environment is also resulting in policies aimed at reducing overall demand for transport, though these will likely exert their impact over a longer term than the present forecast horizon of 4-5 years. Overall, salaried employment in the transport services sector is expected to rise by close to 185,700 between 1995-99, much of this in the inland transport sector (rail and road). This would more than offset the reduction in employment of 53,800 which had been observed over the period 1990-95. Most of the new jobs created will be for by technicians and plant and machine operators, i.e. they will be linked to the expansion of the services themselves and not of the managerial or specialised functions.

Good prospects are also anticipated for the other market services sector, which accounts for 15-16% of total EU salaried employment at present, and which is expected to create close

Figure 10: Composition of EU employment by occupation, 1991, 1995 and 1999 (% of total salaried employment)



Source: DRI, based on Eurostat data.

to 900,000 jobs over the forecast period, more than a third of the total net (salaried) job creation in the economy. The sector currently employs a mix of skills, with just under 50% of the total employment in this category being "highly skilled" functions such as managers and legislators, engineers, and technicians. The bulk of the employment creation will be in business services which will benefit from an increasing trend among large companies to externalise functions (e.g. advertising services, accountancy services, legal services, market research services, computing and software services) not belonging to their core activities. Employment in business services is expected to grow on average by 2.8% over the next four years.

The advances in information and communication technologies (ICT) will indeed continue to play a capital role in the outsourcing of functions. ICT applications will enable small organisations to offer services without an important clerical and administrative infrastructure by using on-line resources and by relying on voice and video communications for local presence. Therefore, ICT will allow an important number of small business service firms to succeed in markets where formerly only large players could operate. Moreover, the development of ICT is obviously a positive factor for employment in computing and software services, which is a major sub-sector of business services.

The construction sector is one which lost close to 1 million (salaried) workers over the period 1990-95, due to difficult overall economic conditions in the EU. The recovery of construction activity over the forecast period is expected to partly offset the previous decline in employment, and some 145,900 new jobs could be created between now and 1999. The faster activity in construction is also leading to higher demand for the non-metallic minerals sector, and thus indirectly contributes to the creation of another 30,800 jobs in that sector. One should, however, note that the above employment figures all related to salaried employment. The construction sector is one which uses a large number of "independent" workers, for which the trend in employment is generally much more cyclical. The likely contribution of the construction sector to employment growth over the period 1995-99 is thus possibly higher than the above figures indicate.

In terms of changes in skill mix, these are not expected to be very significant over the forecast period. The primary impact of ICT on construction will be to improve the efficiency and speed of construction work. To the extent that this allows to reduce the cost of construction, this could lead to an increase in demand and activity, hence to a possible rise in employment. The impact of ICT on the construction sector could also be to smooth out the sector's business cycles, hence to increase the sector's overall stability. Indeed, because of the cyclical nature of demand for construction, the sector tends to shift from situations of excess capacity to situations of capacity shortages on a three-to five-year cycle. If work can be completed more rapidly in the periods where demand exceeds capacity, then the turnover of the sector can rise, profits can be stabilised and overall costs reduced, and there need not be substantial reductions in employment in cyclical downturns.

Table 5: Change in EU salaried employment by occupation, 1995 to 1999 (in thousands)

	Change in employment levels (1)			Percentage Change		
	Total	Manufacturing	Services	Total	Manufacturing	Services
Legisl. and managers	779.0	87.1	668.7	10	6.8	11
Professionals	1 484.9	177.2	1 265.2	10.1	10.5	10
Technicians	1 438.0	381.3	976.7	9.7	14.2	8.5
Clerks	-298.6	-110.6	-142.3	-1.8	-3.7	-1.1
Service workers,etc	-145.5	-63.6	-42.1	-1	-7.8	-0.3
Skilled agricultural workers	-44.9	--	--	-2.6	--	..
Craft and related trade workers	-110.2	-68.8	-194.7	-0.6	-0.8	-4.3
Plant and machine operators	-342.1	-235.8	-45.3	-3.2	-4	-1.1
Elementary occupations.	-235.6	-129.3	-60.0	-2.1	-5.5	-0.8
Armed forces	-143.6	--	-143.6	-18.4	--	-18.4
Total	2 381.8	37.5	2 282.6			

(1) The total columns also includes changes in agriculture, energy and construction
Source: DRI, based on Eurostat data

THE OUTLOOK FOR EMPLOYMENT BY SKILL TYPE

As emphasised in several instances in the previous sections, the forecast changes in the sectoral composition of employment between now and the end of the decade will have important implications on future skill requirements. In 1995, about a third of the total number of persons in employment were in "skilled" functions (defined as legislators, senior officials and managers, professionals (mostly engineers) and technicians). Among these "skilled" workers, 81% were actually employed in service activities, whereas in the manufacturing sectors (in which, as we have seen, employment prospects are more gloomy), 75.4% of the persons employed are classified as low or relatively low-skilled workers: 22.2% are plant and machine operators, 8.8% are in elementary occupations, 33.3% are craft and related trades workers and 11.1% are clerks - all of which are likely to reduce in importance as a result of technological change and innovation.

Over the past years, there has been a long term trend shift in the structure of employment, from less skilled to more skilled, consistent with the fact that manufacturing employment is falling whereas employment in services continues to grow. The shift in the skill mix, however, goes well beyond these mechanical effects of changes in the sectoral composition of employment, as they have been reinforced by the impact of technological developments and innovation. The share of managerial, technical and professional jobs in total employment is rising and the trend shows no sign of abating.

Figure 10 compares the actual composition of EU employment by occupation in 1991 and 1995 and the projected occupational structure of EU employment at the end of the century. The figure indicates a definite trend towards the reduction in the share of low-skilled employment represented by plant and machine operators, service and sales workers, clerks and workers in elementary occupations. Given that the composition of employment by type of skills varies across sectors, and given the projected differences in individual sectoral growth rates, one can derive the likely changes in the number of people in employment by occupational category over the period 1995-99.

In the medium term, technological developments combined with the changing composition of output will continue to influence both the level of demand for employment and the skill requirements for new employees - leading to a further shift in labour demand towards multi-skilled flexible workers, and increased demand for employment in service-related functions.

Thus, a growing skills mismatch is likely to be observed between labour demand and supply, as the EU economies are confronted with a labour pool which is largely composed of low-skilled, young and inexperienced workers. In the absence of corrective actions, such as appropriate training and re-training policies, this may lead to a further growth in structural unemployment and increased tensions in the labour market.

The shift from low-skilled to high-skilled jobs needs an education and training system that effectively matches vocational education and training with the business sector's needs, to be able to balance demand and supply; to make this happen is Europe's employment challenge.

Written by: DRI Europe

Immaterial investments as an innovative factor

INTRODUCTION

Modern economies are entangled in an ongoing process of "dematerialisation": the cost structure of products is more and more dominated by immaterial elements. Common "intangible" components of production are, for instance, quality (assurance and control), research and development, (product and/or process) design, marketing, logistical planning, distribution, licensing, training, servicing etc. Many of these components have a predominant service character. Consequently, the production of material products often constitutes only a limited and decreasing part of the total process of generating added value. The American service sector guru Quinn estimated that "within manufacturing, 75% to 85% of all value added and a similar percentage of costs are due to service activities. The major value added to a product is typically due less to its basic commodity value than to styling features, perceived quality, etc. added by "services' activities" inside or outside the producing company" (Quinn, 1988, p. 340).

Both within and between firms, this dematerialisation process reflects three parallel phenomena:

- the increasing interdependence of industrial and service activities; and
- the continuous process of specialisation and differentiation, both on the level of individual firms and on the level of economic sectors.
- the emergence of economic networks of highly interdependent firms in a mutual subcontracting, outsourcing and co-operation relationship.

On the level of the economic system as a whole, the dematerialisation process is reflected in an increasing dominance of the service sector. In most advanced economies, nowadays, a majority of the working population has a job in the service sector. In many modern economies, the contribution of the service sector to GNP is dominant. As a matter of fact, the dominance of the service sector might be even considered an indicator of the stage of development of an economy.

As service sector activities and industrial production are increasingly interwoven and firms more and more constitute highly differentiated networks of specialised firms, innovation processes tend to be better understandable in terms of (value) chains going beyond the borders of traditional economic sectors. Within these chains or networks, the exchange of (not necessarily new) knowledge plays an essential role in feeding innovation. In innovation, a better and more intensive exploitation of knowledge as a source of added-value is more and more what it is all about. Knowledge in the general sense of the word, including socio-organisational knowledge, develops into a resource which is of central importance for innovation.

Given this innovative role of "intangible", immaterial elements in modern production processes, the effectiveness of productive investment depends increasingly on the adequate investment into immaterial production factors, like R&D, software, styling, marketing etc. "Value added is increasingly likely to come from technological improvements, styling features, product image, and other attributes that only services can create" (Quinn et al., 1990, p.58). "Products themselves are only physical embodiments of the services they deliver" (cfr. Quinn, 1988, p. 330). The immaterial share in the production process as a whole represents already more than half of that devoted to physical investment. Therefore, decision making within company strategies and public policies have to take account of investment into these immaterial factors. Reason enough to have a closer look into the position and nature of investment into immaterial production factors, and its role in competitiveness.

DEFINING IMMATERIAL INVESTMENT

Traditional definitions of investment refer to the acquisition of durable physical goods, such as machines, means of transport and buildings, which can be put in for production more than once. Accordingly, as a rule statistical material as well as economic analyses of investment have a focus on investment in material fixed assets. However, the influence of investment in non-material goods on economic welfare has increased substantially over the last decades. Therefore, there is reason enough for an open eye towards the role of intangibles in the economic process, and in particular in innovation.

In contrast with material investment, immaterial assets are claimed to have the potential of giving a permanent impulse to economic growth. A common definition of immaterial investments refers to expenditures on education and production or acquisition of disembodied know-how. Knowledge, in particular non-rival and only to a limited degree exclusive knowledge, therefore is a core concept in immaterial investment. The combination of non-rival and difficult to exclude knowledge gives immaterial investments positive externalities.

Mainstream research into immaterial investments has a predominant focus on R&D expenditures, mainly because of the availability of internationally comparative statistics. R&D-based indicators, however, are not able to measure economic creativity sufficiently. The measurement of successful market introduction of innovative products or processes requires much more than only R&D. In the Netherlands only 17% of immaterial investment is spent on R&D (Minne, 1994).

The OECD uses a broader definition of immaterial investment, covering all long-term outlays by firms aimed at increasing future performance other than by the purchase of fixed assets, categorised in intangible investments in technology, enabling intangible investments and market exploitation and organisa-

Table 1: Investment in tangible/intangible assets (percentage of GDP)

	TANGIBLE		INTANGIBLE	
	1974	1984	1974	1984
United States	14.2	13.2	4.4	6.2
Japan	26.9	22.9	2.4	3.5
France	16.8	13.4	2.3	3.1
Germany	15	13.8	2.4	3.6
Italy	18.1	14.7	1	1.9
Netherlands	16.1	13.5	2.6	3.7
United Kingdom	16.3	13.5	3.1	3.8
Average	17.6	15	2.6	3.7

Source: OECD (1992).

Table 2: Investment in immaterial assets by Dutch companies, 1975-1990 (in mln Dfl).

	1975	1980	1985	1988	growth'75-'88
Total	8 420	14 055	20 725	24 900	66.20%
Marketing	3 265	5 600	6 940	8 750	62.70%
R&D	2 630	3 680	5 760	7 030	62.60%
Vocational training	970	1 710	2 190	2 460	60.10%
Software	525	1 275	2 765	3 450	84,8%
Other (1)	1 050	1 820	3 070	3 210	67.30%

(1) Licences, rights, patents, and consulting
Source: Vosselman, 1992, p.254

Table 3: Components of immaterial investments, according to the OECD and strategic management literature.

According to OECD:	According to strategic management literature (following Jacobs, 1996)
O R & D expenditure	O Knowledge about economic and social developments, demand articulation
O Know-how	O Hard' technological knowledge (incl. timing)
O Industrial patterns and design	O Strategic choices about core competences (contracting-out, co-development)
O Patents and licences	O Strategic positioning of products and concepts
O Artistic creations, copyright	O Product design, user friendliness, integrated electronic software
O Right to receive royalty payment	O Integrated values: convenience, quality of life, self-affirmation, fun
O Training and other investment in human resources	O Brand names, advertising and image-building
O Market share	O Making combinations: team and network building,
O Product certification	O process design, learning organization, 'soul'
O Customer lists, subscriber lists and lists of potential customers	O Reputation in networks
O Product brands and service brands	O External logistics
O Software and similar products	O After-sales service and customer feedback

Sources: OECD, 1992; Bilderbeek et al., 1995; Jacobs, 1996.

tion (OECD, 1992). Thus far no consensus has been reached on a full list or a system of categorisation.

IMMATERIAL INVESTMENT IN STATISTICAL TERMS

The above-mentioned dematerialisation process is reflected in a shift towards more investment in intangible assets (Table 1).

These statistics indicate a decline in the total investment/GDP ratio from 20.2% to 18.7%, whereas intangible investments increased from 2.6% to 3.5% in 10 years time. Before playing down the relatively modest immaterial share in total investments, one should consider that most 'official' statistics structurally underestimate. Available statistical material is mainly based on narrow definitions of investment, not including expenditures on essential elements like investments in human resources development, (re)organising production, new product service concepts, et cetera. The traditional focus on R&D, licences and patents -- possibly a heritage of the policy orientation on industrial sectors -- seems to be insufficient to measure real immaterial investment.

This is the more so because industrial sectors have a high concentration of R&D compared to other sectors like business services and agriculture, whereas tertiary service sectors have a much higher degree of technical expertise than can be derived

Table 4: The predominant immaterial factors in innovation in the economic sector case studies.

Industry	Immaterial factors in innovation
Flower	O Knowledge and education
	O Distribution and logistics
	O Image, design and quality
Beer	O Premium brands
	O Market differentiation
	O Innovative marketing
Publishing	O Ability to produce, re-package and market content
	O Ability to focus on and deliver content to specific user groups
Financial services	O Organisational transformation
	O (Re)training
	O Distribution channels
	O New communication patterns with less predictable clients
	O Active advertising and marketing strategies
Clothing and fashion	O Design, advertising and distribution
	O Knowledge-intensive and high value-added production
	O Consumer behaviour

Source: TNO

from R&D statistics. Compared to industrial sectors, service sectors invest much higher expenditures on computers and software. Subsequently, business services use and produce a broad range of technical expertise in the field of organisation and logistics.

Whereas the OECD interpretation of intangible investment underexposes the importance of image-building and brand loyalty, modern strategic management theory emphasises that investment in new concepts and commercial solutions is more decisive for competitive strength than the availability of new technologies. Since knowledge-based societies increasingly require creative and disembodied competitiveness in stead of production rationalisation oriented rivalry, it is the creativity of the manager and entrepreneur, which highly determines company success. Benetton, McDonald's, Ikea, CNN and Swatch exemplify the development of new socio-economic concepts, successfully integrated in their products and services.

Knowledge-intensive business services are expected to grow much stronger than industrial sectors. As a result of global competition, companies tend to concentrate on core competencies. Outsourcing of activities, especially services, becomes increasingly common. Additionally, a growing proportion of service sector companies themselves invest more in internal service delivery as well, e.g. on vocational training, orgware, market testing and research. Investment in immaterial investment, therefore, is no longer dominated by expenditures on R&D. The role of business services in creating immaterial assets seems unambiguous, and therefore requires further attention form industrial policy makers.

From both the traditional indicators of immaterial investment and the growth in business services, we may conclude that the process of dematerialisation has intensified, whereas the emphasis is not only on R&D, but on marketing, vocational training, software and orgware as well. This is shown in table 2, indicating the modest share of R&D in total immaterial investments in Dutch companies.

BROADENING THE CONCEPT OF IMMATERIAL INVESTMENTS

An attempt to broaden the concept of immaterial investment is presented in table 3, following modern strategic management literature and focusing on different levels of knowledge as a key factor (Jacobs, 1996). These knowledge levels should be linked in order to achieve successful business strategies within the knowledge society and economy. Failing to successfully combine these knowledge levels will almost certainly result in a failure to achieve the desired return from both material and immaterial investments. A virtually exclusive focus on the 'hard' technological components and limited indicators, such as R&D investments, therefore, results in a highly incomplete and partial approach of industrial and technological policy design.

The OECD-based overview may be considered rather traditional, and -- given its origin not surprisingly -- using primarily an economic perspective. The second overview (in the right column) is more oriented towards strategic management: implicit in it is the business process in all its facets and aspects. Knowledge is a core concept in this (second) overview.

Comparing these 'inventory lists' of immaterial investments, the first thing that catches the eye, is the overlap. Both lists contain the main elements of R&D and R&D-related aspects, although in different terms. The main difference is that the strategic management oriented list shows a higher awareness of really 'soft' components of immaterial investments, like reputation, image, and related concepts like 'fun' and 'soul' (cfr. Peters, 1992).

SECTOR CASE STUDIES OF IMMATERIAL INVESTMENT

In order to get closer to 'immaterial practice', immaterial investment on the firm level has been considered more in-depth in the following sectors:

- the flower industry;
- the beer industry;
- the publishing industry;
- the financial services industry, and
- the textile and clothing industry.

Table 4 shows the predominant immaterial factors in innovation in each of the economic sector case studies.

Considering the common elements in this overview, five main categories seem to dominate the sector case studies focusing on immaterial investment (table 5).

What these factors have in common, is its relationship with the demand side. As competition gets fiercer and more global, there is a growing need for suppliers to be responsive to developments at the users and consumers of products and services. Clearly, the traditional approach of immaterial investment does not include most of these aspects. In most of

Table 5: The main categories of immaterial investment in the sector case studies.

IMMATERIAL INVESTMENT IN:	
Organization:	Transformation towards flexible, adaptive client-oriented organizational structure
Knowledge:	Knowledge-intensive production, education, (re)training
Product:	Brand names, images and design
Market:	Innovative advertising and marketing strategies, oriented towards specific user / consumer groups
Distribution:	Channels for tailor-made delivery of services / products, and communication with less and less predictable consumers

Source: TNO

Table 6: The sustainability of different factors of competitive advantage, in terms of competitors' reaction time.

Factor of competitive advantage	Reaction time of competitors
lower price	2 months
publicity campaign	1 year
new product	2 years
new production process	3 years
distribution network	4 years
human resources	7 years

Source: TNO

the case studies considered, however, these aspects play a predominant role in the sector's innovation processes. Therefore, they deserve more attention in order to get a better understanding of the nature of innovation processes, in particular knowledge-intensive processes, and a better insight into how to stimulate these processes.

CONCLUSION

A best practice programme on the knowledge economy: learning to learn.

The main conclusion is that immaterial investments are a still widely underestimated area of the knowledge economy. Nearly all policy measures in the field of innovation are related to 'hard' technologies. Many studies, however, show that the difference between advanced companies and 'laggards' is much more related to the quality of their management than to their application of new technologies. It is evermore stated that in the knowledge economy the main factor of competitive advantage has become the ability to learn how to learn. For most companies it remains, however, unclear what this means in practice. It follows that European competitiveness could be enhanced substantially by stimulating this capacity on a broad scale. Therefore, it is of utmost importance that the European Union should further develop a programme on best practices in the learning economy. The 'added value or knowledge ladder', presented in table 3, provides an excellent starting point to elaborate such a programme.

This recommendation is underpinned by a finding presented at last year's World Economic Forum, calculating the sustainability of different factors of competitive advantage (table 6).

All kinds of competitive advantage which lead to differentiation, i.e. competing on difference based on added value, appear to provide much more sustainability than competing on cost. In general, immaterial investments lead to factor advantages which are more difficult to imitate or to 'buy' than material investments. Moreover, the success related to investment in material elements like new technologies is highly dependent of their relation with the immaterial elements. And finally, it appears that the immaterial factor which encompasses the whole process -- human resources, learning to learn -- is the most difficult to imitate.

Since some years the conviction that the competitiveness of Europe has to be rooted in activities with a high level of added value, has become widely accepted. However, in the field of policy making there is still a strong degree of reticence about implementing policies in this field. It is therefore of utmost urgency that Europe tries to take the initiative for a best-practice programme in this field. Best practice does not imply that there is only one solution for everybody. In the age of differentiation it is, however, important to make more explicit the 'menu' of choices and opportunities available for each kind of company. One of the great challenges of the knowledge society is indeed the transformation of information into practical knowledge to individual firms, large and small. And experience has taught that the European Union sometimes has to play a role in this.

Next to the general theme of capabilities related to the learning organisation and the 'learning economy', specific programmes are necessary for each of the levels -- and aspects within those -- of the 'knowledge ladder'. To give only a few suggestions:

- competing for foresight: bringing together experts in the field of sociological future research with marketing experts through Europe in order to stimulate a common ground for 'further applied research'; international exchange in the field of scenario building and related awareness workshops;
- product concepts: stimulating comparative research on product range concepts and on product concepts in different branches of industry, e.g. retailing, tourism, consumer electronics;
- integrated product development: comparative research on different ways of organising 'concurrent engineering' in firms and diffusion of best practice experiences.

Statistics

The traditional focus on R&D, licences and patents in most 'official' investment statistics leads to a structural underestimation of immaterial investments. Expenditures on immaterial elements that are nonetheless essential for innovation, like investments in human resources development, (re)organising production, new product service concepts, etcetera. are not or insufficiently included in official statistics. Real investment in intangibles therefore is substantially larger than reflected

in investment statistics. Given the increasing weight of immaterial factors as inputs for innovation there is enough reason to work towards an improved reflection of intangibles in official statistics. A leading question in this respect is how to make immaterial factors in the innovation process more visible.

Defining immaterial investments

There is an obvious lack of consensus on the exact definition of intangibles and immaterial investment. Although available definitions show some overlap in categories of intangibles to be included into the concept of immaterial investments, there are substantial differences as well. As a consequence of the above-mentioned dematerialisation of in economic production processes, the 'soft' components of immaterial investment, like reputation, image, formula and related concepts like fun and soul play an increasingly decisive role as factors for competitive success. Because of its process orientation, strategic management might offer better perspectives on a productive and innovation-oriented approach towards immaterial investment than the traditional, rather economic view.

A broad and knowledge-oriented vision of immaterial investments, including these 'soft', but essential components, therefore, is to be favoured. More needs to be done in the field of defining immaterial investment adequately as an innovation factor. Specific attention should be paid to the following aspects:

- the linkage between innovation processes on the basis of immaterial investments and the utilisation of the public knowledge infrastructure;
- the availability (or the lack of it) of an innovation tool kit, geared towards the specific characteristics of the innovation processes on the basis of immaterial investments;
- knowledge management, both within innovating firms and institutions of the knowledge infrastructure, as an instrument for boosting immaterial investments as an innovation factor;
- barriers in the integration of different knowledge fields or disciplines, contributing to the emergence of innovations on the basis of 'new combinations';
- the potentiality of strategic management support for SME's.

Accounting practice

On a more detailed level efforts might be considered to promote the translation of intangibles in accounting practice in such terms that annual reports give an adequate reflection of immaterial assets. Now, in the absence of adequate forms of standardisation, there is a wide variation in the degree of registering intangibles in annual reports. Consequently, as far as statistical data are drawn from these sources, official statistics reflect this same unstandardised accounting practice. Efforts should be given towards improving the reflection of immaterial investments into official accounting practice.

Appropriability

In relation to appropriability, immaterial investments (or the results of it) in general appear to be more difficult to copy or imitate. In fact, this could be considered one of the big advantages of investing in intangibles. Of course, competitors may try to 'buy' people or even whole teams from other firms, including some secret, literally 'embodied' knowledge. For that reason clever human resources policies are a necessary and probably most important element of competitive strategy in the knowledge economy.

However, there may be fields where appropriability of investments is lacking and therefore constitute a barrier towards investment in intangibles. Relevant (European Union) policy measures, related to immaterial investment are on the one hand related to the legislative system, in particular regarding the protection of existing rights, copyrights, designs, trademarks, software etc., on the other hand mainly concentrated around the areas of competition policy and technology policy. As far as there are real opportunities for imitating and copying intangible innovations with a predominant service character and the limited protection possibilities in this respect, future policy development should pay more attention to identifying ways to protect intellectual property rights. A more adequate protection from illegitimate copying and imitation behaviour could result in a more favourable service innovation climate, in particular for innovations based on immaterial investments. Future policy development should pay more attention to protect intellectual property rights. The identification of appropriability regimes seems to be an even more promising alley for future policy development.

Competition Policy

Generally, in industries at the edge of new developments it will prove to be very difficult to gain a powerful position where new developments by competitors could be stopped. Considering the launch of Windows 95, even in the Microsoft-case the market remains so attractive that continuously new entrants try to fight for market share. The same example teaches, however, that the situation must be monitored and illegal activities by the market leader checked. This should, however, not be done from the perspective of a theoretical market ideal where everybody is equal. Every competitor invests in new developments in order to try to conquer a niche in the market in which it is a kind of monopolist. Without this possible reward, there would be no investment in new developments. This is the reason why appropriability of innovation is sometimes guaranteed in the form of temporal monopoly rights like patents and other forms of intellectual property. Competition policy remains important, but has to start from a dynamic position in which innovation is stimulated, not hampered. A static approach in the field of competition policy would lead to what in German terminology is called quite appropriately 'Schlafmtzenkonkurrenz'. In order to be able to design more adequately future policy development, geared towards reaping the innovative potential of immaterial investments, for each of the above-mentioned areas more efforts should be made to articulate the policy related barriers and obstacles of stimulating immaterial investment.

Barriers and obstacles to investing in intangibles

Investment in immaterial investment is no longer dominated by expenditures on R&D. The role of business services in creating immaterial assets seems unambiguous, and therefore requires further attention form industrial policy makers. Given the growing weight of immaterial components in the innovation process, an important question is whether industrial and technology policy needs adjustment, and if so, to what extent and in what direction.

A productive approach might be to focus on the barriers and obstacles to immaterial investment as an innovation factor, contributing to competitiveness. Given the range of intangibles -- human resources, organisational concepts, software, marketing and advertising, distribution and logistics, image, design and brand names, reputation -- the question arises which components of immaterial investment have a large impact on innovation and competitiveness, and which not. More knowledge in this field offers a good perspective for new leads in innovation policy. This applies in particular to the identification of immaterial factors which are relatively important for innovative potential, e.g. in best practice innovation. An approach aiming at the identification of barriers and obstacles of immaterial investment might also focus on the innovative potential of each of the identified immaterial innovation factors on knowledge ladder determining / influencing innovation.

Towards a more programmatic approach

The determining factors of immaterial investment largely show an overlap with the determinants of investment in general. Major driving forces are the need to innovate in order to maintain or improve competitiveness in an increasingly global market. An important context factor is the growing convergence between traditional industry and the service sector. Through processes of 'servuction' and, the other way around, industrialisation of the service sector, the importance and weight of service activities in total economic output and value-added increases. As a result investment in immaterial factors grows correspondingly. '

This convergence process between industrial and service sector activities offers great perspectives for innovative economic activity. In order to get a better insight into the options to promote this development, a focus on best practice experiences could deliver useful clues for future policy development. In this respect, following the idea of benchmarking and useful elements of business process re-engineering in services (or to use a more common, but similar approach: socio-technical systems (re)design) we consider the approach of the Australian Manufacturing Council (inspired by Dertouzos, 1989) as quite promising. Therefore, a best practice programme for knowledge-intensive, innovative business development based on immaterial investment might be suggested. Such a programme - the development of which obviously would require further efforts - would be primarily diffusion and demonstration oriented, using the potential of inspiring success stories.

Written by: TNO Centre for Technology and Policy Studies

Analysing Growth Markets

INTRODUCTION

All companies like to compete on growing markets and all governments like to have the companies in their region competing on these markets as well. There is, however, no crystal ball that can tell us which markets are going to be attractive five or ten years from now. The purpose of analysing growth markets includes both a better understanding of differences in growth patterns as they have emerged during the last decade, and finding factors related to growth in certain areas. These insights may then be used to enhance the chances of participating in future growth markets.

The growth performance of twenty-eight countries has been analysed (reported as fifteen by displaying the EU as one country). The countries studied are (in alphabetic order): Australia, Brazil, the European Union (EU-15 minus Luxembourg), Hong Kong, Hungary, India, Indonesia, Japan, Korea, Malaysia, Mexico, Poland, Singapore, Taiwan and the United States of America (USA). These fifteen countries are considered to constitute the "world". The fifteen countries are grouped into five subsectors or regions, as is shown in Figure 1.

The industry data were grouped by means of three different classification systems. The categorisation of different ISIC groups into these three classes is based on the definitions of the OECD (see Table 1).

ANALYSES

For each of the countries involved the growth of value added, employment and apparent consumption (calculated as production plus imports minus exports) for the 1981-1992 period per 3-digit ISIC industry was analysed. The raw (nominal) data have been corrected to deal with effects of inflation and exchange rates.

The growth performance has been assessed for subsequently value added, employment and apparent consumption. In this article only value added growth figures per region are presented. The first table presents the division of the total amount of (nominal) values in 1981 over the regions and industry groups. The second table presents the average global growth rate of the indicators per industry group during the 1981-1992 period.

Furthermore, two analyses have been performed to find correlations between certain indicators and growth. On the basis of a list of 86 indicators from the World Competitiveness Report (1994) it has been tested to determine which indicators seem to coincide with growth performance in certain industry groups. The differences that the indicators show between the 28 countries studied have been tested to see whether they coincide (to a statistically significant degree) with differences in growth performances between the same countries. These correlations do not necessarily point out causal relationships. Some of these results are mentioned in the last section, when various common hypotheses are being tested.

Finally, figures have been created in which the countries were positioned on the basis of their average value added growth and their average "value added per worker" growth or on the difference between their 1981- and their 1992-value added per worker.

SOME ECONOMIC THOUGHTS ON COMPETITIVENESS AND GROWTH

Views on economic growth

Economic growth cannot be studied as a separate subject without stating some view on the functioning of economies. In analysing industrial growth markets it is desirable to provide a brief review of the functioning of markets and how the firms will operate within these markets. In short the main features of some approaches are discussed. The neo-classical firm is a profit maximiser, the Austrian firm is being alert and according to Schumpeter it is an innovator. These different views on the strategy of the individual companies have implications for the choice of appropriate government policies. The neo-classical view implies that economic growth is induced by changes in the basic conditions. Otherwise, the original equilibrium is maintained. Important factors contributing to growth then are factor productivity, factor payments and investments. It is less clear which growth contributing factors, are identified by the Austrian approach. This problem is basically induced by the fact that it is a matter of belief and not of deduction. Despite this problem, it is a clear possibility in the Austrian view that rapid economic growth may change from one country to another country. The latter remark also holds for the theory of Schumpeter, but it must be asked instantly that some degree of market power may be necessary to induce economic growth.

According to Paul Krugman competitiveness should be defined as the combination of favourable trade performance and something else. According to him, the most popular definition of competitiveness is the following: our ability to produce goods and services that meet the test of international competition while our citizens enjoy a standard of living that is both rising and sustainable. As a result of this definition competitiveness means something different from "productivity" if and only if purchasing power grows significantly more slowly than output. Krugman demonstrates that the growth rate of living standards essentially equals the growth rate of domestic productivity, i.e. not productivity relative to competitors, but simply domestic productivity. Thus, even though world trade is larger than ever before, national living standards are overwhelming determined by domestic factors rather than by some competition for world markets. Krugman emphasises that our world is not as interdependent as one might think. Countries are nothing at all like corporations and, moreover, countries do not compete with each other the way corporations do.

Table 1: OECD classifications

Technology content	Orientation	Wage content
High tech	Resource intensive	High wage
Medium tech	Labour intensive	Medium wage
Low tech	Specialised supplier	Low wage
	Scale intensive	
	Science based	

Table 2: Shares in value added, 1981

	x 1000 US$	EU-15	USA	Japan	Established Economies	Maturing Economies	Emerging Asia	Emerging Latin Am.	Emerging Other
Technology									
High tech	408 652 353	28.63 (3)	47.02 (2)	17.65	94.10 (1)	2.08	0.64	2.91	0.27
Medium tech	716 179 807	36.28 (3)	37.65 (2)	17.22	92.47 (1)	1.77	0.96	4.44	0.35
Low Tech	1 058 630 621	38.28 (2)	35.18 (3)	15.36	90.71 (1)	2.99	1.20	4.81	0.29
Orientation									
Resource Intensive	523 610 179	39.96 (2)	33.58 (3)	14.63	90.32 (1)	2.57	1.20	5.59	0.33
Labour Intensive	330 163 789	35.19 (3)	36.39 (2)	15.62	88.90 (1)	4.50	1.24	4.96	0.40
Specialised Supplier	437 030 226	36.55 (3)	38.93 (2)	17.66	93.88 (1)	1.89	0.71	3.20	0.32
Scale Intensive	703 383 820	36.39 (3)	36.60 (2)	17.86	92.41 (1)	2.00	1.13	4.18	0.28
Science Based	189 274 769	21.66 (3)	58.45 (2)	14.30	95.33 (1)	1.15	0.43	2.91	0.17
Wages									
High Wage	513 300 544	33.11 (3)	41.74 (2)	15.99	91.95 (1)	1.74	0.87	5.26	0.17
Medium Wage	1 048 147 592	35.32 (3)	39.36 (2)	17.43	93.53 (1)	2.10	0.79	3.36	0.23
Low Wage	622 014 645	38.90 (2)	33.35 (3)	14.99	89.20 (1)	3.51	1.53	5.21	0.56

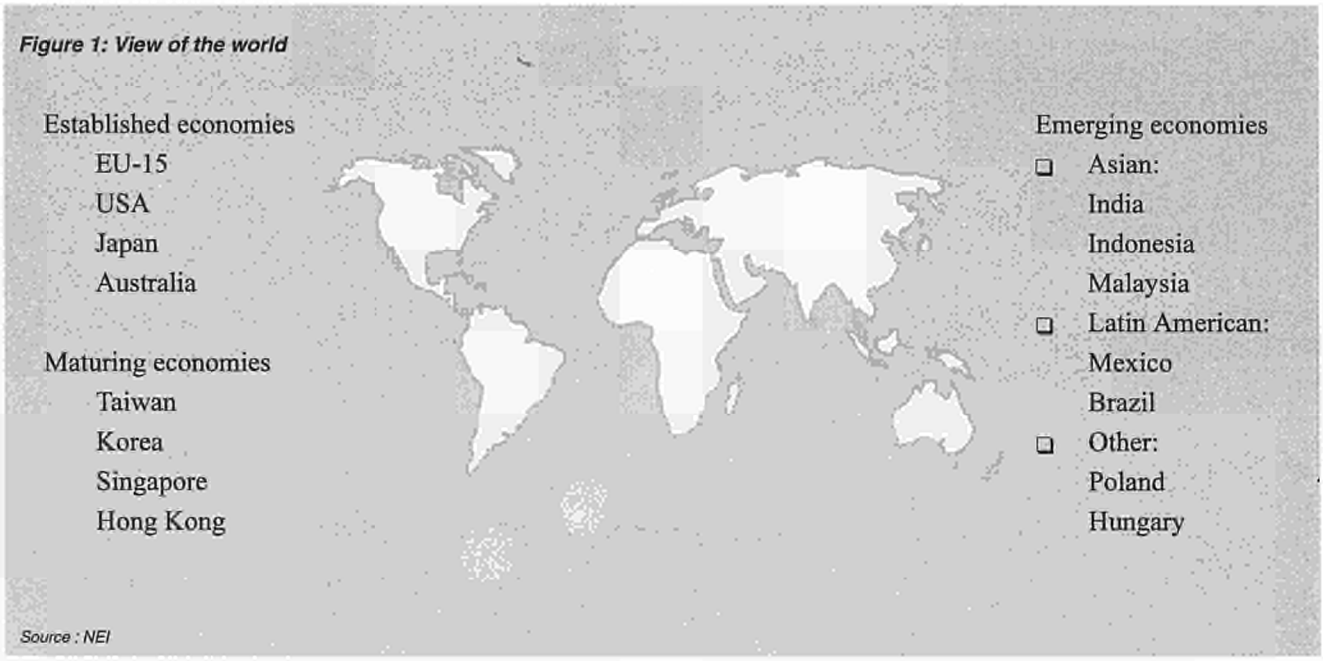
(1) highest rank in share
(2) second highest rank in share
(3) third highest rank in share

Table 3: Value added growth rates, 1981-1992

	Average	EU-15	USA	Japan	Established Economies	Maturing Economies	Emerging Asia	Emerging Latin Am.	Emerging Other
Technology									
High tech	3.92	2.89	2.67	7.95 (3)	3.82	10.35 (2)	11.65 (1)	1.31	0.14
Medium tech	2.76	2.00	2.82	3.79 (3)	2.74	8.18 (1)	6.04 (2)	1.21	-1.34
Low Tech	1.30	0.97	1.41 (3)	1.01	1.19	5.30 (1)	4.70 (2)	0.67	-1.90
Orientation									
Resource Intensive	1.43	1.25	1.52 (3)	0.95	1.32	5.57 (1)	5.10 (2)	1.10	-1.10
Labour Intensive	0.63	-0.15	0.71	1.09 (3)	0.57	3.99 (1)	3.31 (2)	-0.84	-3.68
Specialised Supplier	3.82	2.51	2.90	7.89 (3)	3.77	10.44 (2)	10.78 (1)	0.35	-0.33
Scale Intensive	2.48	2.01	2.52	2.65 (3)	2.37	8.11 (1)	6.15 (2)	1.69	-1.72
Science Based	2.97	2.21	2.67	5.01 (3)	2.95	8.61 (1)	6.26 (2)	0.65	1.34
Wages									
High Wage	2.47	1.75	2.54	3.22 (3)	2.40	8.14 (1)	6.34 (2)	1.41	-1.32
Medium Wage	2.60	1.85	2.19	4.49 (3)	2.51	8.45 (1)	6.95 (2)	0.84	-0.68
Low Wage	1.90	1.30	1.79	3.33 (3)	1.89	4.95 (2)	5.77 (1)	0.60	-2.00

(1) highest rank in share
(2) second highest rank in share
(3) third highest rank in share

Figure 1: View of the world



Source : NEI

Growth opportunities for individual companies

Not all growth markets offer opportunities for all companies in all regions of the globe. The attractiveness of growth markets for particular companies is related to the competitive advantages (assets and competencies) that a company has. A growth market for Sony may offer no possibilities for Bang & Olufsen. It has been argued that higher growth in an industry may benefit inefficient firms while reducing the gains of efficient competitors and that high profitability in an industry may cause the inefficient participants to earn lower profits (Wernerfelt and Montgomery, Management Science October 1986).

In the eighties the most popular strategic management doctrine held that to be successful, companies should choose to compete in attractive industries. The attractiveness of an industry could be described in terms of market size, market growth, intensity of competitive rivalry, threat of substitutes, entry barriers and the relative bargaining power of suppliers and customers. In these perspectives, analysing and predicting growth markets is a major tasks for companies.

The ideas of Porter ea. have not been without criticism. Ohmae was one of the people who argued that even in industries that clearly show higher than average growth and/or profits, there are companies that perform mediocre or badly. In so-called unattractive industries companies could be found that outperform many others competing in more attractive markets.

More recently a shift in the strategic management doctrine can be noted. Scholars such as Hamel, Prahalad, Doz, D'Aveni, Bartlett and Ghoshal propose a more dynamic perspective on strategy. They argue that companies must seek to exploit the way they differ from their main competitors to change the 'rules of the game' (the taken for granted ways of doing business in a certain industry) in their favour. Their approach corresponds with the economic ideas of 'creative destruction' (Schumpeter), more than the static notions of Pareto-efficiency and other Marshallian elements of economic thoughts that form the roots of Porter's viewpoints.

For governments a study of growth markets may offer more interesting insights, if an indication can be found of which demand and supply factors seem to facilitate growth in certain industries.

MAIN FINDINGS

Growth rates

Market growth has differed considerably between different industries and countries over the period studied (1981 - 1992). The following sections discuss growth in value added, growth in apparent consumption and growth in employment, respectively.

The measure of value added indicates where the most valued productive activities are carried out. Apparent consumption can be calculated as production plus imports minus exports. A third measure of growth is related to employment. Most governments consider employment an important economic goal.

Growth in Value Added

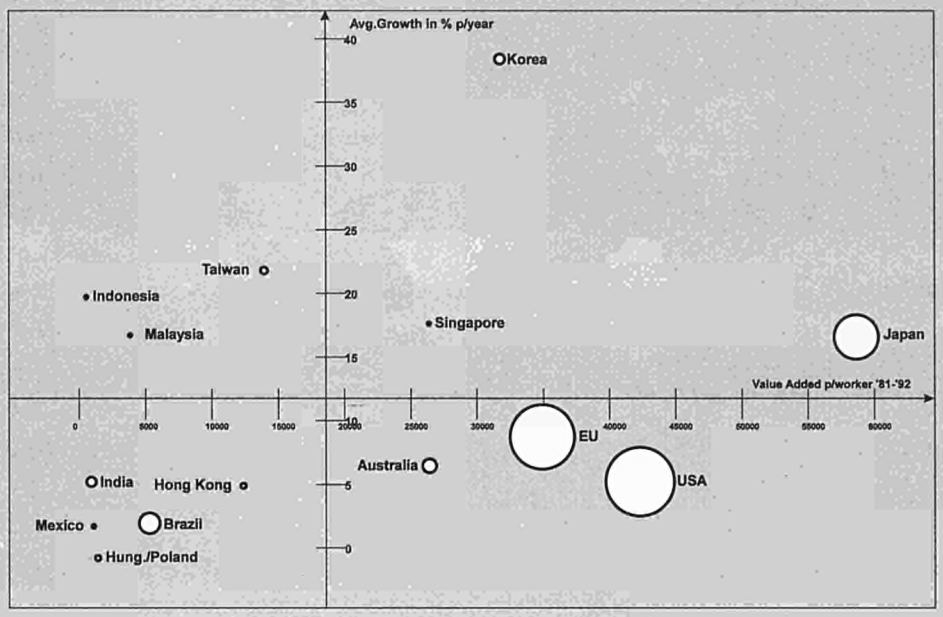
The measure of value added does not relate to the ownership of the producers. American companies producing in Europe will add to the European value added.

The first column in Table 2 represents the division of the total average amount of (nominal) value added in the world in 1981. The total value is divided in three ways: by technology content, by orientation, and by wages content and amounts in total to approximately 2.18 trillion current-dollars. The following columns represent the shares of the regions in these industry groups. Whereas each row amounts to 100%.

As is shown in Table 3 the low tech industries represented almost 50% of the total value added in 1981. Medium tech industries represented almost one third and the remaining part (19%) was represented by high tech industries. Medium wage industries accounted for 48% of total value added in 1981. High wage and low wage industries each accounted for approximately 25%. When splitting the industries according to the strategic oriented classification, one third of the value added stemmed from scale intensive industries, followed by resource intensive, specialised supplier, labour intensive and science based industries with 1981-shares of 24%, 20%, 15% and 9%, respectively.

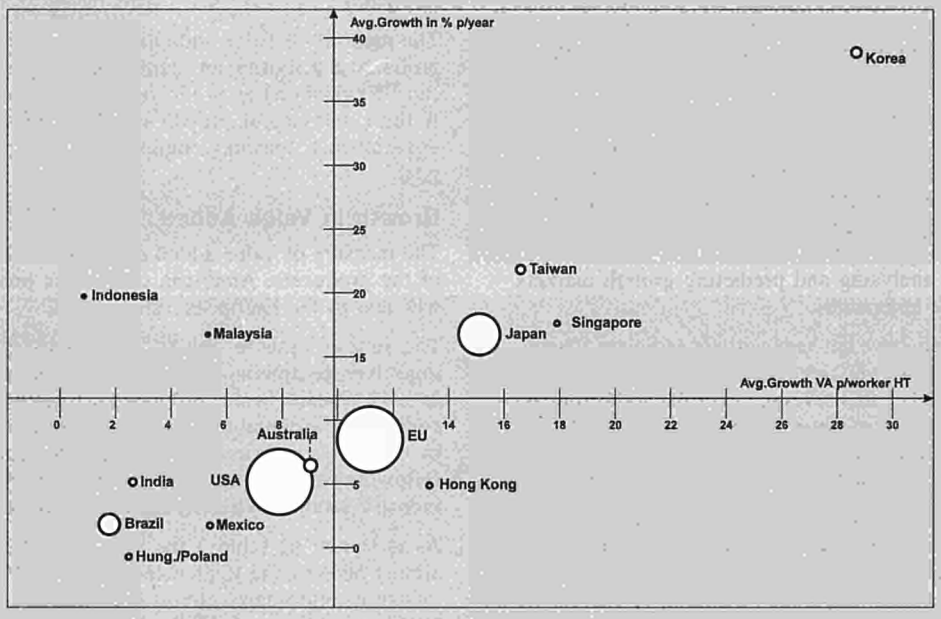
The first column in Table 3 represents the average global growth rate of value added per industry group during the 1981-1992 period. For comparison, the average global growth rate in value added amounted to 2.42%. The following columns represent the average regional growth rates per industry group. Cells with a negative sign represent negative growth rates.

Figure 2: All industries, VA growth vs. Difference 1981 - and 1992 - VA per worker



Source : NEI

Figure 3: High Tech, VA growth vs. VA per worker growth



Source : NEI

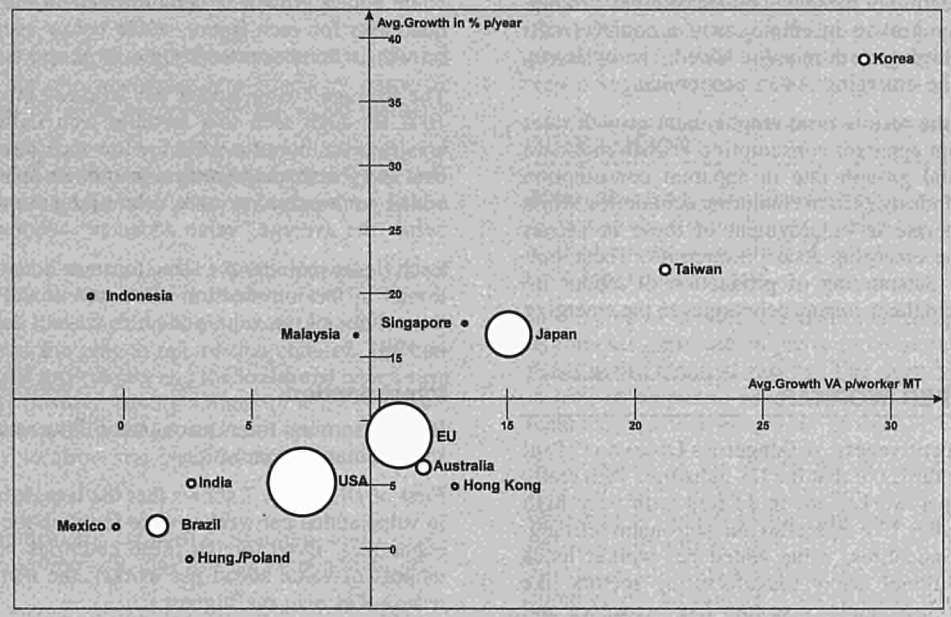
Considering the three countries, Europe, USA and Japan, Japan performs best, except in low tech industries, whereas the EU performs worst in both in high tech and low tech industries. The highest growth rates were recorded by the maturing economies and the emerging Asian countries, particularly for the high tech and the specialised supplier industries. The changes in the period 1981 to 1992 are the smallest for the low tech, resource intensive, labour intensive and low wage industries. For most of the countries, the highest growth rates were recorded in high tech industries, specialised supplier and medium wage industries, while the USA recorded the highest growth for the medium tech, specialised supplier and medium wage industries.

Growth in Apparent Consumption

Growth in value added does not necessarily mean growth in consumption in a certain area. By means of trade, value added in one area may be consumed in another. We have calculated apparent consumption in the different regions by combining production with trade statistics.

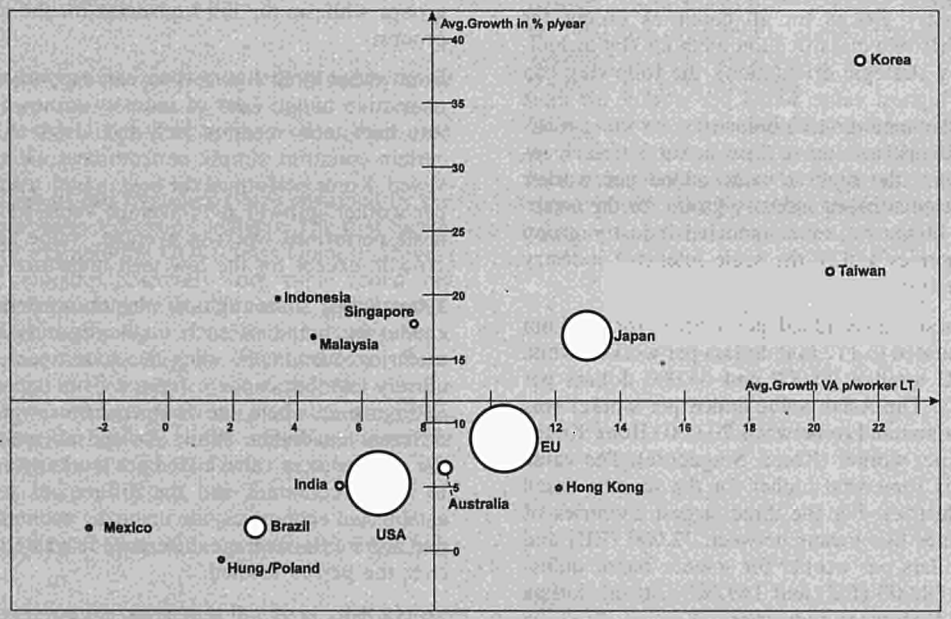
The low tech, resource intensive, labour intensive and high wage industries scored below average in growth. The best performing industry groups were high tech, specialised supplier, science based and medium wage industries.

Figure 4: Medium Tech, VA growth vs. VA per worker growth



Source : NEI

Figure 5: Low Tech, VA growth vs. VA per worker growth



Source : NEI

Of special interest is the result for the EU when the apparent consumption growth rates is compared to value added growth rates. Although the EU never ranks high in growth of value added, the EU does quite often rank third when it comes to apparent consumption.

Growth in Employment

As was mentioned before, most governments consider employment an important economic goal, and some would rather see growth in employment than growth in value added, if a choice had to be made.

Except in the specialised supplier industries, the best performers were the emerging Asian economies. The low tech, labour intensive, specialised supplier and low wage industries scored below average growth rates.

For most industries, the direction of the changes in employment level of the EU and the US were similar and quite opposite to the direction of the changes of Japan. The only notable exception to this is found in the science based industries. During the period 1981-1992, the EU recorded a decline in all industry groups. However, in this particular science based industry group the US recorded a positive growth rate, similar to the growth rate in Japan.

The most important conclusion can be obtained by comparing employment growth rates to value added growth rates. The similarity in the structure of these two tables is rather striking. To obtain a positive growth in employment a country must realise a relatively high growth in value added, viz. by Japan, the maturing and the emerging Asian economies.

When confronting the results from employment growth rates with the results from apparent consumption growth rates, we observe a substantial growth rate in apparent consumption of labour intensive industries in the maturing economies, while the highest growth rate in employment of these industries was observed in the emerging Asian economies. These outcomes support the outsourcing of production of labour intensive products from the maturing economies to the emerging Asian economies.

VALUE ADDED PER WORKER

In his article "Competitiveness: A Dangerous Obsession" Paul Krugman wrote: "It turns out that the US industries with really high value added per worker are in sectors with very high ratios of capital to labor, like cigarettes and petroleum refining. (...) Among large industries, value added per worker tends to be high in traditional heavy manufacturing sectors like steel and autos. High-technology sectors like aerospace and electronics turn out to be only roughly average. High value added per worker occurs in sectors that are highly capital-intensive, that is, sectors in which an additional dollar of capital buys little extra value-added. In other words, there is no free lunch."

From the results of our study it follows that during the period 1981-1992, the highest value added per worker was found in high wage industry groups for all countries except for Mexico. For the other two classification methods (by technology content and by strategic orientation), the following can be concluded: the highest value added per worker for most countries was found in medium tech industries, for some countries in high tech industries and in Taiwan for low tech industries. Furthermore, the highest value added per worker was found in the science based industry group for the established economies, in the resource intensive industry group for the Asian economies and in the scale intensive industry group in other countries.

In 1992, the Japanese value added per worker for medium tech industries amounted to 112,000 dollars per worker, while the US and the EU totalled 90,000 and 64,000 dollars per worker, respectively. The Asian value added per worker was much smaller and amounted to between 20,000 (Hong Kong) and 50,000 dollars per worker (Korea, Singapore). The value added per worker is somewhat higher for the science based and high wage industries. For the three largest countries of established economies this means between 72,000 (EU) and 126,000 (Japan) dollars per worker for science based industries, and between 88,000 (EU) and 149,000 (Japan) dollars per worker for the high wage industries.

In this section, we highlight the "by technology content separated" industries in order to draw some conclusions based on the value added per worker dimension. After a short description of the figures, an interpretation is presented.

Description of the figures

In the Figure 2 the average value added growth is set out to the difference between the value added per worker in 1981 and in 1992. This figure represents the average of all industrial sectors studied.

The other three figures also show the average value added growth on the vertical axis and show the average "value added per worker" growth on the horizontal axis. These three figures are drawn for the high tech, medium tech and low tech industry groups, respectively.

Each figure is separated into four quadrants. The axes are drawn on the overall (unweighted) averages. Above average value added growth is demonstrated in the first and second quadrants for each figure, while below average value added growth is demonstrated by the third and fourth quadrants.

The average "value added per worker" growth amounted to 10% for high tech and medium tech industry groups, and was slightly more than 8% for low tech industry groups. The first and fourth quadrant demonstrate an above average "value added per worker" growth, while the second and third show below the average "value added per worker" growth.

Each figure includes the same fourteen countries as were mentioned in the introduction. The area of the circles represent the volume of the value added (in current dollars) per country in 1981.

Interpretation

Bearing in mind the restrictions of this exercise, we can draw some tentative conclusions.

First of all, Figure 2 shows that the largest (positive) changes in value added per worker were found in the three established economies. Even though these countries had the highest amounts of value added per worker, the increase (in absolute terms) was also the highest.

Furthermore, it can be concluded from the Figures 3, 4 and 5 that for each industry group when divided by the technology classification almost identical clusters of countries appear in the four quadrants. One exception to this is Singapore which appears in both the first and second quadrant. The other exception is formed by Australia, which was included in the fourth quadrant for the low tech and medium tech industry groups while in the third quadrant for the high tech industry groups.

From these three figures one can support the vision that irrespective of the kind of industry group, i.e. when divided into high tech, medium tech and low tech industry groups, certain countries simply perform best. Of the countries surveyed, Korea performed the best in both average "value added per worker" growth as in average value added growth. Indonesia performed worst in average "value added per worker" growth, except for the low tech industries.

Remarkably, some regional clusters as defined in the study, cannot be found as such in the figures. For example, the maturing economies, alias the four tigers, were not found closely together in these figures. This is particularly evident in Figure 2, where the four countries were found in three different quadrants. While for the all emerging economies the difference in value added per worker was small compared to other economies and the differences were high for the established economies, the maturing economies were positioned around the average difference in value added per worker over the period studied.

TESTING VARIOUS COMMON HYPOTHESES

The purpose of this section is to provide the reader with some alternative insights in the area of analysing growth markets. We have chosen to present common knowledge hypotheses and to confront these with empirical results. The hypotheses mentioned below, have been derived from different theories, views and publications to obtain a diverse pool of thoughts. By representing the outcomes this way, they are probably more instrumental to policy makers.

Hypothesis I

"High value added is often implied to be more or less synonymous with high technology"

According to our empirical data, this assumption should be rejected. The highest value added per worker is accomplished

in the medium tech industries, whereas the value added per worker in high tech industries is considerably lower.

Hypothesis II

"Even though world trade is larger than ever before, national living standards are overwhelming determined by domestic factors rather than by some competition for world markets"

This hypothesis is sustained by the results of our factor analysis. Domestic economic strength shows the highest correlation of all factors tested with economic growth in almost every industry group.

It is also sustained by the results of a shift-share analysis of 1995 (Ruygrok, Identifying Growth Markets, 1995). This analysis showed that the structural components in each country hardly contribute to the growth rate of that country. The correlation between the growth rate and the locational component is almost perfectly positive, giving a linearity when presented graphically. In other words, the growth rates are for the larger part explained by location, not by industrial structure.

Hypothesis III

"The best environment for creative destruction, and thereby economic welfare and growth, may involve monopolistic practices"

According to our empirical outcome, absence of monopolistic power is never correlated with growth in high tech industries. However, this is not true for medium and low tech industries where absence of market power is positively correlated with growth. Therefore, on the basis of our stepwise regression, the hypothesis of Schumpeter is sustained in the case of high tech industries and should be rejected in case it concerns medium and low tech industries.

Hypothesis IV

"Broadly speaking, economic growth is determined by three fundamental factors: the volume of real capital formation, the efficiency with which capital and other resources are used and technological progress."

The first two factors of this hypothesis are confirmed by the results from the stepwise regression analysis. The first factor, represented by for example the GDI (Gross Domestic Investment) variable, coincides positively with value added and with apparent consumption growth. The results for all industries, except for high tech industries, indicate that competitive and (Pareto) efficient markets do grow. The third factor, however, is not confirmed by the empirical outcomes. The variable "superior sourcing of technology by domestic companies" is , for example, never related to value added and apparent consumption growth.

Hypothesis V

"A high level of R&D expenditures accelerates economic growth"

Whatever industry group is analysed, the level of R&D expenditures is never related significantly to growth. In contrast, the timing of new products turns out to be correlated with growth of apparent consumption.

Hypothesis VI

"The structure, composition and growth of the population and labour force determines the growth of employment"

Although the results from the factor analysis confirm this hypothesis, the results from the stepwise regression indicate that the variables from the "people" factor is never significant related to employment growth. They are, however, important in apparent consumption growth.

Hypothesis VII

"A relatively large inflow of FDI increases economic growth"

From the stepwise regression analysis it follows that the FDI measures (as a percentage of capital formation) are never significant correlated to growth of value added or employment. The FDI variable is only found to be important twice. It appeared both times in apparent consumption growth, and showed a negative sign.

CONCLUSION

Although, as was mentioned before, conclusions on the basis of this study should be made with the utmost care because of the limitations inherent in this project, we here try to sum up a few tentative ones.

In the area of economic growth and competitiveness a lot of hypotheses exist, which prove to be untrue when confronting these with empirical results. The most spectacular outcome is lack of empirical support for the existence of a circle of technology driven economic growth.

Furthermore, of all factors the domestic economic strength is significantly related to growth. When we consider competitiveness to consist of the following two components: competitive advantage (i.e. firm specific) and comparative advantage (location specific), the relevance of the concept of comparative advantage is more enunciated in our empirical outcomes.

Finally, although competitiveness is usually measured in relation to production growth, when measuring competitiveness in welfare terms, the apparent consumption growth is important. It is worth noting that while the EU even had the highest share in apparent consumption in 1981 it also had the third highest growth in apparent consumption during the 1981-1992 period, except for in high tech and in high wage industries. In 1992 the average EU share in apparent consumption amounted to 37%, compared to a share of 27% of the US and a share of 24.5% of Japan.

During the period studied, the four maturing economies have upgraded their manufacturing sectors, by shifting from labour-intensive products to "high-tech" consumer and investment goods, and by reallocating or outsourcing production to other South-East Asian countries with lower labour costs.

Written by: Netherlands Economic Institute (NEI)

Industrial Restructuring in Central and Eastern Europe and Emerging Patterns of Industrial Specialisation

INTRODUCTION

This paper deals with industrial structural change in the transition economies in Central and Eastern Europe (the CEECs) and the evolving pattern of specialisation of these economies as they integrate into the wider European economy.

Section I of the paper compares the industrial structures of the CEECs with two groups of Western European economies (the EU-North and the EU-South). The aim of this comparison is, on the one hand, to identify these economies' starting point in 1989 in terms of the characteristics of the composition of their industries and, on the other hand, to analyse whether any process of convergence or divergence with the above two groups of economies has taken place since then.

Section II of the paper examines emerging patterns of trade specialisation of CEECs in their trade with the European Union. Emphasis is put both on general tendencies of industrial specialisation (such as trends towards labour-intensive industries, the position of technology- and skill-intensive branches in the different CEECs, etc.) as well as pointing out the heterogeneity of performances across the different CEECs at the detailed industrial level.

Section III extends the analysis of industrial specialisation to an assessment of the structure of FDI flows and of the contribution of FIEs (enterprises with foreign involvement) to the different CEECs' branch performances.

The analysis in this paper is based on the availability of a detailed industrial database compiled at The Vienna Institute for Comparative Economic Studies (WIIW) from both national and international sources.

INDUSTRIAL STRUCTURAL CHANGE IN CENTRAL AND EASTERN EUROPE, 1989 TO 1995

Under the old system, industry was the most highly favoured sector in the CEECs. Its share in GDP was much higher than in comparable Western economies and its structure differed as well. Accordingly, the transition to become market economies generated a particular need for adjustment in this sector. The major reasons for the existing structural differences were, of course, that in the pre-1989 period production patterns were decided by planning authorities instead of the market. Moreover, trade with market economies was relatively small and trade with other socialist countries was determined by the peculiar rules of intra-CMEA division of labour. The lack of internationalisation led to a decoupling from the technological progress and associated structural changes in the West. Another cause of structural differences was the lower level of GDP per capita in the CEECs, at least compared to the more advanced countries in the West, which also implied different structures in industry.[1)]

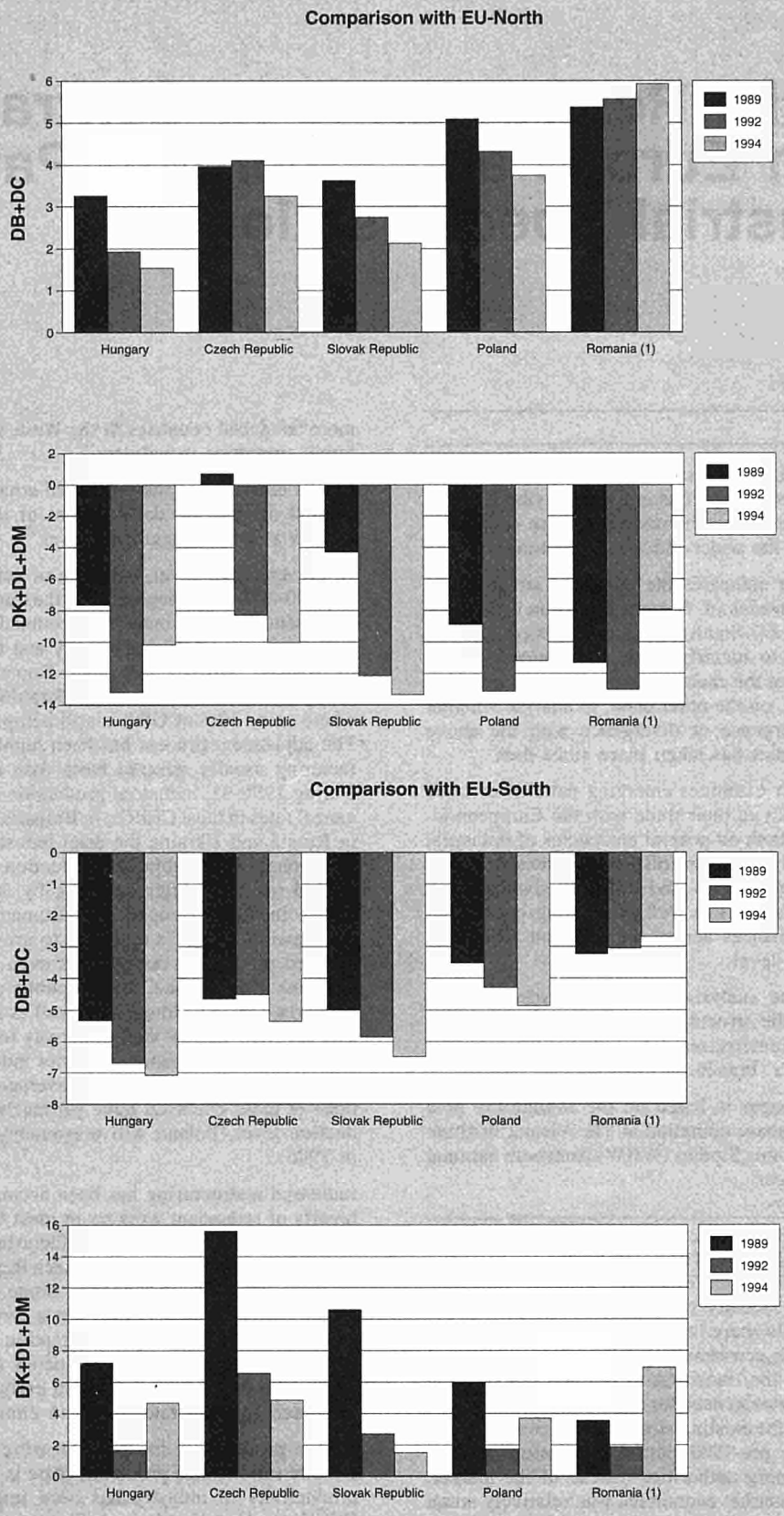
Before entering the more detailed structural comparisons, let us first discuss the development of the industrial sector in CEECs at a more aggregate level.[2)]

At the aggregate level, the share of industry in GDP dropped from 30-40% at the beginning of the transition to some 20-30% at present. In 1995, industry accounted only for 24% of GDP in Bulgaria, for 23% in Hungary and for about 30% of GDP in Croatia, Slovakia, Slovenia, Romania and Russia. More industrialised remain the Czech Republic, Poland and Ukraine where some 33% of GDP is still being generated by industry. The adjustment process has been highly uneven, with manufacturing usually affected more than mining and quarrying. During 1990-91, industrial production shrank by double-digit annual rates in most CEECs; in Bulgaria, Croatia and especially in Russia and Ukraine the deep industrial depressions lasted even longer (see Table 1). Production hit the bottom first in Poland (in 1991, after dropping by 30% as compared with 1989). In 1993, Hungary and Romania followed suit, with the remaining CEECs returning to growth in 1994. Their cumulated production decline was even higher than in Poland – almost 40% in the Czech Republic and more than 50% in Bulgaria, Croatia, Romania as well as in Russia and Ukraine. The recovery is now well underway in most CEECs – in the more advanced transition countries industrial output has been growing by 7-8% per year on average during 199495. Still, none of these countries have yet reached the pre-reform production level (Poland will presumably be the first to do so in 1996).

Industrial restructuring has been accompanied by substantial layoffs of redundant workers in most CEECs. Between 1989 and 1994, employment in manufacturing industry dropped by 23% in Poland, by 30% in the Czech Republic and in Romania, by more than 40% in Hungary. Some of these workers have found new jobs in services, but a large number became unemployed. With the notable exception of the Czech Republic, CEECs' unemployment rates soared from virtually zero to about 12% of the labour force in early 1996. Even in Russia the unemployment rate started to climb up recently.

Labour productivity has been growing rapidly in all CEECs. Despite serious data problems, there is little doubt that labour productivity in industry has been improving rapidly in all CEECs. In Hungary, Poland, Slovenia and Bulgaria the 1995 production levels already exceed those of the year 1989 (see Table 2). In the first quarter of 1996, growth of production in the region slowed down somewhat (it accelerated only in the Czech Republic and Slovakia), but labour productivity has continued to improve impressively in all CEECs – even

Figure 1: Output shares of selected labour-intensive and sophisticated engineering branches in CEECs compared to the West Comparison with EU-North



(1) first year 1990
DB=Textiles and textile productsDL=Electrical and optical equipment
DC=Leather and leather productsDM=Transport equipment
DK=Machinery and equipment n.e.c.

Table 1: Industrial production in Eastern Europe 1990-95

	real change in % against preceding year							Index 1989=100
	1989	1990	1991	1992	1993	1994	(1) 1995	1995
Czech Republic	1.7	-3.3	-24.4	-7.9	-5.3	2.1	9.2	71.0
Hungary	-2.1	-10.2	-16.6	-9.7	4.0	9.6	4.8	80.7
Poland	-0.5	-24.2	-8.0	2.8	6.4	12.1	9.4	93.6
Slovak Republic	-0.7	-4.0	-19.4	-9.0	-3.8	4.9	8.3	76.9
Slovenia	1.1	-10.5	-12.4	-13.2	-2.8	6.4	2.0	71.8
CEEC5 (2)	-.1	-15.0	-14.3	-3.1	1.9	8.4	8.4	84.5
Bulgaria	-1.1	-16.7	-22.2	-15.9	-10.9	8.5	5.4	55.5
Romania	-2.1	-19.0	-22.8	-21.9	1.3	3.3	9.4	55.9
CEEC7 (2)	-.5	-15.9	-16.4	-7.4	1.0	7.4	8.4	76.7
Croatia	-0.5	-11.3	-28.5	-14.6	-5.9	-2.7	0.3	49.7
Russia	1.4	-0.1	-8.0	-18.0	-14.1	-20.9	-3.0	49.7
Ukraine	2.8	-0.1	-4.8	-6.4	-8.0	-27.3	-11.5	52.7

(1) Preliminary figures
(2) WIIW estimates
Source: WIIW database incorporating national statistics.

Table 2: Labour productivity in industry

	change in % against preceding year							Index 1989=100
	1989	1990	1991	1992	1993	1994	(1) 1995	1995
Czech Republic (2)	-0.2	-0.3	-14.4	-2.2	-1.2	5.1	10.5	95.7
Hungary (3)	-0.5	-5.0	-6.2	3.8	13.4	15.7	10.5	134.1
Poland	-0.9	-20.3	-3.0	14.3	8.8	13.1	8.5	118.0
Slovak Republic	-0.7	1.6	-22.5	2.1	2.4	7.0	4.0	91.6
Slovenia	3.2	-7.5	-1.4	-3.3	6.4	13.2	6.3	112.9
Bulgaria (4)	-8.4	-12.1	-5.6	-1.9	0.0	15.2	9.2	102.4
Romania	-4.4	-19.4	-15.0	-13.4	9.0	14.7	15.6	85.7
Croatia	0.4	-7.2	-13.2	0.3	0.3	3.4	6.6	89.3
Russia	3.4	2.6	-4.1	-15.0	-12.0	-11.4	1.2	65.9
Ukraine	4.4	1.7	-2.0	-4.1	-3.2	-20.3	-8.8	67.2

(1) Preliminary figures.
(2) Enterprises with more than 100 employees, in 1992 to 1994 with more than 25 employees.
(3) 1993, 1994 enterprises with more than 20 employees, from 1995 enterprises with more than 10 employees.
(4) Estimate for public sector only.
Source: WIIW database incorporating national statistics.

in countries with relatively low (or negative) production growth such as Hungary and Bulgaria. This indicates that there are still considerable efficiency reserves and that the expected growth of industrial output will not lead to the creation of too many new jobs in this sector.

Structural differences between CEECs and West European countries in 1989

In the following, we will compare the industrial structures in the CEECs with those of certain groups of Western countries in 1989 and then analyse the changes that took place thereafter. Depending upon the availability of comparable data, the countries investigated are Hungary, Czechoslovakia (the Czech and the Slovak Republics respectively), Poland, Slovenia, Bulgaria and Romania on the one hand and two groups of Western countries on the other: a group of industrially more advanced EU countries (UK, France, Germany, Belgium), termed EU-North, and a group of less advanced Southern European member countries (Spain, Greece, Portugal), termed EU-South.

In order to obtain an overview of the differences in the industrial structures between two economies, we employ an aggregate 'structural deviation indicator' (S). This indicator measures the weighted average difference in the share representation of the different industrial branches in total manufacturing (output or employment) in two different economies. The smaller the value of this indicator, the more similar are the two structures compared.[3)] As we will see below, a similar indicator can also be calculated to analyse the 'degree of structural change' which takes place in a given country over time.

Although the deviation indicators calculated were significantly different from zero for all CEECs compared to EU-North and EU-South (see Table 3), they were surprisingly low and do indeed compare well with the structural differences among West European countries (see e.g. the case of Austria in Table 3). Differences in the industrial structures between CEECs and West European countries being relatively moderate, the adjustment of CEEC branch structures at a rather broad level of industrial classification could not be considered the major obstacle to catching-up with the West European countries within a reasonable time span. On average the output structures of CEECs deviated more from the EU-North than the EU-South, as can be expected from their respective levels of development. Moreover, CEECs generally show greater deviations of their employment structures than of their output structures from the West, especially from the South European countries, indicating differences in productivity (manning) levels.

Table 3: Structural differences between the CEECs and West European countries in 1989 (1)

		EU-North (2)	EU-South (2)
Czechoslovakia	S_{EMP}	4.07	5.02
	$S_{OUT(c)}$	3.14	2.66
Hungary	S_{EMP}	3.05	3.61
	$S_{OUT(c)}$	2.72	2.10
Poland	S_{EMP}	2.42	2.99
	$S_{OUT(c)}$	2.70	1.89
Bulgaria	S_{EMP}	3.45	4.52
Slovenia	S_{EMP}	3.55	4.23
CEEC average (3)	S_{EMP}	3.31	4.07
	$S_{OUT(c)}$	2.85	2.22
Austria	S_{EMP}	2.66	4.50
	$S_{OUT(c)}$	2.90	3.97

(1) Based on 3-digit level ISIC data.
(2) For EU-North the reference year is 1992 throughout, for EU-South the reference year is 1990 throughout. (As the year of reference the latest year available for all countries in one group was chosen).
(3) Unweighted average of individual CEECs.
Source: UNIDO database, calculations by WIIW.

Table 4: Structural change indicators (1)

		1990	1991	1992	1993	1994	1990-92	1992-94
Czech Republic	S^*_{EMP}	0.99	0.50	2.79	0.70	0.51	2.42	1.05
	$S^*_{OUT(c)}$	0.47	2.97	1.82	0.68	1.07	4.28	0.86
Slovak Republic	S^*_{EMP}	0.71	1.10	0.55	.	1.62		
	$S^*_{OUT(c)}$	0.77	1.59	1.29	1.94	1.05	2.36	2.24
Hungary	S^*_{EMP}	0.58	0.92	1.39 (2)	0.61	0.34	2.16	0.80
	$S^*_{OUT(c)}$	1.04	2.07	1.21 (2)	1.24	0.86	3.07	1.99
Poland	S^*_{EMP}	0.40	0.74	0.84 (2)	0.40	0.28	1.54	0.55
	$S^*_{OUT(c)}$	0.47	1.77	0.72 (2)	0.36	0.63	2.30	0.95
Romania	S^*_{EMP}		0.78	1.21	0.62	0.35	1.22	0.85
	$S^*_{OUT(c)}$		1.10	1.15	1.86	1.62	1.83	2.27

(1) Based on 2-digit NACE rev.1 data.
(2) Comparable 2-digit NACE data were available from 1992 onwards only; the figures given have been aggregated from ISIC-statistics by WIIW.
Sources: UNIDO database; national statistics (NACE rev. 1); WIIW.

From all CEECs analysed, Czechoslovakia appeared to be the most distorted economy with regard to the West in 1989, while Hungary and Poland seem to deviate least. This corresponds to the findings of Landesmann and Székely (1995, op. cit., p. 26 f.) and others who point to the fact that Czechoslovakia was missing out on two important waves of restructuring to be observed in the other two countries around 1968/69 and following the first oil crisis in 1973.

At the individual branch level, comparisons of the share of a certain industry in output or employment (at the 3-digit ISIC level) in a CEEC with the same industry in EUNorth and EU-South for 1989 reveal the following 'structural surplus' or 'structural deficit branches' of the CEECs as compared to the two groups of Western countries under consideration:[4)]

- a general overhang of heavy industry in the CEECs compared to EU-North as well as EU-South;
- a relative surplus of CEECs in food production and light industries such as textiles, clothing etc. compared to EU-North, but a deficit in these industries compared to EUSouth;
- on the other hand a pronounced structural deficit of CEECs in sophisticated engineering compared to EU-North, but a surplus in these industries compared to EU-South (see Graph 1 below);
- a general structural deficit of CEECs in the paper industry and in printing and publishing, due to less advertising, wrappings etc. and to some degree to the limited freedom of the press in socialist countries.

This pattern was accentuated or weakened through the role played by natural resources (e.g. coal in Poland, tobacco in Bulgaria, agriculture in Hungary) or specialisation in the CMEA division of labour (e.g. mechanical engineering in Czechoslovakia and electrical engineering in Hungary and Bulgaria). In general; our results indicate that the level of industrial development in the CEECs in 1989 can be located somewhere between the more advanced (northern) and the less advanced (southern) EU countries.

Table 5: Comparison of CEECs' industrial structures with EU-North and EU-South (1)

		1989	1990	1991	1992	1992	1993	1994
EU-North								
Czech Republic	S EMP	5.04	4.88	5.11	.	3.55	3.67	3.40
	S OUT(c)	4.01	4.14	4.80	.	5.00	5.38	4.78
Slovak Republic	S EMP	.	.	4.37	.	4.12	3.63	3.58
	S OUT(c)	3.55	3.46	4.08	.	4.10	4.00	4.20
Hungary	S EMP	3.86	3.92	4.10	4.80 (2)	5.02	4.91	5.02
	S OUT(c)	3.08	3.79	4.98	5.79 (2)	5.92	4.99	4.57
Poland	S EMP	3.33	3.24	3.44	3.67	3.92	4.20	4.21
	S OUT(c)	4.29	4.29	5.05	5.11	5.67	5.52	5.08
Romania	S EMP	5.20	5.52	4.89	4.66	4.61		
	S OUT(c)	4.44	4.90	5.50	4.28	4.90		
EU-South								
Czech Republic	S EMP	7.37	7.19	7.44	.	6.98	6.79	6.60
	S OUT(c)	5.18	5.18	3.74	.	3.31	3.65	3.28
Slovak Republic	S EMP	.	.	6.85	.	6.43	6.02	5.60
	S OUT(c)	4.50	4.09	3.88	.	2.27	4.59	5.29
Hungary	S EMP	5.27	5.39	5.57	5.39 (2)	4.84	4.39	4.20
	S OUT(c)	3.01	2.76	3.08	3.63 (2)	3.70	2.93	2.86
Poland	S EMP	4.27	4.32	4.30	4.49 (2)	4.21	3.98	3.74
	S OUT(c)	3.46	3.79	3.47	3.29 (2)	2.95	2.82	2.50
Romania	S EMP	.	4.92	4.78	.	4.43	4.12	4.13
	S OUT(c)	.	2.43	2.29	.	2.76	2.20	2.84

(1) Based on 2-digit level NACE rev. 1 data. For EU-North the reference year is 1992 throughout,for EU-South 1990. For definition of SEMP and SOUT(c) see Table 3.-
(2) Comparable 2-digit NACE data were available from 1992 onwards only; the figures given have been aggregated from ISIC-statistics by WIIW.
Sources: National statistics (NACE rev. 1); WIIW.

Structural changes in the CEECs after 1989

The period after 1989 was subdivided into two periods, 1989-92 and 1993-94. The first period was characterised by a transformational recession in all CEECs,[5] while in the second period recovery gained momentum, setting the stage for adjustment under growth.

Speed of change

As mentioned above, we can calculate a 'structural change indicator' (S*) analogous to the 'structural deviation indicator' (S) by comparing industrial structures (the shares of different industrial branches in output or employment) for the same country at two different points in time. If S* is close to 0, structural change over time in the country concerned was very small; the bigger this indicator, the faster the structural change (see Table 4). Especially in the first years of the transition in all CEECs investigated, employment and output structures have been changing very rapidly compared to the West European countries in the same period, but also compared to those periods, when rapid structural change in West European countries was taking place, e.g. after the first and the second oil shocks, or when individual countries had to prepare for and/or adjust to EU membership.

Direction of change

Still using the 'structural deviation indicator' (S) as a summary measure, we can perceive that the CEECs' output structure was drifting away from EU-North in the early years of the transition, which was only partly compensated by convergence later on (see Table 5). Seen over the whole period 1989-94, output structures diverged further from EU-North in all CEECs investigated. In the Czech Republic, Hungary and Poland output structures converged towards EU-South; in Slovakia and Romania they diverged from both groups of countries. No comparable data were available for Slovenia and Bulgaria after 1992.

Employment structures in the CEECs were generally diverging less than output structures from EU-North in the first years of the transition and they even converged to EU-North in Bulgaria, Slovenia and Romania. With regard to EU-South, the convergence of employment structures was yet more pronounced and valid for all CEECs. This might imply that relative factor use reflected the convergence with production processes used in the West.

Detailed patterns of structural change

We analysed the detailed pattern of change in the CEECs at the 3-digit ISIC level if available, and at the 3-digit NACE (rev. 1) level otherwise. 'Structural surpluses' and 'structural deficits' were calculated as defined above for each industry, for all CEECs and for all years 1989-94, and their changes analysed thereafter[6]. Some similarities but also many differences were found between the individual CEECs:

The growing divergence of output structures from EU-North in the early years of the transition was, in general, due to further specialisation along existing patterns, mainly in resource-intensive branches such as food industries (e.g. Hungary and Poland) and refineries (e.g. in Slovakia and Hungary), where major structural surpluses in production vis-à-vis the West had existed already in 1989. Sometimes existing structural deficits towards the EU-North in the more sophisticated engineering branches have increased, mainly because of the loss of CMEA markets, as illustrated by the production of busses in Hungary or the mechanical engineering industry in

Table 6: Central and East European (CEEC) exports by regions
Shares of regions in the total, in %

Year		1989	1990	1991	1992	1993	1994	1995 (1)
Bulgaria	EU(12)	5.5	5.0	15.7	29.4	28.2	35.6	.
	EU(15)	6.0	5.6	17.4	31.5	30.0	37.6	37.2
	CEEC	11.6	12.1	5.2	5.1	4.4	3.4	3.2
	USSR (2)	65.2	64.0	49.8	22.3	19.1	18.8	17.0
	Other	17.2	18.3	27.6	41.1	46.6	40.2	42.5
	Total (USD mn)	**16210.2**	**13439.6**	**3439.8**	**3921.9**	**3721.0**	**3985.4**	**5111.6**
Czech Republic	EU(12)	26.3	31.4	43.3	52.8	42.3	45.7	.
	EU(15)	31.9	38.4	50.8	61.6	49.4	54.1	55.2
	CEEC (3)	16.0	12.6	11.8	9.2	27.1	23.7	24.4
	USSR (4)	30.7	25.1	17.5	8.9	6.3	3.9	3.5
	Other	21.4	23.9	19.9	20.2	17.2	18.3	16.9
	Total (USD mn)	**10769.8**	**9051.6**	**7923.8**	**8778.8**	**13204.6**	**14254.7**	**17085.5**
Slovakia	EU(12)	24.9	32.2	34.3	41.6	24.0	28.8	.
	EU(15)	32.2	40.8	41.4	50.1	29.5	35.0	37.4
	CEEC (5)	18.7	13.8	16.7	12.8	50.6	46.3	44.9
	USSR (4)	30.2	25.1	24.9	16.8	8.3	4.1	3.8
	Other	18.9	20.3	16.9	20.3	11.5	14.6	13.8
	Total (USD mn)	**3640.5**	**2893.9**	**3282.5**	**3708.6**	**5447.4**	**6690.9**	**8545.5**
Hungary	EU(12)	24.8	32.2	45.7	49.8	46.5	51.0	.
	EU(15)	33.6	42.1	58.6	62.3	58.1	63.7	62.7
	CEEC	10.4	7.9	5.8	6.2	7.5	7.4	9.0
	USSR (4)	25.1	20.2	13.4	13.1	15.3	7.5	6.4
	Other	30.8	29.8	22.2	18.3	19.1	21.4	21.9
	Total (USD mn)	**9667.1**	**9551.2**	**10216.2**	**10678.1**	**8908.2**	**10736.2**	**12904.8**
Poland	EU(12)	32.1	45.1	55.6	58.0	63.2	62.7	.
	EU(15)	39.6	52.7	64.2	65.7	69.2	69.2	70.0
	CEEC	9.8	6.4	5.8	5.9	5.3	5.2	5.9
	USSR (6)	20.8	14.5	11.0	5.5	4.6	5.4	5.6
	Other	29.8	26.3	19.0	22.9	20.9	20.2	18.5
	Total (USD mn)	**13466.1**	**14321.6**	**14903.4**	**13186.6**	**14143.1**	**17241.5**	**22895.7**
Romania	EU(12)	25.2	31.9	33.7	32.1	39.3	46.0	.
	EU(15)	27.6	33.9	36.9	35.2	41.4	48.2	53.2
	CEEC	10.5	9.1	7.1	6.3	5.2	5.9	4.0
	USSR (7)	22.6	25.6	22.7	9.5	4.5	3.4	1.9
	Other	39.3	31.4	33.3	49.0	48.8	42.5	40.9
	Total (USD mn)	**10487.5**	**5777.0**	**4265.7**	**4363.4**	**4892.2**	**6151.3**	**7519.5**
Slovenia (8)	EU(12)	51.3	57.9	63.8	70.9	68.2	69.9	.
	EU(15)	58.0	64.8	70.9	78.6	75.2	77.4	78.4
	USSR	13.7	13.3	8.1	4.4	5.8	5.5	5.3
	Total (USD mn)	**3408.5**	**4117.8**	**3874.3**	**5173.4**	**5118.4**	**5787.8**	**7099.0**

(1) Preliminary.
(2) Since 1992 CIS
(3) Since 1993 incl. trade with Slovakia.
(4) 1992 -1993 former USSR, since 1994 Russia. -
(5) Since 1993 incl. trade with Czech Republic.
(6) Since 1992 Russia.
(7) Since 1991 Russia.
(8) Slovenian trade without ex-Yugoslav republics. Since 1992 incl. exports and imports for commission processing.
Note: calculated from data in national currencies, converted to USD with official exchange rates.
Source: WIIW

Czechoslovakia (see Graph 1). For many industries, however, structural surpluses and deficits were reduced, indicating that a process of convergence in the direction of the more advanced market economies had started, although it did not yet show up in the aggregate measure. Prominent examples are the reduction of surpluses in the iron and steel industry and the reduction of deficits in the manufacture of paper and paper products and in printing and publishing, which is partly due to extensive foreign direct investment in these sectors.

In the period after 1992, adjustment towards EU-North took place in Hungary and Poland at a broad sectoral level, while in the Czech Republic specialisation along existing patterns continued in the important production of basic metals and the fabricated metals industry, including steel (DJ)[7], as well as in mineral products, including glass and ceramics (DI). Also, the existing deficit in transport equipment (DM) was increased. In Slovakia, continued specialisation in steel was of even greater importance and was the main cause for Slovakia's industrial structure diverging further away from EU-North at the aggregate level. In Romania, structural deficits were reduced at a broad industrial level, but existing structural surpluses in several important light industries such as textiles

Table 7: Central and East European (CEEC) imports by regions shares of regions in the total, in %

Year		1989	1990	1991	1992	1993	1994	1995
Bulgaria	EU(12)	10.3	9.6	20.7	31.1	28.9	32.8	.
	EU(15)	12.5	11.5	26.4	35.5	32.8	37.5	38.1
	CEEC	12.9	11.6	3.2	5.3	4.5	5.2	4.2
	USSR (2)	52.9	56.5	43.2	28.5	36.1	31.6	33.1
	Other	21.7	20.4	27.2	30.7	26.6	25.6	24.7
	Total (USD mn)	**15170.3**	**13128.3**	**2706.1**	**4468.1**	**4757.1**	**4184.8**	**5053.0**
Czech Republic	EU(12)	26.5	31.9	39.8	47.7	42.7	45.1	.
	EU(15)	31.8	40.5	49.9	58.9	52.3	55.7	56.4
	CEEC (3)	14.8	12.4	7.3	4.8	21.5	18.4	17.3
	USSR (4)	32.8	24.3	23.4	17.9	11.2	8.4	8.9
	Other	20.6	22.8	19.4	18.3	14.9	17.6	17.4
	Total (USD mn)	**10775.3**	**9815.4**	**7082.1**	**10382.1**	**12858.5**	**14970.6**	**20885.9**
Slovakia	EU(12)	27.3	31.0	23.6	34.6	20.6	26.2	.
	EU(15)	.	.	33.1	46.5	27.9	33.4	34.7
	CEEC (5)	.	.	7.5	6.2	39.5	33.9	32.7
	USSR (4)	21.8	16.6	44.3	34.9	22.7	18.0	17.0
	Other	78.2	83.4	15.1	12.4	9.9	14.6	15.5
	Total (USD mn)	**3242.7**	**3212.1**	**3606.5**	**3832.7**	**6334.3**	**6610.8**	**8485.3**
Hungary	EU(12)	29.0	31.0	41.1	42.7	40.1	45.4	.
	EU(15)	39.7	43.1	56.7	60.0	54.4	61.1	61.5
	CEEC	10.9	8.7	6.9	6.7	6.0	7.1	7.4
	USSR (4)	22.1	19.1	15.3	16.9	22.2	12.0	11.8
	Other	27.3	29.1	21.0	16.5	17.4	19.9	19.3
	Total (USD mn)	**8858.0**	**8622.2**	**11437.5**	**11120.3**	**12630.3**	**14620.0**	**15406.1**
Poland	EU(12)	33.8	43.5	49.9	53.2	57.2	57.5	.
	EU(15)	42.2	51.1	59.0	62.0	64.7	65.3	64.6
	CEEC	9.6	4.6	4.9	4.4	3.8	4.4	5.8
	USSR (6)	18.1	17.0	14.1	8.5	6.8	6.8	6.7
	Other	30.1	27.3	22.0	25.1	24.6	23.5	22.9
	Total (USD mn)	**10277.3**	**9527.7**	**15521.7**	**15912.9**	**18834.5**	**21569.3**	**29050.4**
Romania	EU(12)	5.7	19.9	25.1	37.2	42.1	44.5	.
	EU(15)	6.5	21.8	28.7	41.3	45.3	48.2	49.6
	CEEC	14.4	12.0	7.5	6.5	5.1	4.8	5.2
	USSR (7)	31.5	23.3	17.8	12.8	11.7	13.8	12.6
	Other	47.7	42.9	46.0	39.5	37.9	33.2	32.6
	Total (USD mn)	**8436.4**	**9205.0**	**5793.4**	**6259.6**	**6521.7**	**7109.0**	**9410.4**
Slovenia (8)	EU(12)	56.9	58.3	60.2	62.5	62.4	62.0	.
	EU(15)	66.9	69.0	71.1	74.3	73.5	75.2	74.2
	USSR	7.9	6.4	7.0	5.1	3.7	2.5	3.1
	Total (USD mn)	**3216.3**	**4726.6**	**4131.3**	**4922.7**	**5805.0**	**6720.0**	**8782.0**

(1) Preliminary.
(2) Since 1992 CIS.
(3) Since 1993 incl. trade with Slovakia.
(4) 1992 -1993 former USSR, since 1994 Russia.
(5) Since 1993 incl. trade with Czech Republic.
(6) Since 1992 Russia.-
(7) Since 1991 Russia.
(8) Slovenian trade without ex-Yugoslav republics. Since 1992 incl. exports and imports for commission processing.
Note: calculated from data in national currencies, converted to USD with official exchange rates.
Source: WIIW

(DB), leather (DC) and manufacturing n.e.c. (DN) were increased.

The changes of CEECs' industrial patterns compared to EU-South widely mirror the developments with regard to EU-North; a presentation of the structural surpluses and deficits of two major groups of industries, some labour-intensive industries (DB and DC) on the one hand and some capital- and technology-intensive industries (DK, DL and DM) on the other, with regard to EU-North and EU-South are given in Graph 1. In general, existing surpluses in the more sophisticated engineering branches were reduced, especially in the early period of the transition, with very few exceptions, such as mechanical engineering (DK) in Hungary;[8] also existing structural surpluses in iron and steel were reduced in most countries. But the deficits in the food industry (DA) and in pulp, paper and paper products (DE) were reduced as well. In most CEECs, the food industry even developed into a surplus industry vis-à-vis the EU-South; an important exception in this respect is Slovakia, were the food industry remained in a major deficit position. Concerning the labour-intensive industries, the picture is quite different for Hungary, Poland, the Czech and the Slovak Republics on the one hand and

Table 8: Total FDI and FDI in manufacturing in CEEC-7, stock end 1995

Country	Total FDI USD mn	FDI in manufacturing USD mn	% of total
Bulgaria	530	196	37
Czech Republic	5797	2900 (1)	50 (1)
Hungary	13270	4800 (2)	36 (2)
Poland	6832	4326 (3)	63 (3)
Romania	1595	600 (1)	37 (1)
Slovak Republic	733	318	43
Slovenia	1254	622	50

(1) Estimated by adding up data for specific branches.
(2) Estimated by updating 1994 data.
(3) In industry.
Source: WIIW-WIFO Database, Foreign Direct Investment in Central and East European Countries and the Former Soviet Union.

Table 9: Ownership structure of nominal capital in manufacturing companies (1) in the Czech Republic, Hungary and Poland, 1994, in %

	Czech Rep.	Hungary	Poland
State-owned	26.3	33.2	50
Foreign	5.6	33.2	4
Domestic private	68.1	33.6	46

(1) In Hungary all companies supplying tax declarations, in the Czech Republic representative sample of 247 firms, for Poland estimated.
Source: WIIW

Romania and Bulgaria on the other: in the first group of countries, existing deficits in textiles and textile products (DB) and leather and leather products (DC) were increased during the transition, while in the second group the existing deficits were reduced. In Romania the considerable deficits were reduced very slowly, but continuously. For Bulgaria only data for employment at a 3-digit ISIC level up to 1992 were available, according to which Bulgaria's major deficit in textiles (321) vis-à-vis EU-South remained virtually the same, while its minor deficits in wearing apparel (322) and footwear (324) were reduced further. A special case is Slovenia, where the available figures for employment indicate an increase of the existing surplus in textiles and footwear, but a widening of the deficit in wearing apparel vis-à-vis the Southern European countries. However, specialisation on labour-intensive products as suggested by the internationally extremely low labour costs might have taken place at a less aggregated level, not reflected in our results.[9]

Our findings on industrial restructuring confirm the overall observation that apart from certain general trends, the individual CEECs have started to develop along different lines.

RESTRUCTURING AND EMERGING SPECIALISATION PATTERNS OF TRADE IN CENTRAL AND EASTERN EUROPE

Foreign trade has been one of the areas most affected by the turbulent political, institutional and economic changes in the region. Traditional exchanges largely collapsed after the end of communism and the dissolution of old trading arrangements within the Council for Mutual Economic Assistance (CMEA). Trade liberalisation measures, such as the abolition of the state foreign trade monopoly and the introduction of current account currency convertibility, were introduced as parts of the stabilisation reform packages. The latter included in most cases substantial currency devaluations which affect emerging specialisation patterns as well. Domestic liberalisations have been paralleled by the West with a suspension of most quotas on Central and East European exports, their inclusion in the GSP system and, last but not least, by tariff concessions for industrial products contained in the Association Agreements with the EU. This section deals with recent trade developments in CEECs (the following countries are included in the analysis: Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia), especially with their emerging specialisation patterns in manufacturing industry trade. We attempt, on this basis, to identify CEECs' competitive industries.

CEECs' trade reorientation and restructuring

The reorientation of trade away from the former CMEA to markets in the West, particularly in the EU, has been the outstanding feature during the first half of the 1990s. Initially, expansion of trade with the West (especially with the EU) occurred against the background of stagnating (respectively declining) overall trade, implying huge regional trade shifts. In 1989, the EU accounted for only some 25% of Czech and Slovak, Hungarian and Romanian exports. The share of the EU was somewhat higher in the case of Poland (32%) and substantially lower in the case of Bulgaria (5.5%).[10] By 1995, more than 62% of Polish exports went to the EU(12); in the case of Hungary, the Czech and Slovak Republics, Romania and Bulgaria these shares were somewhat lower, though still significant (30-50%; similar shifts occurred with imports – see Tables 6 and 7). The EU has thus become the main trading partner for all CEECs. After the accession of Austria, Finland and Sweden, some 4080% of CEEC trade is conducted with the enlarged EU(15). Although the CEEC market share in the EU more than doubled, only some 6% of (extra) EU imports came from the CEECs in 1994 and CEEC markets are still only marginally important for the EU. This asymmetry has manifold implications since any trade measure, be it liberalisation or restriction, or the slower growth of Western demand, has a disproportionately greater impact on the CEECs than on the EU.

Rising trade deficits have been another feature of CEECs' trade developments. In 1995, the combined CEEC trade deficit exceeded USD 15 bn, mainly on account of Poland (USD 6.2 bn), the Czech Republic (USD 3.6 bn) and Hungary (USD 2.6 bn). In manufacturing industry trade, the previously balanced trade with the EU has turned into a deficit of some ECU 5 bn in 1993/94. The largest deficits were again incurred by Poland (ECU 1.9 bn), the Czech Republic (ECU 1.5 bn) and Hungary (ECU 1.3 bn). This happened as these countries

Table 10: Share of FIEs in manufacturing, per cent of all companies (1),1994, per cent

	Capital	Labour	Investment	Output	Exports
Czech R.	11.8	7.5	24.8	11.2	16.4
Hungary	60.8	37.2	79	55.4	65.5
(excl.23 (2))	(-56.8)	(-35.5)	(-74)	(-50.5)	(-63.1)
Slovak R.	12.2	9.7	36	12.8	15.7
Poland (3)	12	8	30	13	20

(1) Czech Republic, Slovak Republic: non-financial corporations with at least 25 employees; Hungary and Poland: companies supplying tax declarations.
(2) Hungary, excluding ISIC code 23, i.e. coke and petroleum.
(3) Estimated on the basis of data for the total economy.
Source: WIIW database on foreign investment enterprises, relying on data supplied by national statistical offices.

Table 11: Industries with above average share of FIEs in output, 1994, per cent

	Hungary	Czech Rep.		Slovak Rep.	
99.6	Coke and petroleum	55.1	Motorvehicles,trailers	38.7	Transport equipment
99.5	Beverages and tobacco	31.7	Publishing, printing	25.2	Electric equipment
78.4	Electrical machinery	28.2	Rubber and plastic	15.6	Paper; publishing
72	Motorvehicles,trailers	20.5	Other non-metallic	14.2	Machinery n.e.c.
70	Other transport equip.	13.7	Electrical machinery	13.7	Food, beverages, tob.
67.9	Paper and paper	13.7	Furniture		
61	Radio, TV sets				

Source: WIIW database on foreign investment enterprises, relying on data supplied by national statistical offices.

were beginning to recover from the transformational recession and their imports were growing faster than exports. Apparently, the EU trade liberalisation measures and even the asymmetry of the Europe Agreements (faster tariff reductions by the EU) could not offset the generally low export competitiveness and supply-side bottlenecks, respectively, of CEEC economies. Large CEEC trade deficits are hardly sustainable and might represent one of the major constraints on economic growth in the medium and long run.

Apart from huge increases in volume,[11] there have also been considerable changes in the commodity structure of CEEC manufacturing industry trade. Detailed analysis using the Eurostat COMEXT database (using export and import data for about 100 NACE 3digit industries) reveals another asymmetry in the adjustment processes of CEEC trade structures. The composition of CEEC manufacturing industry imports underwent a radical change after 1989 and the structure of import demand (from the EU) is now very similar to the general structure of EU exports. On the other hand, adjustment on the CEECs' supply side was much less dramatic. The most pronounced structural shifts occurred in Romania and Bulgaria, the lowest in the former CSFR (especially in the Czech Republic as data for 199394 suggest). Most CEECs still display a rather different export pattern as compared with the structure of overall EU import demand. However, there is a convergence of the Czech, Slovak, Slovenian and Hungarian export structures to the EU to the general patterns of EU import demand whereas in the case of Poland, Bulgaria and especially Romania the export structures move away.

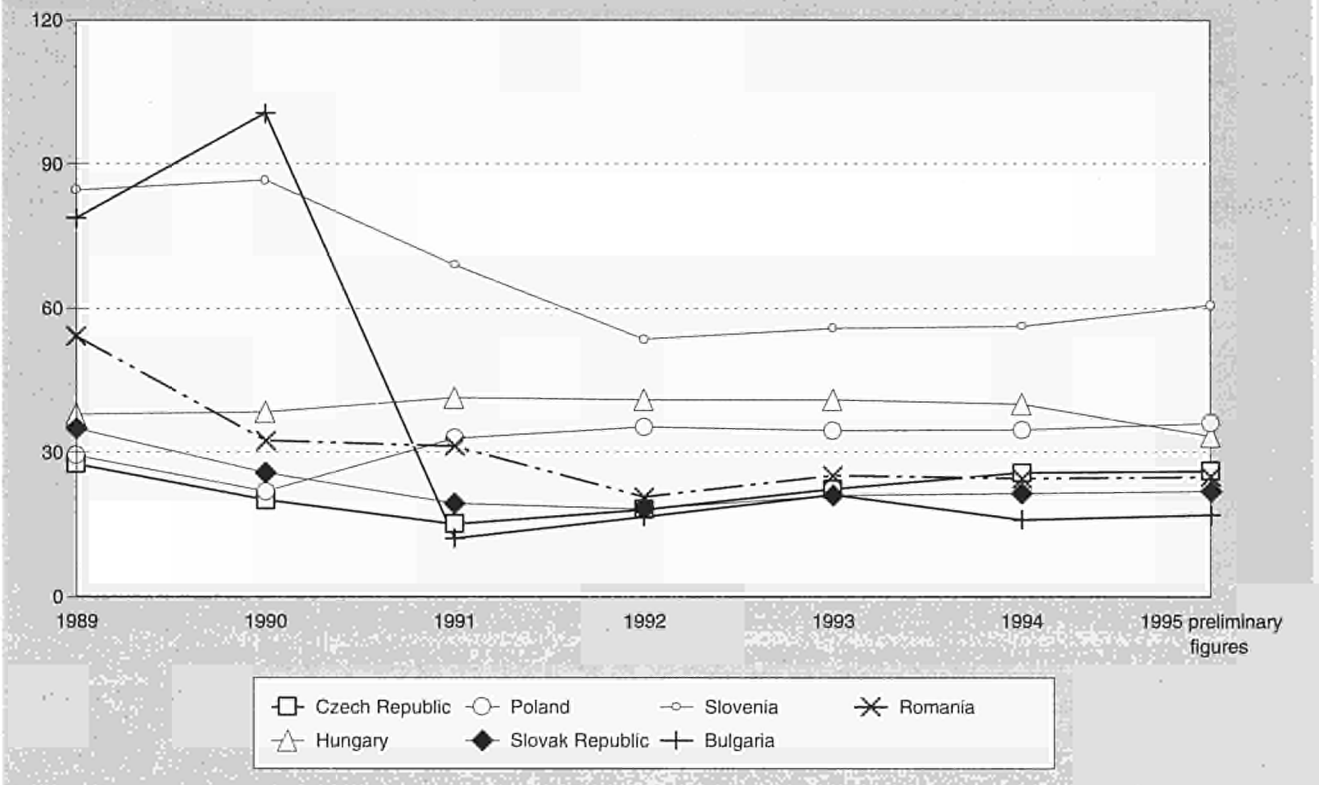
A comparison of the similarity in export structures among the CEECs reveals yet another aspect of structural adjustment. The structures of Czechoslovak, Hungarian and Polish exports to the EU became more similar between 198994 while they were increasingly diverging from the export structures of Bulgaria and Romania. Especially the Czechoslovak and Hungarian export structures became very similar. This suggests that these countries (and some EU countries – e.g. Austria) might increasingly compete on the same product markets. On the other hand, the Bulgarian, Romanian and partly also the Polish export structures again seem to evolve in a different direction. The emergence of at least two groups of countries within the CEEC region with substantial differences in industrial specialisation is therefore clearly visible also in their varying export specialisation on EU markets.

CEEC comparative advantages now and in future

Needless to say, the period 198994 for which detailed trade data are available has not only been too short, but also rather turbulent for providing definite answers about the CEECs' long-term comparative advantages. Until 1993, the CEEC economies were in a deep transformational recession resulting from systemic changes and from the loss of traditional markets in the CMEA. Industrial recovery started first in Poland in 1992, followed by Hungary in 1993; only in 1994 did all CEECs return to growth. Developments have been highly uneven, both across countries and individual industries. A common recent feature were double-digit labour productivity increases in Poland, Hungary, the Czech Republic and Romania as well as extremely low international unit labour costs.

Recent studies have discerned general CEEC export specialisation patterns: away from capital-intensive branches towards labour-intensive industries, while the generally huge gap in the representation of skill- and R&D-intensive industries in exports somewhat declined in Hungary and Czechoslovakia. Nevertheless, at the detailed industry level there are many exemptions to this general rule. An analysis of CEEC market shares in the EU reveals that between 1989 and 1994 the following industries recorded the largest 'competitive gains': iron and steel (NACE 221), non-ferrous metals (224), cement (242), petrochemicals (252), tools and finished metal goods (316), insulated wires and cables (341), electrical machinery (342), motor vehicles (351), knitting industry (436), footwear (451) and clothing (453).[12] These industries have enjoyed the biggest absolute market share increases in most CEECs, either over the whole period 198994 or, after incurring initial losses at the beginning of the transition, consolidating their exports from 1992 and regaining market shares in the EU afterwards. On the other hand, there has been a number of industries incurring 'competitive losses', again either over the whole period 198994 or, suffering from a sort of adverse restructuring effect, only after 1992. Clear losers were in most CEECs the meat industry (412) and dairy products (413), as well as boilermaking (315), plant for mines, iron and steel (325) and animal and poultry foods (422) in some CEECs.

Figure 2: International comparison of unit costs (UCL), PPP adjusted (Austria = 100)



Source: WIIW

A tentative decomposition of the market share analysis into two periods (early transition: 1989-92; restructuring and recovery: 1993-94) helps to identify those CEEC industries which are competitive and important (as measured by the largest absolute market share gains), taking into account both positive and negative effects of restructuring. In this way, we can identify as competitive not only industries with the largest market share gains during the whole transition period 1989-94, but also such industries that have apparently successfully restructured after the initial transitional setback. Examples of industries which successfully restructured are sawing and wood processing (NACE 461) in the CSFR (Czech Republic), other basic chemicals (253) in Hungary, radio and TV receivers (345) in Poland, and petrochemicals (252) in Bulgaria and Romania. On the other hand, clear losers with adverse restructuring effect were e.g. boilermaking (315) in the Czech Republic, plant for mines, iron and steel (325) in Slovakia, glass and glassware (247) in Hungary, motor vehicles (351) in Poland, animal and poultry foods (422) in Bulgaria as well as structural metal products (345) in Romania.

What are the characteristics of the most important CEEC export industries? Can we find out some distinct specialisation patterns apart from the general features described earlier? For example, clothing (NACE 453) – the most labour-intensive of all industries – recorded the largest absolute competitive gain in the CEEC region as a whole.[13] But also, e.g., the highly R&D-intensive electrical machinery industry (342) gained a lot, especially in Czechoslovak, Hungarian and Polish exports to the EU. The same is (partly) true for the highly capital- and energy-intensive cement industry. Specialisation patterns are thus more complicated, despite a general tendency of growing specialisation on labour-intensive industries on the one hand, and the under-representation of capital- and R&D-intensive industries on the other. Besides, there are again considerable differences among the individual CEECs.

The sample of the most competitive industries in the CSFR was characterised by lower than average (across all 89 sectors for which intensities are available) capital and skill intensity, but by considerably higher than average R&D intensity. The competitive industries in Hungary and Bulgaria also displayed much higher than average R&D intensity. In Poland, Bulgaria, Slovakia and Slovenia the sample showed higher than average energy intensity. Besides, Slovak and Slovenian competitive industries also tend to be more capital- and R&D-intensive. At the same time, competitive industries in all CEECs have lower than average skill intensity (mostly in Poland, least in Slovenia), but considerably higher than average R&D intensity (except Poland and Romania). A move towards more labour-intensive industries could be discerned only in Romania, Bulgaria and the Czech Republic; in Slovenia there has been a shift in the opposite direction, perhaps reflecting relatively high unit labour costs in this country.

Industries incurring market share losses and identified as non-competitive were in all CEECs on average less R&D- and skill-intensive. In Czechoslovakia (especially in the Czech Republic), losing industries have above average energy intensity – a possible indication of positive structural adjustment away from energy-intensive sectors. The fact that in all CEECs losing sectors have considerably lower than average R&D and skill intensity can also be interpreted as a sign of positive structural change. Except for Slovenia, the CEECs' non-com-

petitive industries display less than average labour intensity, once more suggesting that wage costs might be a problem in Slovenia.

The recent CEEC trade specialisation patterns are indeed rather heterogeneous. On the one hand, there are some industries where individual CEECs have already reached quite formidable shares on the EU market (e.g. cement, structural metal products, wooden furniture, bodies for motor vehicles, electrical lamps, foundries, etc.), but the pattern of export specialisation is far from straightforward. Low labour costs as the CEECs' most important current comparative advantage seem to be confirmed. As far as the R&D-intensive industries are concerned there has been a closure of the existing gap in some CEECs, though the good qualification of the CEEC labour force (skill-intensive industries) has not (yet?) been reflected in the changing structure of their exports. But, in contrast to developing countries and even the NICs, the existing broad industrial base and industrial traditions of the CEECs, their increasing integration through corporate links with Western firms etc., might potentially improve the CEECs' competitiveness in a wide range of other industries as well. The conjecture that some CEECs (especially Hungary and the Czech Republic) might have embarked upon a long process of catching up while others (Bulgaria and Romania) are falling behind seems to be confirmed by the present analysis as well.

Estimates of the internationally comparable average unit labour costs (ULCs) for the whole economy show that in the Czech Republic ULCs were some 28% of the Austrian level in 1995, in Hungary 33%, in Poland about 36% and in the remaining CEECs less than 25% of the Austrian level.[14] The highest ULCs are observed in Slovenia: 60% of the Austrian level in 1995. Though still considerable, the CEECs' absolute (average) ULC gaps have been diminishing as ULCs have been growing (in some CEECs rather fast) after 1991 (Graph 2). Tentative estimates show that the ULCs in the CEECs' manufacturing industry are even lower than average for the whole economy. Together with the geographic proximity to Western markets and a fairly good formal qualification of the labour force, low unit labour costs give the CEECs an important competitive edge especially in labour-intensive industries. Moreover, the above ULC estimates are averages over the whole economy which vary considerably across sectors and companies, especially with respect to productivity levels. Thus, for instance, it has been reported that CEEC labour productivity in clothing joint ventures reaches 8090% of the Italian level (which is the highest in the EU), and this with comparable product quality.[15] Similar examples where Western management, quality control standards and marketing channels help to raise substantially the average CEEC productivity levels while maintaining considerable wage gaps could be found in other sectors as well (e.g. automobile, electrotechnical and chemical industries).

Whether the CEEC industries identified above as competitive really possess a long-term comparative advantage is difficult to say from the available evidence. The recent export successes might have resulted also from some special factors (e.g. exports without due regard to profitability, a one-time effect of trade liberalisation measures) in the initial stage of economic reforms and trade restructuring. There seem to be some problems with CEECs' skill-intensive industries, despite the fact that skilled labour might be relatively even cheaper than unskilled labour. Predicting the future patterns of CEEC trade and industrial specialisation is thus difficult. Explaining the emerging CEEC trade structure with existing trade theories has so far not been very conclusive, inter alia because of dramatic regime changes and only a short period for which detailed data are available. It is thus not yet clear whether an inter-industry specialisation pattern based on different factor endowments (e.g. labour, skills, etc.) will emerge or rather a rapid development of intra-industry trade with a closure of existing gaps. Moreover, the currently observed differences among the individual CEECs will most likely increase in future. The data available (up to the year 1994) do not permit an unequivocal answer regarding the export competitiveness of specific CEEC industries.

FOREIGN DIRECT INVESTMENT SPECIALISATION IN CEEC MANUFACTURING

General features of FDI in CEECs

After an initial upsurge in 1990 and 1992 and two years of stagnation, the year 1995 brought an upswing of FDI activities in the Central and East European countries. In the CEEC7, inflows doubled compared to the preceding year and reached USD 10 bn, the total stock increasing to three times that amount.

Only Hungary, Poland and the Czech Republic have so far been important FDI targets with significant inflows. These are the most advanced transforming countries with the most stable economies and political systems. The specific reasons for this success were identical in all three cases: sales of stateowned companies to foreign investors in the framework of privatisation and also followup investments in earlier established ventures. Hungary participates with about 43% in the total stock of CEEC7 FDI, Poland with 23% and the Czech Republic with 20%. As for per capita FDI, Hungary was among the first five nonOECD target countries in the last three years, often also ahead of South European countries. In Bulgaria, Romania, Slovakia and Slovenia the inflow of FDI has been meagre, in 1995 it was less than in the preceding year.

Hungary's leading position as a target for FDI is less pronounced in manufacturing than concerning the total economy (Table 8). Poland is approaching as close second. In the Czech Republic and Hungary, FDI in telecommunications, and in Hungary also in the energy sector, surged in 1995 so that the share of manufacturing in the FDI stock decreased to or below 50%. In contrast, in Poland the telecom and energy sectors have not yet been opened to privatisation and distributive trades were mostly privatised to domestic investors so that manufacturing has a high share in total FDI. In countries with low overall FDI, manufacturing constituted about 40% of the invested capital. Investors did not initiate bigger and longerterm projects, but preferred distributive trades and services which provided faster returns on capital.

Foreign ownership in CEEC manufacturing

The ownership structure of assets in manufacturing differs significantly among the most important FDI target countries. The Czech Republic has the highest private share, if the result of voucher privatisation is acknowledged as private property, but very small foreign ownership. Manufacturing in Hungary is equally shared by public, domestic private and foreign owners. Poland was lagging behind in privatisation and corporatisation in 1994, ownership structures can only be estimated (Table 9).

Foreign presence is more pronounced if not only the foreign share of assets, but also the total nominal capital of companies with foreign involvement is considered. These companies with any (even minor) share of foreign involvement, called foreign investment enterprises (FIEs), are the subject of analysis below. Data on these enterprises were especially collected for the WIIW by the national statistical offices;[16] the coverage is limited by the availability of information in the given country. FIEs tend to be significantly different from entirely domestically owned companies.

Hungarian manufacturing has been under much stronger foreign influence than other CEEC industries (Table 10). The early start of foreign investors, the liberalised market economy and the privatisation policy benefiting sales to foreign investors allowed for fast and strong foreign penetration. In 1994 over

60% of nominal capital was in companies with foreign involvement, which produced 55% of the country's manufacturing output. These figures are exaggerated by the oil processing industry, because the national oil company (MOL) has only 1.6% foreign involvement. Although most minority ownership shares in FIEs result in a controlling right of the foreign partner, in the case of MOL this is not the case.

In the Czech Republic, Slovakia and Poland (estimated) the relative importance of FIEs was fairly uniform in 1994, the most recent year for which data are available (Table 10). About 12% of the nominal capital in manufacturing companies was invested in FIEs, which employed below 10% of the labour force, but produced one eighth of the output and delivered one sixth of exports. These are relatively low shares compared to Southern European economies and Hungary. They reveal a relatively small integration of the Czech, Polish and Slovak firms into international corporate ownership networks. The strong position of domestic owners in these countries is the result of the specific ways in which privatisation was pursued. The voucher privatisation in the Czech and Slovak Republics, as well as insider privatisation in Poland and Slovakia excluded foreign investors. Privatisation by sales was practised in these countries as a secondary method, albeit in some important cases.

In all four countries foreign investment enterprises had higher shares in capital than in labour, which means that capital intensity is relatively high in the foreign investment sector. Also labour productivity was higher in the foreign sector than in the domestic one. This confirms the expectation that the foreign sector uses more recent technology, but is also related to the concentration of FDI in specific industries.

The outstanding export performance relative to output indicates that FIEs are more exportoriented than domestic firms. In fact, they import even more than they export and thus have contributed considerably to the foreign trade deficit which emerged in most countries in 1994-95. FDI was initially targeted predominantly at penetrating the local market with the aim of selling foreign goods. High import needs at the early stage of the realisation of investment projects may disappear later.

FIEs contribute overproportionately to fixed investment. This is a confirmation of the positive effect of FDI on economic growth and restructuring. The large amount of followup investment after acquisition suggests that foreign investors rapidly restructure the acquired firms. This is connected with layoffs, so that FDI does not help to solve the problem of unemployment at least in a direct manner. The positive features concerning the activity of foreign investment enterprises may be biased by the fact that foreigners picked the most healthy firms in the privatisation process so that the FIEs' performance is compared with leftovers.

Branch-specific features of manufacturing FIEs

The general features of FIEs in manufacturing hold for most sub-branches in all countries, but the grade of foreign penetration differs by industries. Hungarian manufacturing has a high rate of foreign presence in all industries. Even the branches with the weakest foreign penetration have higher FIE shares than the average in the Czech Republic and Slovakia. In the latter countries, FDI concentrates in a few industries and the bulk of the manufacturing sector has marginal foreign investment (Table 11).

The main common branch with above average foreign penetration in the three countries is the production of motor vehicles. Another one is the manufacturing of electrical machinery and equipment. It can be presumed that the production of soft drinks and tobacco, not separately identified at this level of aggregation, also has significant foreign penetration.

In the Czech Republic, which has relatively low foreign penetration, a few large investment projects dominate. The most intensive foreign presence, with more than one quarter of the output supplied by FIEs, can be found in the car industry, in printing and publishing, as well as in rubber and plastics. Non-metallic minerals, electrical machinery, food, beverages, tobacco and medical etc. instruments also have shares over 10% in output. In Slovak manufacturing, FIEs are more evenly distributed among branches, the strongest points being similar to those in the Czech Republic.

In the case of Hungary, foreign penetration can more precisely be measured by invested capital. An above average share of FIEs in nominal capital stock appears in the food industry, and foreign control is almost complete in the beverage and tobacco industry. There appears to be no difference in the textiles, apparel and leather industry, the share of FIEs in total nominal capital of these industries is about 45%. The growth of foreign control in 1994 was slow, foreign investors may have already picked most of the best companies. The rest is tied to international networks by cooperation or buy-back agreements. The production of chemical products and rubber are activities with high and increasing foreign penetration, while the crisis-hit steel industry is still mainly in domestic, i.e. public hands, but for processed metal goods the share of FIEs was already above 50%. In some activities of machine building FIEs controlled more than three quarters of the nominal capital: office machines, electrical machinery and motor vehicles. In other machine building activities with lower foreign penetration the increase of foreign shares was very rapid in 1994.

The degree of foreign penetration in CEECs in the individual industries depends on the industry-specific features and on characteristics connected with privatisation.

- There are differences in the corporate integration of industries world-wide: light industries are less internationalised than technology-intensive electrical machinery and the production of motor vehicles.
- Foreign investors concentrate in activities with relatively stable domestic markets and good export chances, e.g. in the food, beverage and tobacco industries.
- Branches with usually low international penetration may have high foreign involvement in CEECs which are close to the main EU markets, e.g. construction materials ('non-metallic minerals').
- Privatisation by sales attracted about half of the FDI in CEECs. In branches where public monopolies are intact, like oil processing, FIEs had a negligible share.

In the Czech and Slovak Republics branches which were predominantly privatised by vouchers (light industry) attracted less foreign capital than those where sales were organised (paper, non-metallic minerals).

- Foreign presence is relatively small in branches with great structural difficulties, oversized capacities and lacking markets, like steel, metal industries and chemicals. Even in Hungary, foreign investors picked only the healthy part of these industries, their presence is still small in relation to domestic companies.

Export-orientation of manufacturing FIEs

In 1994 16.4% of Czech manufacturing exports came from FIEs. Exports represent 31% of sales in the case of all enterprises and 41% for FIEs. The lowest export ratios are found in the production of foodstuffs and tobacco (14%). Especially high export/output ratios (more than 60%) were registered for wood products, metals, vehicles, and clothing. Although we lack statistics about imports, it can be assumed that the import content per unit of production in FIEs is significantly above the average national level.

In Hungary also in basically domestic-oriented branches, like the food industry, FIEs have higher export shares than domestically owned firms. Industries which are more internationalised world-wide have a high penetration by foreign capital and high export orientation in Hungary as well. The share of export sales in output is above 60% in the case of FIEs in recycling, electrical machinery, clothing and leather and between 50% and 60% in the production of motor vehicles, basic metals and textiles. Several companies in machinery branches have been established with an off-shore status and sell over 80% of their products abroad. They also import most of their inputs.

In general, high export shares are more common in labour-intensive branches than in others. Beyond the labour cost advantage, land price and labour relations are further factors of attraction for export-oriented firms.

Investment activities of FIEs

FIEs accounted for almost one quarter of capital investment in Czech manufacturing in 1994. This is two times higher than their share in output and nominal capital. FIEs are expanding and have a more recent, probably more modern capital stock than domestic companies. Only in clothing and textiles do FIEs record lower investment shares than output shares. They seem to exploit available capacities and have so far embarked less on modernisation. Heavy investment activities of FIEs can be recorded in branches where investment shares are much higher than output shares in 1994: electrical machinery, food, beverages and tobacco, chemicals, medical instruments, furniture.

In Hungary business investments take place almost exclusively in companies with foreign involvement. A high pace of restructuring in these firms is reflected in high growth rates of labour productivity. Modernisation investments are recorded in food, beverages and tobacco, and the wood and wood products industry. Capacities are enlarged in branches of radio and TV set production, textiles and some machinery industries where local producers were closed down earlier. The car industry does not show up any more, because the main investments were made in 1990-92 already and enlargements started in 1995 only.

Investment specialisation of FIEs in machinery production in Hungary is similar to that in the Czech Republic. Differences appear in the light industries, which are relatively neglected in the Czech Republic but where there is heavy investment of FIEs in Hungary. The pattern is the opposite way round for metals, minerals and chemicals which are significant investment targets for FIEs in the Czech Republic but not in Hungary.

As for Slovakia, material-intensive branches, light industry and the food industry dominate as investment targets. Investment in machinery is less active than in the case of the other two countries.

It can be expected that most FDI in the CEECs will also in the future be confined to three countries – the Czech Republic, Hungary and Poland – for at least two reasons: (1) Established foreign investment projects will attract further investment in the form of capital increases, competing multinational companies in the same branch and subcontractors of major multinationals. (2) No other CEEC is currently prepared to privatise public utilities, or speed up privatisation by sales to foreigners.

The focus of foreign firms may shift between the three leading target countries. In the Czech Republic the restructuring needs of companies privatised in the voucher scheme will make increasing foreign involvement necessary. Investment funds may be interested in inviting strategic investors. In Hungary privatisationrelated FDI in manufacturing will phase out in 1996 and FDI will not be attracted by the expansion of the local market either. At the same time Hungary is emerging as a major location of exportoriented investment projects and their subcontractors and keeps attracting investment in manufacturing. The foreign share in manufacturing FIEs will increase by stocking up the nominal capital stock of existing FIEs. Poland, the largest market and a rapidly growing economy, will attract increasing amounts of FDI. It also has the largest nonprivatised sector offering opportunities for foreign take-overs after mass privatisation has been completed.

CONCLUSIONS

This paper has addressed the question of the emerging pattern of industrial specialisation resulting from the dramatic process of transition in Eastern Europe and the evolving process of East-West European integration. We have analysed this issue at various levels:

Industrial structure comparisons between CEECs and two groups of EU economies, EUNorth and EUSouth. The major findings of this analysis were that CEEC economies started off in an in-between-position as regards the features of broad industrial composition relative to these two groups of economies. There was a stronger representation of heavy industry, but also of the technologically more advanced industries such as electrical and mechanical engineering industries relative to the EUSouth, but a weaker representation of these industries relative to the EU-North. As regards the more labour-intensive industries (textiles, clothing, leather and footwear) the picture was the exact opposite: here there was an 'under-representation' of these industries relative to the EU-South and an 'overrepresentation' relative to the EU-North. As regards developments since 1989/90, one can perceive a process of differentiation across Central and Eastern Europe: the 'most advanced' of these economies (either in terms of technological know-how and/or in the speed of industrial structural and organisational transformation) have embarked upon a process of convergence in broad industrial structural terms with the more advanced Western European economies. This is not, of course, the case at the detailed microeconomic level as regards levels of productivity, quality of products, etc. in which we can perceive (and measure) dramatic 'technology and product quality gaps'[17], but these gaps are pervasive across the whole range of industries. Another group of CEEC economies, particularly those in which cross-border corporate linkages with the West remain weak (partly because of their geographical location), seem to move in the direction of specialisation towards more resource- and labour-intensive branches and thus move more in line with EU-South.

The analysis of evolving trade specialisation has shown that the picture of international trade specialisation is rather complex: on the one hand, we do have evidence of the presence and even strengthening of strong patterns of inter-industry specialisation; compared to the EU import structure in general, CEECs' exports have moved in the direction of more labour-intensive exports, away from more capital-intensive exports, and continue to have very strong deficits in the area of technology- and skill-intensive branches. However, this picture at the overall level should not conceal the fact that, at the detailed industrial level, developments are much more varied. Certain economies (particularly the Czech Republic and Hungary) have made inroads in some sophisticated industrial branches (particularly engineering) and have reduced their deficit in R&D- and skill-intensive areas, but have also strengthened their presence in international trade in some resource- and labour-intensive areas. Other economies have mainly moved in the latter direction. The picture of trade specialisation over the period 1990 to 1994 is still strongly affected by the short- to medium-run impact of the dramatic process of trade liberalisation, absorption of the 'transition shock' and only the gradual evolution (at different speeds) of new industrial organisational structures in the different CEECs; this makes

it difficult to draw very firm conclusions concerning the longer-term comparative advantage position of the different CEEC economies. Nonetheless, for the more advanced of the CEECs the developments do seem to indicate that they have embarked upon a process of strong corporate interlinkage with the rest of the European economy with good prospects for gradual 'catching up'.

Finally, the detailed structural analysis of FDI flows into Eastern Europe and of the characteristic features and the role of FIEs (enterprises with foreign involvement) has confirmed the picture of developmental differentiation which emerges in Central and Eastern Europe. FDI is heavily concentrated in just three of the CEEC economies (Hungary, the Czech Republic and Poland) and in these economies evidence suggests that FIEs are playing a crucial role in the technological, skill and organisational upgrading process. They account for significant proportions of investment and export activity and attract (with higher wage and salary rates) the most skilled employees. Countries which do not manage to attract Western corporate interest to the same extent are, in consequence, suffering in their relative developmental prospects. The analysis of the distribution of FDI and of FIEs across industrial branches reveals again a great deal of differentiation. While there is strong involvement of FDI in the more technology-intensive areas (such as electrical engineering, transport equipment, etc.) with a high degree of export orientation, which also hints at a potential presence of some of the CEECs in trans-European corporate linkages in these areas, there is also a strong presence of FIEs in some areas with a strong local market orientation (such as food industries) and in some of the more resource-intensive industries (such as construction materials, wood and wood products). The outlook on FDI and international corporate involvement in Central and Eastern Europe underlines its crucial role as an agent of change but also as an agent which further reinforces the picture of the uneven geographical and industrial development which currently unfolds in Central and Eastern Europe.

FOOTNOTES

1) See e.g. M. Syrquin (1988), 'Patterns of Structural Change', in Hollis B. Chenery and T.N Srinivasan (eds.) (1988), Handbook of Development Economics, Vol. 1, Ch. 7, Amsterdam, pp. 20373. Even if the PIG (Physical Indictors Global) method, which rather overestimates incomes in the former socialist countries, was used, per capita income in the CEECs was well below the advanced West European countries, such as Austria. See P. Havlik, 'East-West GDP Comparisons: Problems, Methods and Results', WIIW Research Reports, no.174, The Vienna Institute for Comparative Economic Studies (WIIW), September 1991, Table 11.

2) See also L. Podkaminer (1996), 'Transition Countries: Economic Developments in Early 1996 and Outlook for 1996 and 1997 – Part I: Slower Growth in Central and Eastern Europe, Delayed Stabilization in Russia and Ukraine', WIIW Research Report, no. 228, Vienna.

3) See also M.A. Landesmann and I.P. Székely (1995), Industrial restructuring and trade reorientation in Eastern Europe, Cambridge, p. 69. Note that structural comparisons using this indicator depend among other things on the level of statistical disaggregation used, which explains the differences between the figures given in Tables 3 and 5.

4) The output share of a certain industry in a CEEC was deducted from the output share of the same industry in the group of West European countries compared, i.e. EU-North or EU-South. If the share of an industry was higher in the CEEC it was considered a 'structural surplus' industry from the CEECs viewpoint; if the share was below, it was considered a 'structural deficit' branch. In Hungary, for instance, the share of the food industry in total manufacturing output was 21% while it was only 17% on average in the advanced EU countries. Hungary thus had a structural surplus in the food industry compared to EU-North. The share of the printing & publishing industry on the other hand was 3.5% in Hungary, compared to over 6% in both, EU-North and EU-South countries; Hungary thus had a structural deficit in this branch of industry. The same procedure was applied to certain groups of industries such as the 'labour intensive' and 'sophisticated engineering' branches depicted in Graph 1 below. Detailed figures are not printed in this article, but can be supplied on request.

5) The only exception being Poland, where recovery started first, with positive rates of growth of GDP and industrial production as early as 1992.

6) To avoid a 'moving target', the industrial structure of the Western countries was kept constant by choosing a single year of comparison; this is the year 1992 for EU-North and 1990 for EU-South, the last year for which comparable date were available for all countries of the group.

7) Letters in brackets refer to the 2-digit NACE rev. 1 terminology, figures in brackets to the 3-digit ISIC nomenclature.

8) After 1992, when Tungsram started production under new ownership, Hungary has also increased the surplus in electrical engineering again.

9) One straightforward example is the production of textiles and textile products (DB) in Hungary: the more detailed analysis at the 3-digit ISIC-level, available until 1992, reveals that the increase of this deficit was due to the increasing deficit in textiles, whereas the deficit in the usually more labour-intensive production of apparel was reduced significantly.

10)The regional trade shares, especially the ones for Bulgaria, are affected by the unrealistically high valuation of the transferable rouble used in intra-CMEA transactions as compared to the US dollar. Slovenia has recorded an exceptionally large share of trade with the EU since the mid-1980s – more than 50% in 1989.

11)CEEC manufacturing industry exports to the EU increased from ECU 9.3 bn in 1989 to almost ECU 27 bn in 1994; imports grew even more (from ECU 10 bn in 1989 to ECU 32 bn in 1994).

12)Competitive gain is here defined as the gain in the market share weighed by the value of exports of a particular industry in the base year.

13)We use factor intensities derived for the four largest EU countries – see European Economy, Special Supplement (1995): The Interpenetration between the EU and Eastern Europe.

14)International comparisons of unit labour costs are difficult, inter alia because of problems in productivity comparisons. We use here GDP per capita as a measure of aggregate productivity and adjust the unit labour costs both for changes in exchange rates and purchasing power parities. For more details see P. Havlik (1996), 'New Estimates of Aggregate Productivity and Unit Labour Costs', in L. Podkaminer, op. cit., pp. 3746.

15)G. Graziani (1994), 'The relocation of the Italian textiles and clothing industry to Eastern Europe: outward processing traffic and foreign direct investment', paper presented at the ACE Workshop, WIIW, Vienna, November 1994.

16)For details see G. Hunya and J. Stankovsky (1996), WIIW-WIFO Database. Foreign Direct Investment in Central and East European Countries and the Former Soviet Union, Vienna.

17)For details concerning the analysis and prospects of bridging these 'technological and product quality gaps', see M. Landesmann (1995), 'The pattern of East-West European integration: Catching up or falling behind?', WIIW Research Report, no 212, Vienna; and M. Landesmann (1996), 'Emerging Patterns of European Industrial Specialization: Implications for Labour Market Dynamics in Eastern and Western Europe', WIIW Research Report, no. 231, Vienna.

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The Competitiveness of the European Medical Device Industry

INTRODUCTION

The EU medical device industry encompasses a great variety of products: from gauze dressings to MRI (Magnetic Resonance Imaging), from walking canes to cardiac pacemakers, it covers hundreds of thousands of references. Important technologies such as data processing, lasers, optics, nuclear technology and new materials, have been successfully introduced into healthcare products with one major aim: to improve healthcare delivery. As a result, the medical device industry has contributed significantly to the increased life expectancy we have witnessed in Europe. (From 1960 to 1990, life expectancy in Europe has increased by 7 years on average). After a period of substantial growth in the 70's and 80's, the EU medical device industry now faces a number of challenges. Lower growth in the traditional medical device markets (US, EU and Japan) triggered by cost containment policies, together with market globalisation, have significantly changed the way in which companies in this sector compete.

THE MEDICAL DEVICE MARKET

The medical device market is valued at around ECU 80 Billion in 1993. This market comprises three main regions: the United States, the EU and Japan (see Table 1) with the US representing the largest share at some 40% of the world market. Medical device expenditures per capita show a much higher penetration of medical devices in the US and Japan than in the EU.

Globally, the medical device market is growing steadily at 7% in 1993, compared with 1.2% for the world economy for the same period. A fundamental factor driving this growth is favourable demographic development, with an increase and an ageing of the world population. This factor is strongly linked with improvements in medical care and continuous technological development (innovation as well as improvements of existing technologies). The widespread concern over increasing healthcare expenditure in industrialised countries and the resulting cost containment policies have had a negative impact on growth, particularly in Japan and Europe. However, growth forecasts for the period 1994-1995 (see Table 1 above) remain positive.

Growth of the world market is currently boosted by the emergence of rapidly-growing markets in Asia and parts of Latin America (Argentina and Chile for instance), which are experiencing growth rates three to four times higher than those of the USA, the EU and Japan. The rapid economic development of such countries leads to new requirements for high quality healthcare, and this results in significant investments in new hospitals and new healthcare programmes. Sustained economic growth and development of hospital infrastructure are primarily benefiting heavy equipment and other hospital hardware manufacturers.

MARKET SEGMENTATION

The medical device market can be divided into twelve segments as shown in Table 2 below. These segments range from 460 Mio ECU for active implantable devices (which include devices as pacemakers and defibrillators) representing 2% of the total market to 4,430 Mio ECU for In Vitro Diagnostic (reagents, reagent product, equipment or systems used in clinical chemistry, immunology, haematology or microbiology) representing 18% of the total market. These market segments had different growth prospects for 1994, ranging from 1% for imaging (X-Ray, MRI, Ultrasound, Scanner and Nuclear Medicine) owing to market saturation and cost containment measures in developed countries to 12% for aids for disabled persons (orthopaedic apparatus, external prostheses and walk-assistance devices such as wheelchairs) which is benefiting particularly from factors such as ageing of population or policies towards handicapped people.

THE EU MEDICAL DEVICE INDUSTRY

The medical device market is highly fragmented, with numerous niche product lines representing modest market sizes. Each product requires specific manufacturing or distribution skills and as a result, the industry is fragmented, with many small and medium size companies concentrating on a single product line or on a specific geographical area. At the other extreme, there are a few very large companies producing a broad range of devices and pursuing a global strategy on a world-wide scale. There are overall some 5,500 medical device manufacturers in Europe, employing around 240,000 people. In comparison, the number of companies in the US is estimated at 7,700 (282,000 employees) while there are around 2,850 manufacturers (89,000 employees) in Japan. Employment has grown steadily in the EU medical device industry in the eighties. From 1983 to 1990, employment level in the EU medical and surgical equipment and orthopaedic appliances sector (covered by NACE 372) has grown at a compounded annual growth rate of 2.3%. This growth has slowed over the last few years, down to 0.8% per annum between 1990 and 1993.

Table 3 below illustrates the position of European manufacturing world-wide versus its US and Japanese competitors. European manufacturing includes all goods produced in Europe, regardless of whether manufacturing companies are foreign or European owned. It does not include goods produced by European firms abroad.

As Table 3 above shows, the position of European medical device manufacturing in Europe is strong with 76% of the EU market served by EU manufacturing. The situation is particularly favourable in Germany, the largest and one of the fastest growing markets in Europe where 82% of the products sold are manufactured in the EU. This reflects the strength

Table 1: World medical device market in 1993 (1)

Country	Market Size (million ECU)	% of World Market	Medical device per capita (ECU)	Growth Rate 1994/95E
EU (15)	24 500	31	66	6
US	32 200	40	125	7
Japan	14 500	18	116	6
Rest of the World	8 800	11	-	12
World Market	80 000	100	-	7

(1) at Manufacturing Selling Price
Source: HIMA, LEK

Table 2: Medical device market by segment in 1993

	EU (Mio ECU)	% Total	US (Mio ECU)	Japan (Mio ECU)	Growth 94 1994
In Vitro Diagnostic	4 430	18	4 360	2 680	5
Disposable devices	4 090	17	7 090	1 460	5
Ophthalmic and optical devices	3 120	13	3 420	1 100	2
Electromedical/Mechanical devices	2 880	12	4 780	2 640	9
Imaging	2 350	10	3 450	2 610	1
Dental devices	1 780	7	1 110	1 050	9
Surgical Reusable Instruments	1 450	6	2 500	290	4
Non-active implantable devices	1 150	5	1 000	410	10
Aids for disabled persons	1 030	4	1 000	290	12
Anaesthetic/Respiratory devices	970	4	550	240	5
Hospital hardware	790	3	2 000	1 400	5
Active implantable devices	460	2	940	330	8
Total	24 500	100	32 200	14 500	6

Source: HIMA, LEK

of the German medical device industry as well as the market dynamics spurred by the reunification with the former Eastern Germany. In the UK the situation is less favourable to the EU industry with 66% of the market served by EU manufacturing. This can be attributed to the relatively high dependence on imports of the UK medical device industry in certain segments and its traditional links with the US (US imports represent 21% of the market). The figures for France are close to the EU average and show a strong position of the EU medical device production.

The competitive position of European manufacturing in the US market is weak with only 7% of the market. It reflects the overall low level of imports in the US in aggregate: in 1991, imports represented a mere 12.6% of the total market, a percentage which by 1993 had further decreased to 11.6%. EU manufacturers have also been affected by this development. The actual yearly growth rate of European exports to the US has slowed down significantly. Between 1991 and 1993, European exports to the US increased by only 6%, down from almost 15% in previous years. This seems mainly due to the increasingly fierce competition in the market following managed care reforms and difficulties in the product approval process governed by the FDA.

European medical devices represent 10% of the Japanese market. This low market share can be attributed to the strong national preference and an archaic distribution system. EU companies are not alone in experiencing these problems since US companies have found it equally hard to penetrate the Japanese market and only command 10% of the market. Japan has taken measures to open up public procurement of medical devices to foreign manufacturers and is also taking active steps towards global harmonisation of regulatory standards. These efforts combined with an active promotion policy of the Japanese government (low interest loans are granted, etc.) should lead to increasing business opportunities for foreign companies. European exports to Japan grew by 17% between 1991 and 1993.

While the markets of Western Europe and North America have been affected by government attempts to curb healthcare expenditure, strong potential for future growth in the medical device market lies in Asia and Latin America. Both markets are projected to become the target markets of the next decade due to sustained economic growth and the development of hospital infrastructure. Medical equipment imports into these countries are increasing at annual growth rates of 10 to 30% depending on the country (source: "The Medical and Healthcare Marketplace Guide", MLR, 1994). Japanese, European and American actors have different degrees of involvement in these emerging markets.

As demonstrated in Table 3, US and Japanese firms have acquired a strong position in Taiwan, Korea and China as in other Asian and South-American countries while the Europeans are lagging behind. In fact, the market share of the US and Japanese production on these markets is twice higher than the EU one. Geographic and cultural proximity have helped Japanese firms to play an important role in the Asian region and US companies have put a high priority on their presence in these countries. European companies however, do not seem to enjoy the same reputation as their American counterparts in these regions (source: LEK interviews). It was suggested during interviews that the European Commission could help to improve the image of the European medical

Table 3: Market share of EU/US/Japan production in selected countries, 1993

	Market Size (Mio ECU)	Market Growth	Market Shares EU Production	US Production	Japan Production
Germany	8 125	9	82	12	5
France	4 220	6	73	17	6
UK	2 220	4	66	21	10
Europe	24 500	6	76	17	5
US	32 200	7	7	87	3
Japan	14 500	6	10	10	73
Taiwan	410	18	17	28	26
Korea	624	20	14	28	21
China	641	20	10	25	21

Source: HIMA, LEK

Table 4: Competitiveness of the European production by segment in 1993

(Millions of ECU)	European Production	US Production	Japanese Production	Total Rate (%)	Growth	RMS (1)
Dental	2 231	1 295	910	4 436	9	1.7
Anaesthetic	1 029	680	156	1 865	5	1.5
Imaging	3 779	3 085	3 048	9 912	1	1.2
Ophtalmic	3 378	3 100	1 120	7 598	2	1.1
Aids for disabled	1 031	1 130	276	2 437	12	0.9
Non active Implant	966	1 466	197	2 629	10	0.7
Surgical instruments	1 608	2 563	112	4 283	4	0.6
Electromedical	3 431	5 386	2 853	11 670	9	0.6
In Vitro Diagnostic	3 690	5 900	2 495	12 085	5	0.6
Disposable	3 445	8 096	847	12 388	5	0.4
Hospital hardware	911	2 103	1 439	4 453	5	0.4
Active Implantable	460	1 031	243	1 734	8	0.4
Total	25 959	35 835	13 696	75 490	6	0.7

(1) RMS= Relative Market Share - European production divided by US production
Source: HIMA, LEK

devices in these countries. This is particularly important considering the fact that emerging markets are bound to become increasingly attractive in the years to come, while traditional markets will certainly experience lower growth due to cost containment policies.

Position by segment

To assess the European medical device industry position by segment, we have looked at the production of European industry in each segment and compared it with the US production. Table 4 shows the position of the EU industry in each of the twelve segments.

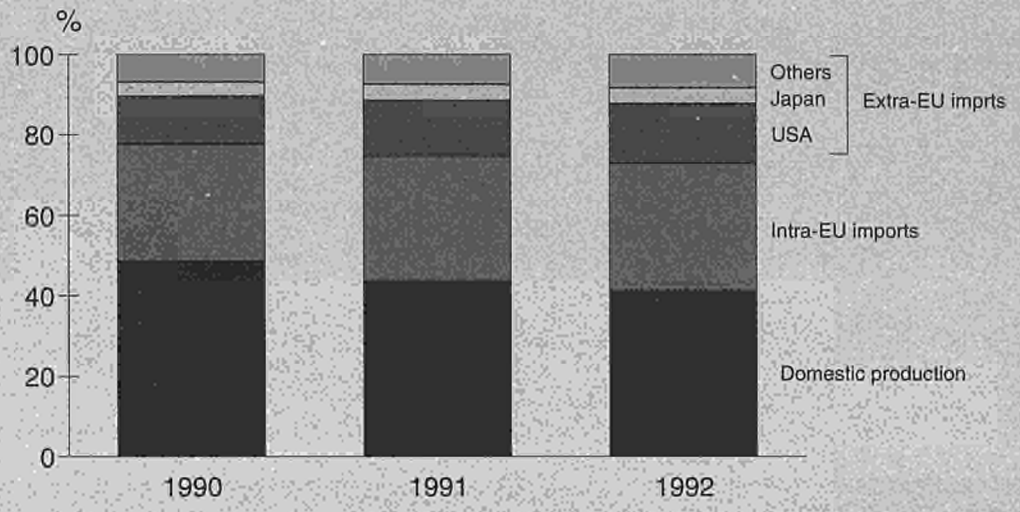
From Table 4, one can divide the twelve device segments in three main groups according to their relative market share.

- Group 1 includes Dental, Anaesthetics, Imaging and Ophthalmic. These four segments all have a relative market share above 1: these are the fields in which the EU industry has a strong position and is quite competitive on a worldwide scale.
- Group 2 including Aids for Disabled, Surgical Instruments, Non Active Implantable, Electro-medical and In Vitro Diagnostics where the relative market share of EU production is between 0.5 and 1. These are segments where the EU industry (products manufactured in the EU) comes closely behind the US industry. There are EU manufacturers operating in these segments with good competitive position but they are overall dominated by their US counterparts.
- Group 3 includes Hospital Hardware, Disposable and Active Implantable where the relative market share of EU production is below 0.5. These are segments where the EU industry is lagging far behind the US and where the competitiveness of the EU industry is most endangered.

Industrial competitiveness of an industry is just a question of how competitive its firms are. If we go further in the segment analysis, we realise that the strengths and weaknesses of the EU industry are very much correlated with the presence or absence in these segments of competitive European firms. A significant number of these firms are from German origin which is not surprising considering that German production represents 42% of the total EU medical device production, more than the sum of French, Italian, British and Dutch productions together.

In segments where the EU remains at the leading competitive edge (Group 1), Germany often has more than one medium or large manufacturer (e.g. Rodenstock and Carl Zeiss in the optical sector), while high levels of production in other EU countries are mainly generated by one large manufacturer. Philips (imaging) in the Netherlands, Essilor (optical) in France, or Gambro (anaesthetic-respiratory) in Sweden serve as good examples. The strong position of Germany will be

Figure 1: EU medical device market evolution (1)



(1) Domestic production is defined as the production of each country. Other countries include EFTA countries - EU includes 12 countries only
Source: Signis, LEK

supported by at least one other major EU producer. Segments in this group are R&D intensive (in particular Imaging).

In Group 2, one of the following two scenarios can in general be observed. In the first scenario, German production is relatively weak (such as in the non-active implantable devices segment). When this is the case, even if other European companies have comparably high levels of production (as France in the case of non-active implantable devices), their output is not enough to compensate for the weak German position. In the second scenario, German output may be strong (as is the case in the surgical reusable instruments or electromedical sectors, where Germany has a significant number of large manufacturers), but no other EU country generates a significant level of output. In this Group, we find segments with high level of R&D such as in Vitro Diagnostics, Electromedical equipment and Non active implantable devices.

In the segments where EU production is poor (< 0.5), we mainly find segments with relatively lower R&D levels such as disposable and hospital hardware. These segments are not only dominated by large US based companies pursuing a global strategy (such as Baxter, Johnson & Johnson, Abbot, Becton Dickinson) but also see the emergence of products from low wage countries. In addition, EU production is particularly weak in active implantable, where neither German nor other European manufacturers have a significant market position. The sale of Siemens-Pacesetter to St Jude in 1994 seems to be the final confirmation of US dominance in that particular segment.

CHALLENGES FACING THE EU MEDICAL DEVICE INDUSTRY

Human resources

Comparatively high labour costs have affected the EU manufacturing industry as a whole and have pushed many companies to delocalise part of their production in low wage countries. Industry sectors with a low technological content or low value added have been particularly under threat. However, the EU medical device industry, because of its high value added content, has been less threatened by these high labour costs. Nevertheless, there are some lower value added areas of the medical device industry where the EU has been losing ground vis-à-vis low wage countries. This is what has been happening in the gauze industry for instance where important productivity gains in the European plants, mainly achieved through automation, have not been able to compensate for the huge difference in wages with low labour cost countries (according to UNAMEC, wages in China can be as low as 1/50th of EU average). Although highly automated, the EU industry is not cost competitive compared to hand made gauze from these low wage countries. Similarly, at the lower end of the surgical reusable instruments range, low-cost suppliers (in particular India and Pakistan) threaten the competitive position of EU manufacturers.

However, the EU has significant potential for improving its competitiveness by increasing the value added and productivity of its workforce and thus producing better goods and services. In the EU medical and surgical equipment and orthopaedic appliances sector (covered by NACE 372) for instance, the value added by employee increased in real terms by a compounded annual growth rate of 3.5% over the period 1985-1992. Over the period 1989-1992, this productivity increase reached a compounded annual growth rate of 5% (source: Panorama 1994 of EU Industry).

Importance of R&D in the medical device

The medical device industry is very R&D intensive. Providers of healthcare have been traditionally looking for the best available techniques to improve public health. State-of-the-art technology has been often perceived as a key buying decision factor by hospitals as well as an important differentiation factor by medical device firms. Accordingly, manufacturers have invested heavily in R&D. The level of R&D expenditures reflects the high rate of innovation as well as the shortening product life cycle.

As technology plays such an important role in the purchasing decision of many medical devices, becoming a technology leader is perceived as a clear competitive advantage in this sector. By comparing medical device R&D spending as a percent of sales in the EU, the US and Japan, it is possible to make the following comments: with on average 5% of sales spent on R&D, against 6.7% for the US and 6% for Japan (source: "R&D Scoreboard", Business Week, June 27, 1994), the EU industry spent on average in 1993 25% less than its US competitors and 17% less than its Japanese competitors on R&D investments. This can be partly explained by R&D funding issues.

The funding of new products development is a major issue for all medical device companies. Because of the large investments it involves, the long pay back periods, and the

Table 5: Healthcare expenditures in the EU, US and Japan

Country	Population (Million)	Health Exp. (Billion ECU)	Health Exp. per capita (ECU)	% GDP 1970	% GDP 1993	Real Growth (%) 1985-92
Austria	7.9	14	1 742	5.9	8.4	3.3
Belgium	10	15	1 520	4.2	7.9	3.5
Denmark	5.2	8	1 541	5.9	6.5	2
Finland	5	7	1 467	N/A	-9.4	4.5
France	57.4	111	1 938	5.9	10	5
Germany	80.6	132	1 635	6	8.5	2.7
Greece	10.3	4	364	3.7	5.2	2.7
Ireland	3.6	3	810	5.1	7	3
Italy	56.8	70	1 224	5.2	8.3	4.2
Luxembourg	0.4	1	1 733	4.7	7.2	1.7
Nerherlands	15.2	23	1 534	5.9	8.5	4.1
Portugal	9.9	5	501	3	7.3	4.4
Spain	39.1	27	684	3.6	6.7	6.1
Sweden	8.7	15	1 735	N/A	-9.2	1.8
UK	58	53	917	4.6	6.5	3.3
EC (15)	368	487	1 325	4.9	8.3	3.7
Japan	125	212	1 694	4.2	6.6	4.9 (1)
US	256	740	2 892	7.4	13.4	6.1 (1)

(1) for 1985-1990 - Source OECD
Source: HIMA, LEK

inherent risks, firms have often to look outside their company for additional resources to finance their development and share the risks. This is particularly true at a start-up phase but can also be the case at a later stage of development of the company. The availability of capital, the attitude of the financial community towards capital venture and the benefits sharing practices in the US have attracted many European scientists. In the microbiology and immunology fields for instance, although European scientists, and in particular UK and French ones, are at the forefront of research, 70% of the R&D in these sectors is done in the US due to the financing advantages.

Cost containment policies

Another major challenge for the medical device companies are the cost containment policies that have started to be implemented in different EU countries. These measures address the issue of ever rising healthcare expenditures. Healthcare expenditures have risen steadily over the period 1985-1992 in the EU countries. Real compounded annual growth rates over the period range from 1.7% for Luxembourg to 6.1% for Spain as shown in Table 5 below. More striking is the evolution of healthcare expenditures as a % of GDP from 1970 to 1993. Over the period, they have increased from 4.9% to 8.3% on average in the EU countries. The growth has been even stronger in the US with the percentage going from 7.4 to 13.4%.

The surge in healthcare spending can be explained by a number of factors. The most important ones appear to be technology and demographics, but other factors such as blurred incentives in healthcare systems or legal claims (in the US in particular) also have played a significant role. Although their relative impact varies from country to country, they appear to be common to virtually all major markets.

As a response to the rising level of healthcare expenditure, EU states have adopted a series of cost containment measures. Some countries have introduced policies which are expected to lead indirectly to a reduction in healthcare spending such as improved cost measurement with a wider use of so-called patient classification systems which group patients into case types (such as Diagnosis-Related Groups, Patient Management Categories and Disease Staging). Under this new scheme, sickness funds will reimburse complete medical treatments rather than particular products and services. Payment will be at a flat rate, regardless of actual cost. Reimbursement rates for some 200 DRG and specified operations, covering about 30% of hospital spending have been published by the German Health Ministry. The sickness funds are encouraged to negotiate additional items themselves. Another indirect measure mentioned is the encouragement of competition between providers of healthcare services.

Direct measures have also been introduced in some European countries. Many European countries have agreed on limits for expenditure, usually stated in advance in monetary terms. In most countries, the greatest impact of budget control has been felt in hospitals. This has resulted in growing pressures to reduce the length of stay or to rationalise the existing hospital base. Moreover, governments have encouraged the development of alternatives to hospital care such as day care or home care. This development is widely expected to go hand in hand with a gradual decrease in the number of acute hospital beds. Controls on pharmaceutical expenditures has increasingly become the focus of cost control measures initiated by governments. In most cases, these programmes aim at either controlling demand for products or their price. Other governments have introduced measures to try to influence the authorising behaviour of doctors. This may be achieved for example by changing the way doctors are paid, thus modifying their incentives for carrying out certain treatments.

Finally, several other measures have been used: cost sharing systems for instance which are supposed to reduce demand through balancing the burden of payment between insurers, national healthcare and patients; or systems limiting the supply of expensive medical equipment, e.g. with the help of health maps in Belgium and in France; or systems encouraging the creation of an internal market, where authorities purchase hospital services from public and private hospitals on the basis of cost and quality.

All these measures have had a differentiated albeit significant impact on medical devices and will have to cope with by medical devices manufacturers.

GLOBALISATION OF MARKETS

Another important challenge facing the EU medical device industry is market globalisation. Most medical devices are

designed to be used for specific patient conditions; as a consequence, most medical device segments are small at a national level and need to be addressed at a world-wide level if the company wants to create scale to amortise heavy R&D costs and to allow the use of advanced production technology. Exports play therefore a major role for most medical device companies. In that respect, standardisation as well as market access procedures are important issues. This market globalisation can be characterised by increasing trade flows but also by increased direct investments in the medical device industry.

Importance of exports

Exports represent a considerable share of overall production in the EU countries, especially in Germany or the UK (respectively more than 50% and 60% of total production are exported outside Germany or the UK) as well as in France or Italy. If we compare these levels of export (average of 54% for these 4 EU countries) with the level in the US and Japan (respectively 23% and 27%), we realise that EU companies export outside of their country of origin on average twice as much as their US and Japanese competitors (It is interesting to note that should intra-EU export not be taken into consideration, the level of export of EU companies would then come roughly in line with the one of their US and Japanese competitors. This is of importance as exports are certainly more difficult for a small structure than for a larger one. EU manufacturers, in their quest for growth are confronted much earlier than their US competitors by the problem of exports. This is simply linked to the size of the national market. For small EU firms, this entails a number of problems that US competitors will have to confront much later in their development and at a stage where they will have the resources (not only in terms of finance but also of personnel, skills, brand name) to cope more effectively with these problems. The recent Medical Devices Directives issued by the Commission, as a significant contribution to the completion of the internal market, could prove beneficial to the EU companies in that respect.

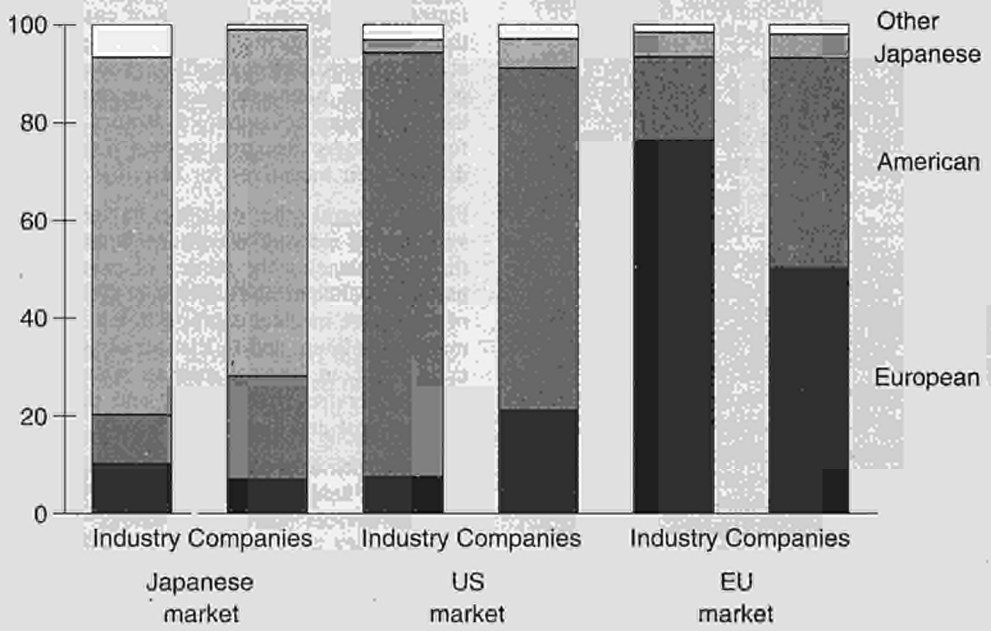
Market access to the EU, USA and Japan

The main hurdle to market a medical device in the US are the FDA review times which apply equally to US and foreign manufacturers. When compared to review times in the US, review times in Europe (based on experience to date) appear much lower. In 1994, review time for a high risk device reached 25-30 months in the US compared to 6-9 months in Europe. For lower risks devices, review time was 6-7 months as opposed to around 3 months in Europe for a similar devices (source: HIMA, "The European Regulatory System for Medical Devices", February 1995).

This is the result of a completely different approach to medical device regulation: European rely on self-certification for low risk devices and on the use of third-party bodies (the Notified Bodies) for the review and approval of higher risk devices. The US on the contrary, have a much heavier and centralised approach by the FDA which controls alone the approval process for all devices. Under the European medical device directives, there technically will not be any (or only a very small number of) government officials approving medical devices, because this function is the responsibility of third-party Notified Bodies. The role of government officials in Europe who formerly approved medical devices will be to manage and oversee the new approval system, such as monitoring for problems and intervening when necessary. In the US, FDA (including Office of Device Evaluation) has nearly 1,500 government officials doing this job today (source: HIMA, "The European Regulatory System for Medical Devices", February 1995).

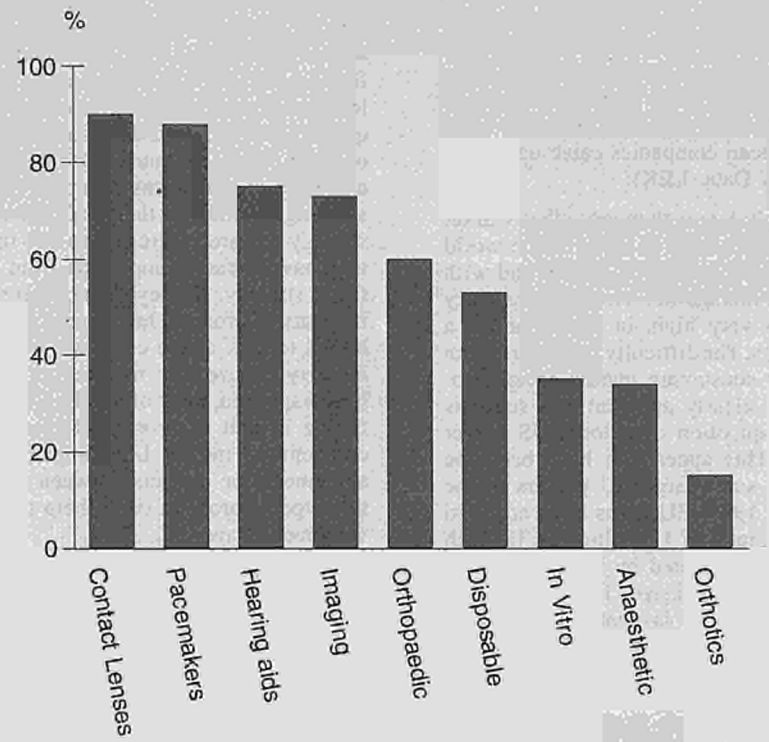
Access to the Japanese market appears to be easier than to the US from a regulatory point of view. Review times appear lower than in the US: 12-24 months for high risk devices and around 120 days for lower risks devices (source: "Medical Device Technology", September 1994). However, the standards for quality assurance of imported drugs and medical devices, Good Manufacturing Practice for Importers Regulations (GMPI) which came into force on 1 April 1994 in Japan, introduced new requirements for importers that may also affect foreign manufacturers. Importers are now responsible for testing the medical devices they import. If there is a bilateral good manufacturing practice (GMP) agreement between Japan and the exporting country, these tests are not required from the importers (in 1 April 1994, such agreements existed with Australia for all products and with Germany for sterile products only). Although an official agreement has not been signed by the US and Japan, FDA certification is recognised by the Japanese authorities and allows US manufacturers to avoid the GMPI measures. This is however not the case for European

Figure 2: Market shares by country of manufacture and by nationality of company in 1993



Source: HIMA, LEK

Figure 3: Concentration of medical device segments
World market share of the top 5 companies



Source; LEK analysis

certifications carried out by Notified Bodies which are not recognised yet. This could lead to a significant competitive disadvantage for European manufacturers in the Japanese market. The EU is discussing the possibility of a bilateral agreement with Japan to avoid any possible problems for importers of European products, but this is still at the negotiation stage.

Going through all these market access procedures is very time consuming for medical device manufacturers. There are discussions currently going on about harmonisation of these procedures, or at least mutual recognition of product testing and certification between the US, Japan and the EU. Closer co-operation in terms of global harmonisation between the EU and its partners on regulatory matters such as standardisation and conformity requirements would benefit both manufacturers and consumers. Although still at a preliminary stage, such discussions have led to high expectations in the market place and have to be carried forward.

Trade flows analysis

Market globalisation can be characterised by increasing trade flows: as can be seen in the Figure 1 below, the proportion of domestic production, defined as the production of each European country for its domestic market, has decreased over the period from 48% to 41%. This is a significant reduction and reflects a globalisation of the medical device market.

The level of intra-EU imports experienced an increase from 29% to 32% between 1990 and 1992. This rise is the result of strong efforts from European companies to gain market shares in their neighbouring EU countries. These efforts were encouraged by the technical standardisation taking place within the EU and the breakdowns of barriers inside the internal market. It is expected that this trend towards a coherent single market will continue with the implementation of the EU harmonisation directives.

Extra-EU imports as a percentage of total market have risen from 23% in 1990 to 27% in 1992. Imports from the United States account for the largest part of this increase, having grown over the period from 12 to around 15% of the total market. This trend has continued in 1993 and it is estimated that American exports to Europe (source: Signis) represented some 62% of European extra-EU imports in 1993 (from 1990 to 1993, they increased at a compound annual rate of 14.5%). Continuous pressures in the US market towards managed care and increasing cost pressures are likely to reinforce the aggressive attitude of American companies towards their export markets. Imports from East Asian newly industrialised countries have equally increased, mainly in low value added segments such as dressings and low-end surgical reusable instruments. These imports have put some European companies operating in these segments in a difficult situation. The EU medical device industry showed a trade surplus of 1.5 Billion ECU in 1993 (source: LEK). In the same year, the US trade balance in medical devices had a trade surplus of 3.6 Billion ECU while the Japanese trade balance in medical devices showed a trade deficit of 0.8 Billion ECU.

Level of direct investment

The Figure 2 below shows for the EU, US and Japan, a comparison between market shares by country of manufacture and market shares by nationality of company in 1993. More than 75% of the European medical device market was served by European production in 1993. However 26% of the EU domestic production was controlled by US companies (source: HIMA). If we include US imports into Europe, which represented 17% of the EU market, we had 43% of the total EU medical device market which was controlled by US companies in 1993. This can be explained by two factors.

First of all, in order to better penetrate the EU market, US firms have set up manufacturing sites in Europe. This trend is likely to continue, as the difficulties with FDA approval

in the US lead American firms to move R&D and/or production facilities to Europe (source: The Wilkerson Group, LEK interviews). Secondly, US companies have made numerous acquisitions in Europe. They have acquired small innovative firms to gain access to new technologies but much of the acquisition going on currently and expected in the future is for gaining market share, extending product range and consolidation. In that case, market entry has been made through the purchase of strong domestic companies. Between 1991 and 1995, 48 formerly European companies came under US ownership (source: Securities Data, LEK).

The US market is considerably larger than any other market in the world, representing alone close to 40% of the world market. A European company in search of growth and with high ambitions cannot ignore this market. However the entry ticket into the US market is very high, in particular for a small to medium sized company. The difficulty for an European SME to go through the time consuming market access procedures from its EU base is clearly apparent and suggests that an entry strategy by acquisition of a local US player would be more successful. This appears to have been the successful entry strategy for some large EU players in the US. Between 1990 and June 1995, EU firms have acquired 18 companies in the US for a total of 1.3 Billion ECU. Such a strategy can however only be pursued by large players as US acquisitions are particularly expensive. This is linked to the size of US companies which are in general (at least in their established stage) much larger than their European counterparts, but also to the premium that one has to pay to have access to the largest and until recently one of the fastest growing market in the world. As a result, if we look at the average size of the take-over deals made by EU firms in the US versus the take-overs deals made in Europe by US companies, we see substantial differences. Though far smaller in number, the average value of take-overs by EU firms is more than six times higher (72.3 Mio. ECU versus 11.3 Mio. ECU (source: Securities Data co., LEK analysis - From 1991 to 1995, US companies have acquired 48 EU companies for a total of 540 Mio ECU). As a result, EU firms controlled 21% of the US medical device market in 1993. Over the period 1990 - June 1995, EU companies acquired only two companies in Japan while Japanese companies acquired four companies in Europe (source: Securities Data Company). These figures tend to confirm the Japanese aversion to mergers and acquisitions.

STRATEGIC TRENDS

Concentration

An important trend in the medical device industry is concentration. Due to the very high R&D costs, important improvements in process automation and market globalisation trends, there are clear advantages linked to size. Concentration has been a constant of the medical device industry over the last 10 years. This concentration has been achieved in most of the cases through mergers and acquisitions. The Figure 3 below shows the concentration level in some key segments.

The evolution of the medical device industry is reinforcing the position of the large players: the combined market share of the top 30 European and American companies has increased from 49% in 1988 to 56% in 1992. A strong size advantage remains with the US companies which represented in 1992 35% of the world market versus 21% for the EU firms.

Identified strategies in the medical device industry

Three generic strategies have been identified in the medical device field: focus strategy, cost leadership strategy and differentiation strategy. There are some small firms focused on a niche segment still highly profitable in the medical device sector. Similarly, at the other end of the spectrum, we can find large multi-national companies following either a cost leadership strategy or a differentiation strategy which are also quite profitable. And then, in the middle, they are a number of firms which we could call "stuck in the middle". The best examples of such firms would be SMEs who have developed a strong position in their national market following a focus strategy and are seeking to go into the exports markets. There they have to face competition from local players with strong focus strategy. If they do not have the necessary strengths in terms of product, human and financial resources, they are bound to fail. These cases are legion in the medical device industry, spurred by markets globalisation. What seems to have happened, most of the time, in the EU, is that companies falling in that category, have tended to sell off to foreign competitors, mostly US companies. Fostering co-operation agreements or mergers between EU SMEs confronted with this type of problem could help them going through this development stage.

CONCLUSION

The European medical device industry has indeniably a number of strengths: a large European market (31% of the world market for medical devices), Medical Schools which produce among the finest researchers in the world, companies which are world-wide leaders in a number of segments. This has resulted in 76% of the European market served by EC produced medical devices in 1993.

However new challenges facing the medical industry and in particular cost containment policies and market globalisation have made apparent some weaknesses: comparatively high labour costs, lower R&D expenditures than US and Japan, weak presence in the fastest growing markets (South-East Asia and South-America), insufficient consolidation of European companies.

To overcome these challenges and retain a competitive position world-wide will require significant efforts and investments from the European medical device industry. A market still growing at 7% per annum on a world-wide scale, and offering a high number of profitable opportunities should make all these efforts worthwhile.

Written by: The LEK Partnership

Reviews and Forecasts: Industrial Sectors

Overview

NACE (Revision 1) 10, 11, 12, 23, 40.1, 40.2

Slightly revised figures for 1993 show that gross inland energy consumption in the EU-12 totalled just over 1.2 billion tonnes of oil equivalent (toe), a level of consumption 2% above the previous year. The EU-12 remained 50% self-sufficient in energy supplies, mainly due to North Sea production of oil and gas, gas production in the Netherlands, and coal production in the United Kingdom, Germany and Spain.

The primary energy demand mix is still dominated by oil, which accounts for almost 45% of gross inland primary energy demand. However, natural gas consumption is increasing fast, and is now approaching 20% of demand, ahead of coal and other solid fuels, whose share of energy demand is decreasing and becoming increasingly concentrated in the power generation sector.

In relation to energy policy, efforts by the European Commission to introduce measures to promote the Internal Energy Market have been important in recent years. Of particular relevance to the electricity and gas sectors, proposed measures would increase competition, contribute to market integration within the EU, and enhance the international competitiveness of EU industry. After years of debate, a major breakthrough was achieved in mid-1996, with the agreement of Member States to a draft Directive opening up the electricity sector to increased competition.

INDUSTRY PROFILE

Description of the sector

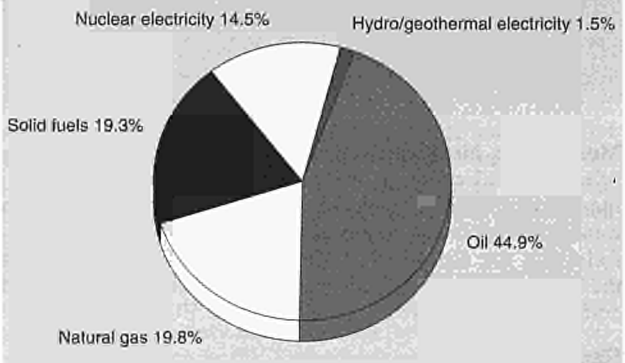
The activities covered by the energy industry in the EU are classified according to the following standard NACE classifications, revised since the last edition of Panorama: mining of coal and lignite; extraction of peat (NACE 10); extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying (NACE 11); mining of uranium and thorium ores (NACE 12); manufacture of coke, refined petroleum products and nuclear fuel (NACE 23); production and distribution of electricity (NACE 40.1); and the manufacture of gas and distribution of gaseous fuels through mains (NACE 40.2). Each of these activities is dealt with in the following specific chapters:

- Solid fuels (NACE 10);
- Exploration and production of crude oil and natural gas (NACE 11);
- Nuclear fuels (NACE 12 and 23.3);
- Refining and distribution of oil products (NACE 23.2);
- Electricity generation and distribution (NACE 40.1);
- Transmission and distribution of natural gas (NACE 40.2).

In addition, a chapter on the renewable energy sector is given. This sector has no specific NACE classification. Renewable energy includes hydro-electric power, wind energy, biomass, tidal energy, geothermal energy and solar energy.

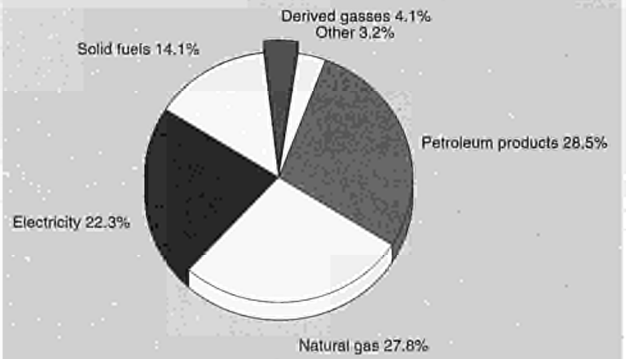
The following conventions and definitions are used. Energy consumption is referred to at two different levels, primary and final. Primary energy consumption refers to the sum of all energies either used by consumers or used as an input to the production of other energy forms. For example, the production of electricity requires the input of such fuels as coal, natural gas and heavy fuel oil. These are included in primary energy consumption, whilst the electricity produced from these inputs is not. However, electricity produced from nuclear, hydro or renewable sources is included in primary energy consumption, since, in these cases, there is no process of transformation from another energy source. Gross inland energy consumption refers to primary consumption of fuels for inland uses, i.e. excluding marine and aviation transport fuels. Final energy consumption refers to the sum of all energy used by consumers, including electricity produced from other fuels. It generally excludes transformation and distribution losses.

Figure 1: Energy
Fuel shares of primary energy demand, 1994



Source: DRI Europe

Figure 2: Energy
Fuel shares of final industrial energy demand, 1994



Source: DRI Europe

Table 1: Energy
Main indicators in volume (1)

(million toe) (2)	1985	1986	1987	1988	1989	1990	1991	1992	1993
Final energy consumption	676.2	689.1	703.1	707.3	712.8	724.4	786.3	783.5	813.4
Gross inland consumption	1 029.4	1 043.8	1 062.6	1 077.1	1 098.6	1 114.4	1 212.6	1 205.5	1 229.2
Net imports	456.8	479.5	489.6	511.4	552.3	573.2	617.3	630.1	600.8
Primary production	589.0	600.5	600.8	590.9	575.6	572.8	628.5	622.4	657.4
Employment (thousands) (3)	1 915	1 870	1 797	N/A	N/A	N/A	N/A	N/A	N/A

(1) Excluding Portugal. Including former East Germany from 1991 onwards.
(2) toe: tonnes of oil equivalent.
(3) Employment figures are for energy and water.
Source: Eurostat

Most of the historical statistics included in these chapters refer to the 12 countries that were members of the EU up to the end of 1994. In some cases, comparative series have been established for the 15 countries which are now Member States, following the accession of Austria, Finland and Sweden at the beginning of 1995. In each case, statistical series and comments in the text are labelled either EU-12 or EU-15.

Recent trends

In the eight years between 1985 and 1993, EU-12 gross inland primary energy consumption increased by 19%, an average annual increase of 2.2%. Over the same period, primary energy production in the EU-12 also increased, but by only 11.6%, with regular increases in oil and gas production partially offset by a decline in solid fuels production, as high-cost indigenous production was phased down. Thus, there has been an overall increase of 31.5% in net imports of energy into the EU-12 between 1985 and 1993.

The mix of fuel consumption has also evolved, with natural gas and nuclear electricity substantially increasing their share at the expense of solid fuels and, to some extent, oil. The use of oil is becoming increasingly concentrated in the transport sector, which has shown growth, but this has been offset by its loss of share in the other sectors to gas and electricity. The latest figures for 1994 show that oil represented almost 45% of total gross inland primary energy consumption, with solid fuels, natural gas and primary electricity (mainly nuclear power and hydro-electric power) each contributing 20% or less. Renewable energy contributed 1.5% of primary consumption.

Over the whole of the EU-12, energy intensity, defined as gross inland energy consumption per unit of GDP, has declined over the past decade. This can be explained by the maturity of EU energy markets, where growth has been primarily in sectors with low energy intensity, while energy intensive industry has tended to decline in relative importance. The main exception to this trend was in 1991 following German reunification, when the boost in German energy intensity was caused by the predominance of energy intensive industry in the former East Germany. Since 1991, industrial restructuring in the new Lander has caused energy intensity in Germany to resume its downward trend.

Generally speaking, the countries which have shown the smallest decreases (or even increases) in energy intensity are those with rapidly growing industrial sectors (e.g. Portugal and Spain). Those countries showing significant decreases in energy intensity are those which have undergone extensive industrial restructuring (e.g. Belgium and Germany).

International comparison

In 1993, gross inland primary energy consumption in the EU-12 was just over 1.2 billion toe, approximately the same as in 1992. This level of consumption represents just over 15% of total world primary energy consumption, making the EU one of the most important energy markets in the world, after North America and Asia. The USA is still the largest energy consuming country in the world, accounting for about 25% of total world primary energy consumption. Asia is the fastest growing area of energy demand in the world, including the relatively mature energy economy of Japan, but also the high-growth economies of China, India and the Southeast Asian newly industrialising countries. Asia now represents over 27% of world energy demand, but has substantial potential for future growth since annual energy consumption per capita, at 0.8 toe, lags well behind Western Europe (3.9 toe) and North America (7.9 toe), and the economies of the region, with the exception of Japan, are in a long-term growth cycle.

Foreign trade

The EU is a significant net importer of energy. Net imports were over 800 million toe in 1993, or 73% of gross inland energy consumption.

Table 2: Energy
Primary production in volume by fuel type (1)

(thousand toe) (2)	1985	1986	1987	1988	1989	1990	1991	1992	1993
Hard coal	133 627	139 496	133 938	129 460	125 839	118 828	115 777	110 090	95 685
Lignite and peat	35 634	33 854	32 404	32 397	34 303	33 854	70 593	62 581	57 633
Crude oil and feedstocks	144 765	145 697	144 082	136 319	113 260	113 899	114 582	117 733	123 371
Petroleum products	5 860	6 239	5 725	4 591	4 213	2 059	2 170	2 375	2 458
Natural gas	127 117	124 565	129 101	120 203	125 296	129 791	144 534	145 556	156 763
Other fuels	26 032	1 660	2 169	26 142	26 564	26 450	27 962	28 978	29 083
Nuclear/geothermal heat	125 711	132 888	138 583	148 768	158 883	159 170	163 929	168 702	178 890
Electrical energy	14 581	14 246	15 189	16 532	11 336	12 484	13 788	13 911	14 246
Total	613327	598645	601191	614412	599694	596535	653335	649926	658129

(1) Including former East Germany from 1991 onwards.
(2) toe: tonnes of oil equivalent.
Source: Eurostat

Imports of oil, natural gas and coal have all risen over the past ten years as rising demand has outstripped production growth. The Middle East and Norway have been the principal sources of crude oil imports, Algeria, Norway and the former USSR are the most important natural gas suppliers from outside the EU, while coal imports are dominated by supplies from the USA, Australia and South Africa.

MARKET FORCES

Demand

Final energy demand by sector

The principal sectors of final energy demand are industry, transport, the residential sector and the commercial sector, (the power generation sector, whose fuel use is included in gross inland primary energy demand is a transformation sector, whose output is included in final energy demand). For the purposes of the statistics shown in this publication, the residential and commercial sectors are combined together.

All three main end-use sectors have shown growth in energy demand between 1988 and 1993. However, the sectoral shares of demand in the total have undergone some modification. While the residential/commercial sector has remained stable at around 40% of the total, the share of industry has declined as energy intensive industry has been restructured and growth has been concentrated in light industry. The transport sector has increased its share, in line with the increase in personal mobility allied with rising living standards, and increased freight transport by truck with the development of intra-EU trade. The transport sector has now overtaken industry to become the second most important end-use sector for energy at over 30% of final energy demand.

Energy consumption in the residential and commercial sector is dominated by heating applications for which electricity, natural gas and petroleum products are the main competitors. Other energy uses open to inter-fuel competition are cooking, and provision of hot water, while lighting and appliances are almost exclusively powered by electricity. Energy demand growth in the sector is principally due to increased electricity appliance penetration and usage, including multiple TV and video ownership and a rapid penetration of home computing equipment.

There are many different uses for energy in industry, from space-heating and lighting, steam-raising in industrial boilers, drying and many specific process applications. In the latter category, there is a shift towards electricity use as many new industrial processes are exclusively powered by electricity. The other fuels compete for more traditional steam-raising, heating and process uses, with natural gas gaining market share at the expense of coal and oil.

Transport is dominated by oil, since, as yet, no alternative fuels have made a significant penetration on the market. Consumer choice is thus focused almost exclusively on gasoline's and diesel fuels refined from oil. In the long term, alternative fuelled vehicles, using electricity or compressed natural gas are likely to become more available, but are unlikely to make significant inroads into the dominant position held by oil.

Energy demand by fuel

Oil still accounts for almost 45% of Europe's energy requirements, a level which is little changed since 1985. Loss of markets for oil in the residential/commercial and industrial sectors, where natural gas and electricity have become more competitive, have been offset by continuing growth in the transport sector, where the opportunities for fuel substitution are extremely limited, as explained above.

Natural gas now represents almost 20% of EU energy demand, up from 17.5% in 1985. Although the development of natural gas has been extremely uneven across the EU, with resource-rich countries, such as the Netherlands and the United Kingdom, developing important gas markets much earlier than other EU countries, natural gas is now becoming a major componént of energy markets right across the EU. Portugal and Greece, the last countries to introduce natural gas, both have major plans to develop natural gas import and distribution infrastructure over the next few years to facilitate gas availability. Portugal will import gas from Algeria via the Euro-Maghreb pipeline which also will serve Spain, and another pipeline project is due to bring gas to Greece from Russia. In both cases, natural gas is expected to start flowing in significant quantities in 1997. Spain should show the biggest demand among the new gas-consuming countries, with a major effort to develop gas consumption being undertaken in conjunction with the completion of the EuroMaghreb pipeline from Algeria. The attractiveness of gas in the power generation sector means that the already developed markets in Northern Europe (Belgium/Luxembourg, France, Germany, the Netherlands and the United Kingdom) plus Italy will still see substantial future growth in demand for gas.

The share of nuclear and hydro-electricity in gross inland primary energy consumption has now reached almost 16%, following the extensive programme of development of nuclear power in France in the 1980s. France now exports electricity to its neighbouring countries. The current share enjoyed by

Table 3: Energy
Evolution of the energy intensity (1)

(1985=100)	1986	1987	1988	1989	1990	1991	1992	1993
EUR12 (2)	99	98	96	94	94	97	96	91
Belgique/België	102	101	98	95	94	97	97	93
Danmark	97	99	93	87	85	92	88	92
Deutschland (2)	97	96	94	90	87	98	93	90
Ellada	97	103	106	113	113	110	112	91
España	98	96	99	98	97	100	101	96
France	100	100	96	97	95	99	97	99
Ireland	103	103	100	94	87	87	80	76
Italia	99	107	99	100	99	99	99	98
Luxembourg	95	90	89	91	91	94	92	78
Nederland	102	104	100	97	91	93	91	94
Portugal	104	103	108	119	102	102	110	98
United Kingdom	98	94	90	89	88	92	91	91

(1) Energy intensity equals gross inland energy consumption divided by gross domestic product (GDP).
(2) Including former East Germany from 1991 onwards.
Source: Eurostat

Table 4: Energy
External trade in volume (1)

(million toe) (2)	1985	1986	1987	1988	1989	1990	1991	1992	1993
Exports	267.0	287.0	273.8	265.7	254.4	269.9	274.5	285.6	297.4
Imports	724.0	766.0	765.1	777.1	805.8	843.1	891.8	915.7	898.0
Net exports	-457.0	-479.0	-491.3	-511.4	-551.4	-573.2	-617.3	-630.1	-600.6

(1) Including former East Germany from 1991 onwards.
(2) toe: tonnes of oil equivalent.
Source: Eurostat

nuclear and hydro-electricity is not now expected to increase much further, since the nuclear programme in France has been considerably slowed down, and other countries are making different choices for their power sector development programmes. There are also very few opportunities left in the EU for the development of new large-scale hydro-electric power plants.

Coal and other solid fuels (lignite and peat) account for 19% of gross inland primary energy consumption, a share which has declined from 23% in 1985. The increasing availability of natural gas, and regulations to limit harmful emissions, have contributed to a large reduction in coal's share of energy use in the industrial sector. It is now primarily used as a fuel input to power generation, where large-scale plants have been able to fit emissions abatement equipment. Future coal demand is expected to be increasingly concentrated in this sector. However, even in this sector, in several countries in the EU, new electric power plants have tended to be fuelled by natural gas in the 1990s, both for environmental and economic reasons. Natural gas-fired plant achieves lower harmful airborne emissions than coal-fired plant, while combined-cycle gas turbine power plants have higher efficiency rates and shorter construction times than coal-fired power plants.

Supply and competition

The contribution of EU-12 indigenous energy production to energy demand has remained quite stable over the past 10 years at just over 50%, but there have been some modifications in the relative contribution of production of different forms of energy.

EU-12 oil production declined by almost 15% in the eight years between 1984 and 1993. The principal source of oil production in the EU is the United Kingdom sector of the North Sea, where output dropped in the late 1980s following loss of capacity after the Piper Alpha disaster, but production has now stabilised and is expected to regain an upward trend until the late 1990s, before declining after the year 2000. There has been a major effort in recent years to cut back on exploration, development and production costs of oil in the North Sea, and this has paid off by increasing the quantity of economically viable reserves and extending the life of fields currently in operation. While this trend has extended the period of peak production, a decline in the rate of new discoveries is expected to see overall output begin to phase down in the early years of the next century.

EU-12 natural gas production has increased by 23% in the eight years between 1985 and 1993, as more exploration and development investment has been focused on natural gas, particularly offshore in the Netherlands and the United Kingdom, in response to the anticipated higher growth opportunities for natural gas demand than for oil.

In contrast, EU-12 coal and solid fuel output has declined since 1985, by almost 9.5%. Although German reunification in 1991 added significant production of lignite to EU output of solid fuels, both hard coal and lignite production in the EU are in a long-term downward trend. Hard coal production has dropped by 28% since 1985, while lignite production has declined by 18% since 1991. The reasons for this are twofold. Firstly traditional markets for coal are declining as industry switches to natural gas and electricity for environmental reasons. Secondly, the major coal-producing regions of the EU (Germany, the United Kingdom, Spain and France) are all restructuring their coal industries, since production costs for European deep-mined coal are above world coal-price levels. Belgium ceased to mine hard coal in 1992. In addition, production subsidies, combined with guaranteed purchase contracts with the power sector, which have been the means to maintain indigenous production, are now beginning to be phased out, which will lead to cuts in production capacity.

Output from nuclear and hydro-electricity production has increased by 38% since 1985, mainly due to the contribution from new nuclear power stations in France.

Competition between fuels is well-established in the EU, especially for all the applications for which fuel substitution is technically possible. The only exceptions to this have been the special purchase arrangements for coal into the power sector in the main coal-producing countries, whose governments have in the past sponsored contracts guaranteeing a price and a quantity of coal. These arrangements are now being phased out, and fuel choice based on competitive and economic criteria should now be generalised.

The degree of competition between suppliers of a particular fuel varies considerably. In the oil markets, there is a high degree of competition throughout the EU, as each country is served by a sufficient number of refining and marketing com-

Table 5: Energy
Final energy consumption by sector (1)

(million toe) (2)	1988	Share (%)	1989	Share (%)	1990	Share (%)	1991	Share (%)	1992	Share (%)	1993	Share (%)
Industry	219.0	31.0	222.4	31.3	220.0	30.4	224.6	28.6	225.9	28.8	225.4	27.7
Transport	211.5	29.9	221.1	31.1	229.8	31.7	240.3	30.6	247.3	31.6	253.4	31.1
Residential	276.9	39.1	267.1	37.6	274.6	37.9	320.7	40.8	309.9	39.6	334.7	41.1
Total	707.4		710.6		724.4		785.6		783.1		813.5	

(1) Including former East Germany from 1991 onwards.
(2) toe: tonnes of oil equivalent.
Source : Eurostat

panies to ensure competition. In addition price transparency is the norm, and there are very few barriers to trade. The natural gas and electricity transmission and distribution industries have traditionally been the domain of state-owned public service companies with national or regional monopolies. However, this pattern is beginning to change. The United Kingdom has pioneered the opening up of these sectors to competition, with its programme of privatisation and liberalisation, while the European Commission is continuing to promote the introduction of a framework for more competition across the whole of the EU, via its proposals for the Internal Energy Market, (including measures to introduce Third Party Access (TPA) to the electricity and natural gas transmission grids and other supporting measures.) The coal supply industry is generally competitive for most sectors, with access to imported sources of coal becoming more available.

INDUSTRY STRUCTURE

Companies

There is a great diversity of companies involved in the energy production and distribution industries in the EU, including giant state-owned energy companies such as ENEL and ENI of Italy, and EdF and GdF of France; large privately-owned multinational energy companies headquartered in the EU, such as Royal Dutch/Shell (NL/UK), British Petroleum (UK), Elf (F), Total (F) or British Gas (UK); non-EU based multinationals with significant activities in the EU, such as Exxon or Texaco (USA); large privately-owned national energy companies such as RuhrGas (D), RWE (D), or National Power (UK); and a multitude of medium-sized or small companies involved in producing, transporting or selling all the forms of energy discussed here.

The major trend in industry structure over the past 10 years has been the ongoing reduction in the role of the state. Privatisation's of state ownership or shareholdings in energy companies have occurred in practically every country in the EU, and are still continuing. For example, in Italy it is expected that privatisation of the electricity utility ENEL will be launched by the end of 1996, and that ENI, the state oil and gas sector holding company encompassing AGIP, AGIP Petroli and SNAM, will be privatised shortly afterwards. In Spain, the new conservative government is expected to progressively reduce its remaining 25% stake in oil company Repsol, and its 55% stake in electric utility Endesa. In Portugal, the state will also sell off the electricity sector holding company EdP in phases beginning in 1996, while privatisation of oil company Petrogal has been underway since 1992. Only in France is it firmly expected that EdF, the electricity company, and GdF, the natural gas transmission and distribution company, will remain in state hands. In Greece, while there is still considerable opposition to privatisation, the government is expected to begin moves to sell off its holdings in the oil sector, before possibly proceeding later with privatisation of the electricity supply industry.

REGIONAL DISTRIBUTION

Energy demand in the EU is distributed according to the economic activity of each country or region. By and large, most regions have access to all the forms of energy supply available. Where this is not the case, there are projects being undertaken to ensure that new energy supplies will be made more widely available over the next few years. This is the case with respect to the development of new gas supply infrastructure to Portugal, Spain and Greece, and the connection of electricity networks in Greece and Ireland to those of other EU countries. The EU is particularly committed to European integration, and to ensure the access of remote areas to economic energy supplies.

Apart from the production of nuclear electricity, technically possible in many locations, the regional distribution of production of other energy forms depends on the geological resource endowment of each region. EU oil and gas production is concentrated in the United Kingdom and the Netherlands, with smaller endowments in Denmark, France, Germany and Italy. Coal production is mainly in the United Kingdom, Germany, Spain and France.

ENVIRONMENT

Environmental considerations have been at the forefront of energy policy-making for the past several years, both at EU level and within individual Member States.

For example, in the framework of the debate on global warming, the EU has committed itself to stabilising CO_2 emissions at the 1990 level by the year 2000, and has instituted a monitoring programme to assess the contributions of national programmes of Member States towards meeting this goal. The energy sector has a very important role to play in meeting this target, through improvements in energy efficiency and the promotion of fuels containing less carbon (such as natural gas or nuclear and hydro-electricity), at the expense of fuels with higher carbon content (such as coal or oil). Since the early 1990s, the EU has promoted the idea of a carbon/energy tax as a strategy to achieve greenhouse gas emission stabilisation. However, Member States have not been able to agree either on the principle or the definition of such a tax. In the

Table 6: Energy
Evolution of final industrial energy consumption by fuel type (1)

(thousand toe) (2)	1985	1986	1987	1988	1989	1990	1991	1992	1993
Hard coal and patent fuel	18 727	16 668	18 703	18 480	18 137	18 897	19 925	19 971	17 240
Coke	27 125	24 166	22 194	22 792	22 751	21 690	20 216	17 929	16 949
Lignite, peat and derived products (3)	2 236	1 903	1 898	1 936	2 303	2 199	4 233	3 661	3 387
Residual fueloil	29 031	29 095	25 833	25 949	24 257	22 986	23 846	22 767	21 350
Other petroleum products	21 350	22 916	24 753	23 750	46 901	21 375	44 777	42 667	43 354
Natural gas	51 090	50 340	56 602	57 662	61 296	63 210	62 137	69 769	70 386
Derived gases	11 974	10 809	11 099	10 664	11 112	9 342	9 527	8 411	8 340
Derived heat	2 288	2 286	2 792	2 336	2 641	2 648	2 727	1 983	1 583
Electrical energy	49 542	50 452	52 924	55 417	57 313	58 085	61 208	61 673	59 700
Total	213 363	208 635	216 798	218 986	246 711	220 432	248 596	248 831	242 289

(1) Including former East Germany from 1991 onwards.
(2) toe: tonnes of oil equivalent.
(3) Peat for Ireland.
Source : Eurostat

Table 7: Energy
Gross inland consumption by type of primary energy (1)

(thousand toe) (2)	1985	1988	1989	1990	1991	1992	1993
Hard coal (3)	200 662	192 997	195 560	199 062	203 003	192 452	177 373
Lignite and peat (4)	38 345	33 717	35 445	34 742	71 742	63 477	59 093
Crude oil (3)	462 591	488 072	491 758	497 626	525 270	525 277	526 666
Natural gas	184 742	192 580	201 453	207 589	231 683	231 683	243 035
Other fuels	26 239	26 336	26 891	26 707	28 160	29 194	29 314
Nuclear/geothermal heat	125 346	148 768	158 883	159 170	162 785	163 929	178 890
Electrical energy	15 754	18 297	13 035	13 902	14 425	14 425	15 588
Total	1 053 679	1 100 767	1 123 025	1 138 798	1 237 068	1 220 437	1 229 959

(1) Including former East Germany from 1991 onwards.
(2) toe: tonnes of oil equivalent.
(3) Including the balance of foreign trade and stock changes of derived products.
(4) Including the balance of foreign trade and stock changes of derived products. Peat for Ireland.
Source: Eurostat

absence of such agreement, some countries, such as Denmark and the Netherlands, (and also Finland, although this was prior to its membership of the EU) have introduced this type of tax.

The EU has also moved to limit other sources of harmful emissions, particularly SO_2. In 1988 the EU passed the Large Combustion Plant Directive (LCPD), which applied to all existing and new industrial plants above 50 MW (Megawatt) capacity. Its objective was for plants to achieve a phased reduction of SO_2 emissions from 1990 levels totalling 60% by 2003, by limiting the amount of SO_2 present in flue-gas emissions. To meet these targets, industrial plants and power generation facilities were effectively obliged to choose between burning lower sulphur fuels in their boilers, or to invest in flue-gas clean-up technology, such as FGD (flue gas desulphurisation). The LCPD will soon be due for review and revision.

Other EU initiatives to control emissions involve modifications to the specifications of petroleum products, and regulations to introduce technology to limit emissions of volatile organic compounds during the storage and distribution of petroleum products. These are discussed more fully in the chapter on refining and distribution of petroleum products. The most important recent initiative has been the tripartite EPEFEE (European Programme on Emissions, Fuels and European Technologies) joint European Commission / automotive industry / oil industry programme. This innovative programme was the first to involve all interested parties in the debate and analysis of effective routes towards the contribution of the transport sector towards improving air quality. The programme completed its work in 1995.

REGULATIONS

There is a well-developed regulatory framework covering the energy industry in the EU, both at the national level, and at the level of the EU. Regulations can have specific provisions for the energy industry covering such aspects as the environment, health and safety, competition and fiscality, as well as including the application of provisions affecting all industrial or business enterprises, such as planning regulations or the obligation to publish audited accounts.

Since the introduction of the Single Market within the EU, the thrust of EU policy towards the energy sector has included proposals for the development of a new regulatory framework which will assist development of a single energy market, known as the Internal Energy Market (IEM). There are two main aspects to this effort. On the one hand, the European Commission is enforcing existing EU legislation and treaty obligations, including the free trade provisions of the EEC treaty as well as competition and state aid provisions. On the other hand, a strategy involving regulatory changes and new EU legislation has been in progress since the late 1980s. A three-stage approach was originally proposed by the Commission. The first stage was largely completed by 1992. It involved the adoption of Directives on the transit of electricity and natural gas, and on price transparency in the gas and electricity sectors. Measures were also taken to harmonise technical rules and standards, and to define minimum levels for excise taxes and VAT on petroleum products.

Progress on the second and third stages were delayed for several years, as Member States and their energy companies debated the definitions and principles of more open competition in the electricity and gas sectors. Stage 2 of the Internal Energy Market programme was originally scheduled by the

Table 8: Energy
The ten largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Royal Dutch/Shell	NL/GBR	79 764	5 242	106.0
British petroleum	GBR	42 653	2 031	60.0
Elf Aquitaine	F	33 172	-825	89.5
Electricité de France	F	27 873	191	117.6
ENI	I	27 377	1 675	91.5
RWE	D	23 934	479	118.0
Total	F	20 725	513	51.8
ENEL	I	17 725	1 248	105.2
Repsol	E	14 894	608	18.7
Petrofina	B	14 094	259	14.0

Source: DABLE, Fortune 500

Table 9: Energy
Expected annual gross inland consumption growth rates

(%)	1990-1995	1995-2000	2000-2005
Solid fuels	-5.0	1.6	1.3
Oil	2.0	1.3	0.6
Natural gas	4.6	3.3	1.7
Nuclear fuels	2.9	0.6	-0.1
Hydropower	3.2	1.2	0.7
Heat	2.1	2.4	2.3
Renewables	4.7	3.0	2.7
Total	0.6	1.7	0.9

Source: DRI

Commission to have been completed by 1994, with Stage 3 to be in place by 1996. The original proposed measures included the removal of exclusive rights for electricity generation and construction of electricity and gas transmission infrastructure, the obligation to unbundle the management and accounts of vertically integrated electricity and gas companies and the introduction of third party access (TPA) to transmission and distribution networks, firstly for certain eligible companies, such as large industrial users and distribution companies, and later to smaller consumers.

The debate mainly focused on the electricity sector, with detailed proposals relating to the gas sector awaiting resolution of the electricity sector debate. In the face of strong opposition to obligatory TPA from some European governments and electric utilities, in 1993 the Commission proposed to introduce negotiated (rather than mandatory) TPA, with electricity producers and consumers being able to directly contract supplies with each other, but with the need to negotiate access to the network with the network operator. In response, France, still opposed to TPA even in this revised form, proposed a Single Buyer System (SBS), whereby a transmission system operator in each country would have sole responsibility for running the network, issuing tenders for new generating plant, and negotiating power imports from producers in other Member States. The Commission carried out a study comparing negotiated TPA with the proposed Single Buyer System, and concluded that SBS, as proposed, would not bring about the desired level of competition, and that substantial modifications would have to be made to SBS if it were to be introduced as an alternative to negotiated TPA in Member States which choose that route.

Finally, a draft Directive covering the phased opening up of electricity markets to competition was agreed in June 1996, to be brought into effect from 1999. This Directive is expected to allow free choice of electricity supply for eligible consumers initially covering about 23% of EU electricity demand, rising to about 32% before further liberalisation measures are considered. This agreement constitutes a major breakthrough in the development of the IEM, and should be followed by similar developments covering natural gas transmission and distribution.

OUTLOOK

As the major EU economies renew their path to growth through the mid 1990s, energy demand is also expected to pick up, albeit at a slower rate than GDP growth, as energy efficiency improvements and conservation investments continue to put downward pressure on the energy intensity of EU countries. Total final inland energy consumption in the EU is expected to grow by an annual average of 1.7% between 1995 and 2000, over double the rate of the first half of the 1990s. After the year 2000, growth is expected to slow to under 1% per year, on average.

The future EU primary energy mix will be characterised by the continued dominance of oil, with its share remaining at over 42% through 2005. Oil will remain the largest single contributor to the primary energy mix.

Natural gas consumption is expected to increase at the fastest rate of all fuels, at 2.5% per year, on average between 1995 and 2005 in primary inland energy demand. This will result in natural gas occupying the second largest share in the fuel mix. In 2005, natural gas is expected to have a share of over 24% of primary energy demand. This rapid increase reflects the growing attractiveness of this fuel in terms of environmental and economic considerations, and its increasing penetration of the power generation sector.

Solid fuels consumption is expected to resume growth over the remainder of the 1990s and into the early years of the next century, as stable international coal prices help coal regain its competitiveness in the power generation sector while oil and gas prices rise. Coal should thus retain a share of around 18% of EU primary energy demand.

On the production side, prospects are less favourable, relative to recent years. Oil production from the EU 12 countries is expected to decline quite sharply after the turn of the century as existing reserves are depleted, although this decline could be partially offset by the results of new exploration programmes. Natural gas production is expected to stabilise over a longer period, since gas reserves have hitherto been relatively less exploited than oil has. However, a slow decline in output is expected to begin after the year 2000. With regard to solid fuels, hard coal production levels are expected to decline appreciably as state aid supporting high-cost mines is phased out, while lignite production is also expected to fall as environmental considerations continue to induce fuel-switching to cleaner forms of energy.

A small increase in nuclear electricity production is expected by the year 2000 as those plants currently under construction in the United Kingdom and France come on stream. However after the year 2000, in the absence of major changes in policy by EU electricity generating companies, it is anticipated that retirements will outstrip capacity additions, and thus nuclear output will begin a period of decline.

Written by: DRI Europe

Solid fuels
NACE (Revision 1) 10 and 23.1

The share of solid fuels in the total primary energy requirements of the EU Member States was around 19% in 1994, having steadily fallen from 23% in 1980. A large part of this decline is explained by the increased use of natural gas in the key industrial and power generation demand segments.
In parallel, output from the EU's indigenous coal industry has also been in steady, long-term decline as industry restructuring has been carried out in most EU coal-producing countries in response to the high costs of production in Europe. Hard coal production has declined by almost 40% since 1985. These reductions in EU production of hard coal have been partially offset by increased imports, whilst the inclusion of the former East Germany into the EU in 1991 gave a substantial boost to lignite production.
However, the outlook for hard coal production in the EU is for a continued gradual decline over the next 20 years. Encouraged by the European Commission, governments are beginning to phase down subsidies for uneconomic production, leading to a reduction in production capacity.
On the demand side of the equation, price moderation and good international supply availability will help solid fuels maintain their share of primary energy demand in the EU at approximately current levels, with the power generating sector increasingly becoming the key market for coal.

Industry profile

Description of the sector

This chapter covers the extraction, as well as the associated washing, grading and ranking processes, of all types of coal, including:

- hard coal (NACE 10.1);
- lignite (NACE 10.2); and,
- peat (NACE 10.3).

It also covers the manufacture of coke oven products (NACE 23.1).

Although this chapter covers all solid fuels, the main emphasis, as in previous years' editions of Panorama, continues to be on hard coal, which represents almost 70% of total solid fuels consumption on an energy equivalent basis in the EU. Lignite and peat have a much lower energy content than hard coal, and are primarily used in applications close to the site of production.

Recent trends

The production of hard coal in the EU-12 has fallen continuously and steadily since 1987, largely as a result of cut backs in production capacity in the UK, France and Germany, and also the complete termination of coal production in Belgium in 1992 and in Portugal in 1994. This leaves just four EU countries with coal mining industries, France, Germany, Spain and the UK. Hard coal production in the EU-12 countries has been cut back by almost 40% between 1985 and 1994, falling to just over 130 million tonnes in 1994. None of the three most recent EU Member States, Austria, Finland and Sweden, has significant hard coal production capacity or output. Austria produces lignite, which provides less than 10% of its solid fuel needs, while Finland and Sweden's solid fuel production is largely composed of peat.

Whilst the level of indigenous EU production has fallen, this has partly been offset by a rise in the level of imports. Thus the impact of the decline in the EU's indigenous coal industry on the share of solid fuels in gross inland consumption in the EU by 1994 has been by 4.4% decline since 1980.

The key underlying reason for the reduction in EU hard coal output is the divergence between the cost of EU production and prices available in the international coal market from lower-cost coal-producing countries. EU production tends to be from deep mines, sometimes in geologically difficult seams, whereas, internationally, an increasing proportion of high-quality coal comes from countries where low-cost surface mining is possible, and, sometimes where labour costs tend to be lower than in the EU. Thus, if EU governments wished to maintain coal production, they have been obliged to subsidise hard coal output, either through direct grants or through imposing market restrictions guaranteeing a market for higher priced indigenous production. In the interests of promoting growth and free trade, and in accordance with EU legislation, governments have increasingly sought to reduce these subsidies, leading to closures of high-cost production capacity. In the UK, it is anticipated that hard coal production could be fully competitive with imported coal by 1998.

The difficult situation for the hard coal industry was further exacerbated in 1986 by the fall in the price of oil and particularly heavy fuel oil, with which coal competes in its main market, power generation. Until this time, governments had been encouraging industry to switch away from high cost imported oil, by providing grants for the construction of coal fired boilers. However, the fall in the cost of oil reduced the incentive to switch fuels and the share of coal in industrial and commercial markets was eroded by more convenient fuels such as gas and heating oil. In addition, the abrogation in March 1991 of a 1975 Community restriction on the use of natural gas for electricity generation resulted in a shift towards gas-fired power stations, which had the advantages of faster construction times, lower capital costs, and higher efficiency rates than coal-fired generating units.

In contrast, the production of lignite is largely carried out on a commercial basis, and is even more concentrated than that of hard coal. Only three EU countries (Germany, Greece and Spain) produce significant quantities of lignite, and Germany accounts for around 75% of EU production on an energy equivalent basis. The production of lignite in the EU was dramatically increased as a result of German re-unification in 1991. Indeed at that time the former East Germany accounted for nearly half of EU lignite production, although its share has since fallen back due to the economic re-structuring of its industry and environmental concerns. Indeed, since 1991, EU lignite production has dropped by 21%, mainly because of the restructuring in the new Länder of Germany. 1994 production of lignite stood at 282 million tonnes

The impact of the re-structuring and cut-backs on employment in the hard coal and lignite industries has been significant in overall terms, and quite severe in those regions where coal-mining was an important economic activity. Employment in the sector has fallen by almost 70% since 1985, leading to the loss of over 310 000 jobs, the majority of them being in underground coal-mining.

International comparison

Most EU hard coal production comes from underground mines, often with deep seams in unfavourable geological conditions. These have production costs substantially higher than those of the world's major coal exporting countries, such as the USA., Australia or South Africa. Coal output in EU countries is typically between 3 and 11 tonnes/man-shift, whereas output for the best open-cast mines can be in excess of 100 tonnes/man-shift. This is primarily because less than 10% of European coal is extracted from surface mines, compared, for example, to 50% in Australia, 60% in the USA and 85% in Canada. German production costs are particularly high, notwithstanding the highest technical level in the world, be-

Table 1: Solid fuels
Main indicators - Hard coal (1)

(million tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Gross inland consumption	322.1	319.7	323.9	311.7	314.1	318.1	327.6	308.8	275.5	282.1
Net exports	-96.5	-92.5	-91.3	-93.4	-101.1	-114.7	-131.5	-133.7	-111.5	-117.1
Production	217.4	227.9	221.7	214.6	208.7	197.2	194.4	185.0	158.8	131.2
Employment (thousands)	464.4	420.8	378.4	336.7	297.1	270.1	245.8	215.4	175.3	152.4
of which, underground	311.4	285.0	255.3	230.0	209.1	187.5	169.3	153.4	125.1	93.5

(1) Including former East Germany from 1991 onwards
Source: Eurostat

Table 2: Solid fuels
Main indicators - Lignite (1)

(million tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Gross inland consumption	194.4	186.6	179.6	183.1	190.9	188.4	359.4	322.7	298.6	286.5
Net exports	-2.7	-2.9	-2.5	-2.1	-2.3	-2.3	-3.3	-3.8	-3.0	-2.7
Production	186.9	183.1	179.8	179.7	188.7	186.2	356.6	319.0	295.1	282.3

(1) Including former East Germany from 1991 onwards
Source: Eurostat

Table 3: Solid fuels
Share of solid fuels in gross inland energy consumption

(%)	1980	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR 12 (1)	23.1	23.3	22.2	21.8	21.0	21.0	20.9	22.6	21.5	19.6	18.7
Belgique/België	24.0	22.7	19.7	19.0	19.0	20.6	21.6	20.0	18.7	16.0	18.5
Danmark	30.6	39.6	38.5	39.2	38.5	33.2	35.7	44.2	37.8	39.1	37.8
Deutschland (1)	29.7	30.9	29.5	28.1	27.6	28.1	27.6	33.7	31.4	29.9	29.0
Ellada	20.9	34.8	36.8	37.4	38.3	37.5	38.0	36.0	38.1	37.9	35.1
España	21.5	28.0	25.8	24.0	19.6	22.5	22.2	22.0	23.4	21.5	19.4
France	16.9	12.6	10.3	9.4	9.1	9.6	9.4	9.3	8.9	6.8	6.2
Ireland	20.7	29.5	30.8	38.1	39.1	38.1	35.1	32.9	33.0	30.7	25.8
Italia	8.6	11.5	10.6	10.5	9.7	9.2	9.7	9.1	7.9	6.8	7.4
Luxembourg	50.7	45.3	42.1	34.5	34.8	34.0	31.9	28.3	27.0	26.3	24.0
Nederland	6.3	11.5	10.2	10.5	12.7	12.6	13.7	11.6	11.6	12.2	12.5
Portugal	4.6	6.4	10.0	14.4	15.5	16.3	17.1	19.2	18.2	19.8	17.5
United Kingdom	35.0	14.1	31.8	33.0	31.6	30.5	30.0	29.1	28.1	24.3	22.0

(1) Including former East Germany from 1991 onwards
Source: Eurostat

Table 4: Solid fuels
Production, trade and consumption by sector - Hard coal (1)

(million tonnes)	1980	1989	1990	1991	1992	1993	1994
Production	260.3	208.7	197.2	194.4	185.0	158.8	131.2
Imports	97.7	111.5	126.0	140.7	139.5	117.1	128.3
Exports	16.9	10.4	11.3	9.2	5.7	5.6	11.2
Gross domestic consumption	330.9	314.0	318.2	327.6	308.8	275.5	282.1
Transformation, of which	293.3	273.5	280.6	285.1	269.4	241.2	259.5
Electric power stations	194.2	200.4	210.2	218.3	207.1	185.1	190.5
Coking plants	93.8	71.1	68.4	64.6	60.4	53.8	50.3
Final consumption, of which	36.0	40.9	39.4	42.0	40.3	34.7	63.0
Industrial	16.9	28.5	28.5	29.8	29.9	24.9	52.0
Domestic	18.9	12.4	10.8	12.2	10.5	9.8	11.0

(1) Including former East Germany from 1991 onwards
Source: Eurostat

Table 5: Solid fuels
Production by country - Hard coal

(million tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR 12 (1)	217.4	227.9	221.7	214.6	208.7	197.2	194.4	185.0	158.8	131.2
Belgique/België	6.2	5.6	4.3	2.5	1.9	1.0	0.6	0.2	0.0	0.0
Deutschland (1)	88.8	87.1	82.4	79.3	77.5	76.6	72.7	72.2	64.2	57.6
España	16.1	15.9	19.3	19.0	19.2	19.4	17.9	18.6	18.1	18.2
France	15.1	14.4	13.7	12.1	11.5	10.5	10.1	9.5	8.6	7.5
United Kingdom	90.8	104.6	101.6	101.4	98.3	89.3	92.7	84.2	67.6	47.7

(1) Including former East Germany from 1991 onwards.
Source: Eurostat

cause hard coal deposits at an average depth of 900m. The result is that coal production in the EU now accounts for only about 7% of the world's total solid fuels production, compared to over 15% in 1980. The EU currently has about 9% of the world's proven solid fuel reserves.

On the demand side, the phasing down of high-cost local production, combined with the growing availability of natural gas, contributed to reduce the share of solid fuels in primary energy consumption. Since 1980, the share of coal in primary energy consumption in the EU has declined from 23% to 19% in 1994, whereas in North America, for example, the share of coal has actually increased from 23.5% to almost 26% over the same period. Coal demand in North America is overwhelmingly concentrated in the power generation sector, where the regulatory framework encouraged the building of large base-load power plants for which coal was the optimum economic choice. In Japan, solid fuel demand has declined from 20% of primary energy demand in 1985 to 17% in 1994. Japan is heavily reliant on imported energy for all fuel types, and over this period the build-up of natural gas imports, as part of the Japanese policy of increasing the diversity of energy supply, eroded the share of coal, as well as oil, in the primary energy demand mix.

Foreign trade

The EU is now one of the major importers of hard coal from international markets. Indigenous hard coal production accounted for just 46.5% of gross hard coal consumption in 1994, with the remainder being covered by imports (45%)and stock withdrawals (8.5%). The share of imported hard coal has risen from around 20% in the early 1980s, with imported tonnages almost doubling from around 70 million tonnes in 1980 to over 130 million tonnes in 1994.

Within the EU, only the UK and Germany export significant quantities of coal, each exporting around 1 million tonnes, and the vast majority of this is sold to other EU countries. Germany exports anthracite, and its main markets are in France, Belgium, Italy and the Netherlands. UK exports are almost exclusively steam coal and its main markets are in Denmark, France, Germany, Ireland and Spain. Between 1980 and 1994, intra-EU trade of locally-produced coal fell from 17.2 to 2.3 million tonnes, mainly due to the deterioration in the price competitiveness of EU coal versus coal originating from third countries.

In 1994, South Africa overtook temporarily the USA to become the leading coal supplier to the EU with imports from South Africa totalling 27.5 million tonnes, 22.8% of total imports from outside the EU in 1994. Imports from the USA and Australia accounted for 22.5% and 16%, respectively. The remaining 38.7% was made up largely by imports from Colombia, Poland, the former Soviet Union, Canada and China.

MARKET FORCES

Demand

Hard coal

The power generation market has become far and away the most important outlet for coal in the EU. In 1994, this sector accounted for 67.5% of gross domestic hard coal consumption. A significant proportion of the region's base-load power generating capacity is still fuelled by coal, despite a shift to natural gas in the 1990s.

A further 18% of hard coal demand in the EU was accounted for by the production of coke in 1994. Of the remaining 14.5% of hard coal demand used in end-use sectors, most is in energy intensive intermediate goods industries, where plants are typically large scale, such as the iron and steel, chemicals and cement sectors.

One reason for the growing concentration of demand for coal in just a few sectors is the high cost of combustion equipment and the greater difficulty of transportation compared with liquid or gaseous fuels. Coal is therefore only an attractive option when economies of scale can be achieved, and where the cost of transportation can be limited, such as in the power station market. In small scale markets, e.g. commercial and domestic boilers, coal has difficulty competing with gas and heating oil due to their greater convenience and lower cost.

Table 6: Solid fuels
Output per man-hour underground - Hard coal

(kg)	1988	1989	1990	1991	1992	1993	1994
EUR 12 (1)	578	603	628	665	703	762	794
Belgique/België	320	328	361	383	268	N/A	N/A
Deutschland (1)	630	645	673	681	698	707	706
España	333	329	341	315	328	396	423
France	534	589	634	727	743	711	673
United Kingdom	633	680	704	801	919	1239	1422

(1) Including former East Germany from 1991 onwards
Source: Eurostat

Table 7: Solid fuels
Investment in the coal industry - Coal extraction and preparation

(million ECU)	1990	1991	1992	1993	1994 (1)	1995 (1)
EUR 12	1030.7	892.4	686.3	622.9	642.6	N/A
Belgique/België	2.0	N/A	N/A	N/A	N/A	N/A
Deutschland	274.7	232.4	180.2	199.7	310.9	274.7
España	201.8	255.8	228.2	215.1	223.2	166.3
France	45.1	42.2	31.3	29.9	24.3	25.4
Italia	54.8	17.4	33.2	21.1	N/A	N/A
Portugal	0.8	0.5	0.5	N/A	N/A	N/A
United Kingdom	451.5	344.1	212.9	157.1	84.2	N/A

(1) DG XVIII forecast.
Source: European Commission, DG XVIII

More stringent environmental regulation regarding airborne emissions and the disposal of combustion waste have also tended to reduce the coal market to those large industries which can afford to finance the investments needed to abate the environmental impact of coal combustion.

Lignite

Lignite consumption is concentrated in the power generation sector, which in 1994 accounted for 79% of consumption. Most lignite used in the power sector is burned in power stations located next to the lignite deposits. It is generally uneconomic to transport lignite over long distances.

The other significant markets for lignite are briqueting plants and gas manufacture in the former East Germany. However, due to the environmental impact of manufacturing gas from lignite, and the availability of natural gas following German re-unification, the quantity of lignite used for this purpose is falling quickly.

Supply and competition

EU solid fuel reserves are estimated to have stood at 88 billion tonnes at the end of 1994. Of this total, hard coal and anthracite reserves accounted for 27.4 billion tonnes At current rates of production, this means that hard coal reserves would last about 210 years. Germany has the majority of hard coal reserves in the EU, at almost 24 billion tonnes.

Sub-bituminous coal and lignite reserves totalled 60.5 billion tonnes at the end of 1994, a reserve to production ratio of 214 years. Again, Germany has the most extensive resource base, with 56 billion tonnes of reserves.

Although the EU is reasonably well-endowed with coal, the majority of remaining reserves are deep deposits that require working at very great depths, sometimes in excess of 1 000 metres with heavy-duty, sophisticated equipment, both for technical and safety reasons. This has led to high production costs and has undermined the financial situation of the coal production industry.

During the 1970s the fact that coal production in Europe was becoming increasingly expensive was hidden by the rapid increase in the price of oil, and the consequent desire to improve security and diversity of energy supplies. In addition, governments saw a need to maintain coal production in order to support regional economies.

However, from the early 1980s onwards, with a growing availability of cheap coal from exporting countries, together with a desire to improve economic performance by reducing trade barriers, governments in the EU began to seek to reduce subsidies. This gained momentum during the 1980s as oil prices fell and coal became available from a wide range of countries, particularly OECD countries, such as the USA and Australia, which reduced concerns over supply security.

The greater availability of competitively-priced coal on international markets, compared with the high cost of EU production, has motivated a gradual tightening of policy towards state aid and subsidies to the EU coal industry. Whilst the European Coal and Steel Community Treaty, under Article 4(c), prohibits all "subsidies or aids granted by States, or special charges imposed by States, in any form whatsoever", the critical state of the Community coal industry from the early 1960s onwards led to the European Commission establishing, in 1965, a temporary framework for State aid to the Community coal industry under the provisions of Article 95 of the Treaty. The continuing high-costs in the industry have led to successive Commission decisions establishing Community rules for State aid to the coal industry, the most recent of which is Decision No. 3632/93/ECSC. This Commission Decision, which will last until the expire of the ECSC Treaty in the year 2002, establishes that aid may be considered compatible with the proper functioning of the common market provided that it helps to achieve at least one of the following objectives:

- to make, in light of coal prices on international markets, further progress towards economic viability with the aim of achieving a reduction in aid;
- to alleviate the social and regional problems created by the total or partial reductions in the activity of production units;
- to help the coal industry adjust to environmental protection standards.

The Decision also contains provisions designed to make existing aid schemes more transparent. After a transitional period not exceeding three years (therefore ending on 31st December 1996), aid would only be authorised if it was entered in the national, regional or local public budgets of Member States or channelled through strictly equivalent mechanisms. In addition, from the beginning of 1994, all aid received by undertakings has to be shown together with their profit-and-loss accounts as a separate item of revenue, distinct from turnover.

Member States intending to grant aid to coal undertakings during the period 1994 to 2002 are required to subject to the Commission in advance a modernisation, rationalisation and restructuring plan to improve the economic viability of the undertakings concerned by reducing production costs. For undertakings unable to achieve this, aid will only be considered if they are subject to a closure plan with a deadline occurring before the expire of Decision No 3632/93/ECSC or, in exceptional social and regional circumstances, if the closure occurs after the expire of the Decision.

Despite the major efforts undertaken by several countries in rationalising and restructuring their coal-mining industries to reduce costs and increase productivity (including the closure of all remaining production capacity in Belgium), the amount

of aid required to support production in the EU has, in fact, increased over the last 10 years, as even lower prices for coal available on the international market have increased the competitive gap between EU-produced coal and imported coal. It has to be stressed, however that the UK coal industry no longer benefits from any State aid. Thus the report to the European Commission on "The Application of the Community Rules for State Aid to the Coal Industry in 1993" stated that, between 1986 and 1993, state aid had risen by 9% in absolute terms, and by 56% in support per tonne of production. In 1993, total direct and indirect financial aid to the coal industry in the EU was reported to total 5 billion ECU, equivalent to 31.73 ECU/tonne.

Production process

There are two principal methods of extracting solid fuels from the ground, these are open-cast or under-ground mines. Most coal in the EU is extracted from underground mines, whilst lignite is generally only economic if accessible using an open-cast pit.

Open-cast mining is possible if the coal reserves lie relatively close to the surface, and can be accessed by removing the over-burden of top-soil and sub-soil. This is usually carried out using large scale machinery and productivity can be very high.

Where deposits are much deeper, underground mining is necessary, requiring a shaft to be sunk and tunnels to be constructed in order for coal faces to be developed. For under-ground mines the degree of mechanisation depends on the thickness of the coal seam, and on the geological conditions, i.e. the extent of faulting and the inclination of the seam. The two main technologies are longwall and continuous mining machines. Longwall technology can be used for thicker seams and where the coal seam is not highly faulted. Longwall cutters remove a coal seam by taking slices across the coal face, and then automatically advancing to make a new cut. Alternatively, continuous mining machines, together with a "room-and-pillar" extraction method, can be used when the seam requires more flexible methods.

Following extraction, most coal is then washed in order to remove non-combustible material extracted with the coal, and then graded.

Overland transportation of coal is usually by rail, although smaller quantities can be transported by road, and dedicated transport systems, such as slurry pipelines and conveyors are sometimes used over very short distances. Coal delivery to power stations, where these are not located directly on the mine, is usually by rail, and may involve a dedicated rail link. Barges are used for transport on waterways, or in coastal waters, and international seaborne trade can involve ship sizes of up to 200 000 dwt.

Rationalisation of the EU coal-mining industry, with the closure of high-cost deep mines, particularly in the UK, France and Belgium, has contributed to a steady increase in productivity. Overall output per man-hour has increased in the EU by 37% between 1988 and 1994, with the most spectacular improvement being seen in the UK, where output per man-hour has significantly more than doubled over the same period.

Research and development

Investment in the EU coal industry declined from just over 1 billion ECU in 1990 to 623 million ECU in 1993. Investment is estimated to have slightly increased again in 1994, reaching 643 million ECU. A 46% fall in investment in the UK between 1993 and 1994 was more than offset by a 56% rise in investment in Germany.

Two key areas of technical research have been in mining technology and product upgrading. Research in mining technology is concerned with improvement of roadway support techniques (particularly in light of ever greater working depths), monitoring of ventilation, automatic steering of mining machines, and more efficient and safer transport systems for both personnel and materials. Research is also being made into remote control, data processing and modern communication systems, to examine whether and how these can contribute to increased safety, improved working conditions and more efficient mining operations.

Research into product upgrading concerns efficiency and environmental considerations of coal preparation, handling and coking. Both fundamental and applied research is being carried out by mining institutes, universities and laboratories, often on an international level, with ECSC financial support which can amount to some 60% of total costs.

After the first oil crisis, in 1974, interest grew in the conversion of hard coal and lignite into other materials as a way of reducing dependence on imported hydrocarbons. As a result, several pilot and demonstration programmes were launched by the EU into:

- gasification and liquefaction of solid fuels (including underground gasification);
- substitution of hydrocarbons by solid fuels with fluidised bed combustion, coal-liquid mixtures and combined cycles as key areas of research;
- utilisation of solid fuels within the framework of the EU JOULE 2 R&D programme into non-nuclear energy and rational use of energy which took over from Joule in 1992;
- energy production from fossil fuels based on advanced technologies, notably combined cycles, within the recent "Framework programme" (1990-94); and
- new and improved clean combustion methods for solid fuels such as fluidised bed combustion, underground coal gasification and use and treatment or enhancement of wastes arising as a result of the use of solid fuels, all within the new demonstration "Thermie" Programme (European Technologies for Energy Management) which was proposed by the Commission and ran from 1990-94. THERMIE II is now on the table as part of the "Fourth Framework Programme."

INDUSTRY STRUCTURE

Companies

The bulk of French coal production is the responsibility of the nationalised company, Charbonnages de France (CdF). A few small mines are operated by Electricité de France or are privately held. The Technical Association for Coal Imports (ATIC) co-ordinates coal imports. All coal and lignite mining in France is due to cease by 2005, and one of the main responsibilities of CdF is the reconversion of former mining areas in order to attract new industry, and the placing in alternative employment of former miners.

In Germany, the main coal mining companies are Ruhrkohle, Saarbergwerke, and Preussag, which produce hard coal, and Rheinbraun, Mibrag and Laubag for lignite. The lignite companies are mostly owned by electricity companies or have power plants associated with their mines. Indeed, Rheinbraun is a subsidiary of RWE, and owns a large share in Laubag, the remainder of which is owned directly by power companies. A new subsidy programme was announced at the start of 1994 which fixed the amount of money to be made available to the hard coal industry. The figure was set at DM 7.5 billion up to 1996 and DM 7 billion per year between 1997 and 2000, and is likely to lead to further rationalisation. A major change in the subsidy mechanism was forced on the industry when the German High Court declared the "kohlenpfennig" unconstitutional. This had been a means by which electricity producers, forced to purchase German coal at higher prices

than available imported coal, could pass on the cost to electricity consumers as a surcharge on their electricity bills. The Court decided that the burden of state aid to the industry should not be borne by one group of the population, but should come directly out of federal budgets, beginning in 1996.

The major producer of lignite in Greece is the publicly-owned electricity company, Public Power Corporation (PPC). Additionally, there are some small privately-owned mines in northern Greece. Greek lignite is burned almost exclusively in PPC's power plants.

In Ireland, coal mining was stopped in 1990. However, the production of peat for use in power stations and other low grade heating applications still continues. The Electricity Supply Board consumes about 2 million tonnes/year of peat, and a smaller quantity is turned into peat briquettes.

Italy's modest lignite output is found in Tuscany and Umbria. There is also some sub-bituminous coal production in Sardinia. Coal imports are made by ENEL, ENI and Finsider, the steel company.

In Portugal, the last operating pit was closed down in 1994; before this, solid fuel production was limited to one mine, the output from which was used to fire a mine-mouth power station operated by state electric utility Electricidade de Portugal. The mine's operating losses were covered by direct state aid.

Coal in Spain is produced by a large number of companies, more than 100 in total. The leading company, but also the most uncompetitive, Hunosa, is publicly owned, while most of the rest are held privately. Sales of coal to power stations are made under the auspices of a contract between Carbunion, the association of coal producing companies, and UNESA, the association of electricity utilities. The coal industry in Spain receives significant subsidies, both directly from the government and via state-sponsored guaranteed price contracts with the electricity industry.

Finally, in the United Kingdom, the coal industry has seen very substantial rationalisation of its capacity over the last few years, culminating in the privatisation of all British Coal's remaining producing assets at the end of 1994. Mines in England were purchased by RJB Mining, mines in Wales were purchased by Celtic Energy, and mines in Scotland were purchased by Mining (Scotland). RJB Mining in particular has proved a successful operator in its first year of business, maintaining output, improving productivity, and paying off early most of the debt incurred to purchase the assets. A more difficult period may follow, particularly after guaranteed price contracts with the principal electricity generators, inherited from British Coal, expire in 1998. At this point, production will have to be fully competitive with supplies from international markets.

Strategies

The strategies of companies in the EU solid fuels sector are largely shaped by the foreseen decline in indigenous output, caused by the EU drive for increased competitiveness within the context of the EU state aid policy. Producing companies will have to rationalise capacity and increase productivity in order to gain or maintain profitability.

In the UK, the re-structuring and privatisation of British Coal was intended to remove any further need for state aid to the industry. The main protection mechanism in place in the UK has been a large contract for coal sales to the electricity industry. For 1993/94 the volume of this contract was cut to 40 million tonnes, and then to 30 million tonnes per year up to 1997/8. These volumes are a reduction from 70 million tonnes per year at the end of the 1980s prior to privatisation of the electricity industry.

In Germany, hard coal production capacity has also seen substantial rationalisation and productivity improvements. Production has been cut by about 33% and employment by 43% since the early 1980s. Further rationalisation will result from the recent reduction in subsidies, and this will include coking capacity. Lignite production has also been falling as a result of the economic re-structuring in the former East Germany, and in response to environmental pressures. The process of stabilisation of output is close to completion and will result in a further concentration of demand in the power sector.

Charbonnages de France has recently reached agreement with its employees on a programme which will lead to the ending of coal and lignite production in France by 2005. CdF is liable by law for the livelihood of its mining employees, and thus is investing in developing alternative employment for them. CdF will continue to operate its coal fired power stations, but will increasingly fire them on imported coal.

The Spanish coal industry has accepted to implement a re-structuring plan which will result in the closure of the uneconomic underground pits and, hence, a further reduction of the underground workforce.

REGIONAL DISTRIBUTION

Hard coal is currently mined in significant quantities in four EU countries: Germany (57.6 million tonnes in 1994); the United Kingdom (47.7 million tonnes in 1994); Spain (18.2 million tonnes in 1994), and France (7.5 million tonnes in 1994).

Lignite production is concentrated in three EU countries: Germany (207 million tonnes in 1994); Greece (54 million tonnes in 1994); and Spain (11 million tonnes in 1994). The three biggest producers accounted for over 98% of total output in 1993. In addition, 5 million tonnes of peat is produced in Ireland and 8.4 million tonnes is produced in Finland. Lignite production in France was terminated in 1992.

Within each producing country there is a further regional concentration of production. In Germany lignite is produced in the former East Germany and the Rhineland district, and hard coal is produced in the Ruhr and Saar coalfields. In the UK the majority of production comes from mines in Nottinghamshire and Yorkshire, although other areas, particularly South Wales and the Northeast have been more important in the past. In Spain the main producing regions are Asturias and Leon, while in France hard coal mining is mostly concentrated in the underground mines in Lorraine and in the South of France.

Traditionally coal mining areas have also been areas associated with heavy industry, and the regional effects of reduced coal mining together with re-structuring of heavy industries has had a big impact on unemployment and regional development.

ENVIRONMENT

As with any fossil-fuel, the production, transformation and use of solid fuels have an impact on the environment. Hard coal and lignite are used mainly for large scale power and heat generation, processes which offer cost effective environmental protection measures. In particular, major efforts have been undertaken since the mid-1970s to reduce particulate, SO_2, and NO_x emissions from coal and lignite-burning power plants, albeit at the expense of conversion efficiency and the relative cost of coal-generated electricity. As a result of the installation of flue gas desulphurisation and NO_x removal units, significant reductions in the emissions of pollutants have already been achieved. Further improvements are expected over the balance of this decade with the development of a large number of pilot plants that employ advanced methods of clean coal utilisation such as fluidised bed com-

Table 8: Solid fuels
Forecasts

(million tonnes)	1994	1995	1996	2000
EU-12				
Hard coal				
Production	131.2	121.6	115.7	96.8
Gross inland consumption	282.1	278.0	276.2	296.7
Lignite and peat				
Production	282.3	273.5	269.6	287.4
Gross inland consumption	286.5	273.2	271.6	288.6
EU-15				
Hard coal				
Production		121.6	115.7	96.8
Gross inland consumption		293.9	292.3	312.8
Lignite and peat				
Production		317.5	313.9	328.2
Gross inland consumption		319.1	318.0	332.8

Source: DRI Europe

bustion. These will help to maintain a market for coal in the power generation and large boiler sectors.

Compared to other fossil fuels, solid fuels emit the highest amount of CO_2 per unit of energy. In order to ensure that the greenhouse gas emissions from coal use are minimised, it is important that, wherever possible, the efficiency of coal utilisation continues to improve. So far this century, the efficiency of coal-fired power generation has doubled due to technological improvements. Further efficiency gains are expected as combined cycle systems are developed and widely deployed. CO_2 emissions from such plants are as much as 20% lower than from conventional plants. Furthermore, the development of combined heat and power plants offers potential CO_2 emissions reductions of more than over 50%.

REGULATIONS

The coal and lignite mining industries operate under strict health and safety regulations. These particularly concern under-ground mines, where dust, methane, subsidence and water all present considerable health and safety risks. Such regulations are generally developed and monitored by national institutions.

With respect to the EU, the key regulations are those concerning the issue of subsidies and environment. The issue of subsidies is covered by the ECSC Treaty (since 1952), which completely prohibits State aid under Article 4(c), and rules agreed subsequently. The most recent reform, Decision No 3632/93/ECSC, is detailed under "Supply and Competition" of this monograph. These new rules, agreed in an attempt to reduce the level of subsidies and open coal markets, allow aid provided it meets one of three criteria: it is intended to make the industry more efficient with the aim of achieving a reduction of aids; it is intended to off-set social and regional problems; it is intended to help the industry meet environmental standards. Furthermore, after 1996, aid will only be allowed if it is recorded transparently in national and/or regional government accounts, and in the accounts of the receiving company. Finally, security of supply is no longer an acceptable criteria to justify State aid.

The Treaty also encourages, under Article 55, the promotion of technical and economic research relating to the production and increased use of coal and to occupational safety in the coal industry. The ECSC Treaty will expire in June 2002, when the coal and steel sectors will be integrated into the EU Treaty.

The main environmental measure currently in place, and which impacts on the cost of coal combustion, is the Large Combustion Plant Directive (LCPD) which places emission limits on large scale boilers (over 50 MWt) as well as specifying maximum emission levels for each country. This legislation effectively requires the use of flue-gas-desulphurisation and NOx reduction plant to be fitted to all new coal plants, and for a reduction of emissions from existing plants by retro-fitting flue gas cleaning plant or switching to non-polluting fuels, e.g. gas.

OUTLOOK

Solid fuels face a continuing declining share of the energy demand mix in both the domestic and industrial sectors. This is largely due to consumer preference, with competing fuels offering greater convenience, less local environmental impact and lower investment costs in capital equipment. This trend is not expected to be significantly altered by differential fuel prices, unless the image of coal can be corrrected.

Coal does, however, have a future in power generation where its share of the fuel mix should rise into the next century. Oil and gas prices are expected to rise more quickly than coal prices over the next 10 to 15 years, thus allowing the competitive position of coal to improve, and new coal-fired capacity to be built as needs arise from the early years of the next century.

Competition from politically stable extra-EU coal exporting countries, further rationalisation resulting from the general effort to lessen national subsidies and the addition of three non coal producing Member States to the EU means that, by the year 2000, over 70% of EU-15 hard coal consumption will be serviced by imports compared with about 53% for the EU-12 in 1994. Meanwhile, hard coal production is expected to fall by around 25% by the year 2000, compared to 1994.

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Exploration and production of crude oil and natural gas

NACE (Revision 1) 11

Both oil and natural gas production in the EU have been steadily increasing since the beginning of the 1990s after hitting a plateau in the mid to late 1980s. The continued reduction in exploration and production costs has extended the viability of many North Sea fields, even in an environment of lower oil prices. At the same time significant new gas fields have come on stream, again mainly in the North Sea. Thus, in 1994, total oil and gas output in the EU reached 311 million tonnes oil equivalent, an increase of 11% over 1993.

The United Kingdom is the leading oil and gas producer within the EU, producing almost 60% of total EU output in 1994. The Netherlands is the second most important producer, accounting for just over 20% of EU production. Output in the Netherlands is heavily weighted towards natural gas, principally from the giant Groningen field.

Both oil and gas output are expected to increase up until the end of the century and peak around the year 2000. In the early years of the next century, field depletion and the slowing down of the discovery of new reserves is expected to lead to a gradual decline in EU oil and gas production.

INDUSTRY PROFILE

Description of the sector

NACE (Revision 1) 11 comprises four main activities:

- exploration for crude oil and natural gas;
- production of liquid hydrocarbons (i.e. crude oil), condensates and other liquids resulting from gas processing operations;
- production of natural gas;
- service activities in support of oil and gas exploration and production (excluding surveying).

Recent trends

Production of oil and gas in the EU increased steadily up until the middle of the 1980s, stimulated by rising oil prices following the oil price shocks of the 1970s. However, the 1986 oil price collapse reduced the attractiveness of upstream investment and set output on a downward trend. By 1989, hydrocarbon production had fallen to pre-1983 levels at 238.5 million tonnes oil equivalent (toe). Since then, hydrocarbon output has increased to 311 million toe in 1994, with both oil and gas production on a rising trend.

The United Kingdom has maintained its position as the most important oil and gas producer in the EU. Its share of total EU hydrocarbon output increased from 53% in 1992 to 60% in 1994 as new gas fields came on stream, and oil output continued to increase. Meanwhile, the Netherlands (the second largest hydrocarbon producer in the EU) saw its share of EU production fall from 25% in 1992 to 21% in 1994. The policy of the Netherlands has been to manage its reserves to ensure long-term availability of gas rather than to maximise output in the short-term.

Because of lower prices, crude oil production contracted by 22% between 1986 and 1989. Since then, output has resumed steady growth until 1994, when EU crude oil output was almost 35% higher than in 1989 at 152.5 million tonnes. The increase was largely owed to a 40% build-up in Britain's North Sea sector crude oil production, which rose to 126.7 million tonnes in 1994, compared to 90 million tonnes in 1989.

After a strong increase in 1993, EU natural gas production growth slowed down in 1994, just 1.1% ahead of the 1993 level. However, at 158.5 million toe, natural gas output was still above oil output in the EU. The two principal natural gas producers are the Netherlands and the United Kingdom, each with around 37% of EU production.

International comparison

Crude oil

The EU accounts for a relatively small part of world oil reserves, with only 0.7% of global proven reserves at the end of 1994. EU reserves totalled 1 billion tonnes of crude oil out of a world total of 137.3 billion tonnes. In Western Europe, Norway has the most significant levels of oil reserves, at 1.2 billion tonnes, 0.9% of the world total. The EU reserves to production ratio stands at seven and a half years, compared to a global R/P ratio of 43 years at the end of 1994.

Total world production of crude oil was 3.2 billion tonnes in 1994, an increase of 0.9% versus 1993 levels. The EU showed a very strong increase compared to other regions of the world, with a 23.4% increase in production. Norway also increased output by 13.3% over 1993. Total OPEC output was just 0.7% above 1993 levels, while production declined in the USA (-2.8%) and in Eastern Europe and the former Soviet Union (-9.6%).

Natural gas

Total proven world gas reserves were 141 trillion cubic metres (tcm) at the end of 1994, 1 tcm down from 1993 levels. EU gas reserves account for 2.4% of the world total, while, in Western Europe, Norway accounts for an additional 1.4% of world reserves. The two best-endowed regions, in terms of natural gas reserves, are Eastern Europe and the former Soviet Union, with 40.2% of world gas reserves, and the Middle East, with 32% of world reserves. The reserves to production ratio for the world stands at 66.4 years, as of the end of 1994, and at 18 years for the EU.

World natural gas production in 1994, at 1874 million toe, was 0.6% above 1993 levels, with the greatest percentage increases coming from the Middle East (+3.8%), and Asia (+9.7%). As with oil, natural gas production in Eastern Europe and the former Soviet Union fell by 5.6% in 1994, as the decline in local demand was not offset by an equivalent increase in exports.

Foreign trade

Crude oil

Despite rising oil output in the EU, primarily owed to activity within the British North Sea, the EU is still heavily dependent on oil imports, with an oil self-sufficiency of 29% in 1994.

Intra-EU trade is quite limited, representing only about 10% of total EU crude oil imports. The vast majority of this is comprised of crude oil exports from the United Kingdom to other EU countries. Increasing British North Sea output in 1994 enabled intra-EU crude oil trade to increase by over 21% in 1994 over 1993, and thus to reduce somewhat the call on suppliers from outside the EU.

Extra-EU imports of crude oil into the EU stood at 451.0 million tonnes in 1994, 3% lower than in 1993. The Middle East is by far the most important supplier of crude oil to the EU, making up 35.5% of total EU crude oil imports in 1994. Because of the prevalence of Middle East countries in OPEC, the EU's reliance on OPEC country supplies was 56% in 1994, down from 59% in 1993. Norway has steadily increased

Table 1: Exploration and distribution of crude oil and natural gas
Production by Member State - Crude oil

(million tonnes)	1992	1993	1994	Share 1994(%)	Change 1993/94 (%)
EUR 12	118.0	123.6	152.5	100.0	23.4
Belgique/België, Luxembourg	0.0	0.0	0.0	0.0	0.0
Danmark	7.8	8.3	9.1	6.0	9.6
Deutschland	3.3	3.1	2.9	1.9	-6.5
Ellada	0.7	0.6	0.5	0.3	-16.7
España	1.4	0.9	0.9	0.6	0.0
France	3.3	3.2	3.2	2.1	0.0
Ireland	0.0	0.0	0.0	0.0	0.0
Italia	4.5	4.6	4.9	3.2	6.5
Nederland	3.3	3.2	4.3	2.8	34.4
Portugal	0.0	0.0	0.0	0.0	0.0
United Kingdom	94.3	100.1	126.7	83.1	26.6

Source: Eurostat

Table 2: Exploration and distribution of crude oil and natural gas
Production by Member State - Natural gas

(million toe) (1)	1992	1993	1994	Share 1994(%)	Change 1993/94 (%)
EUR 12	144.4	156.7	158.5	100.0	1.1
Belgique/België, Luxembourg	0.0	0.0	0.0	0.0	0.0
Danmark	3.3	3.9	4.3	2.7	10.3
Deutschland	13.7	13.8	14.3	9.0	3.6
Ellada	0.1	0.1	0.0	0.0	-100.0
España	1.1	0.6	0.2	0.1	-66.7
France	2.7	2.9	2.9	1.8	0.0
Ireland	1.9	2.2	2.2	1.4	0.0
Italia	14.8	15.7	16.5	10.4	5.1
Nederland	61.6	63.1	59.9	37.8	-5.1
United Kingdom	45.2	54.4	58.2	36.7	7.0

(1) toe: tonnes of oil equivalent.
Source: Eurostat

Table 3: Exploration and distribution of crude oil and natural gas
World production - Crude oil

(million tonnes)	1992	1993	1994	Share 1994(%)	Change 1993/94 (%)
EUR 12	118.0	124.1	167.9	5.2	35.3
Rest of Western Europe	112.6	119.6	119.6	3.7	0.0
Former USSR & Eastern Europe	461.0	402.3	367.8	11.5	-8.6
North America	515.6	504.7	497.8	15.5	-1.4
Latin America	398.4	396.5	408.9	12.8	3.1
Asia	304.3	302.8	313.7	9.8	3.6
Africa	332.0	334.5	332.9	10.4	-0.5
Middle East	900.0	957.7	971.0	30.3	1.4
Australia & New Zealand	26.8	24.9	25.3	0.8	1.5
World	3 168.7	3 167.1	3 205.0	100.0	1.2

Source: BP Statistical Review of World Energy, Eurostat

Table 4: Exploration and distribution of crude oil and natural gas
World production - Natural gas

(million toe) (1)	1992	1993	1994	Share 1994(%)	Change 1993/94 (%)
EUR 12	144.5	156.6	158.4	3 683.7	1.1
Rest of Western Europe	34.5	32.9	35.6	827.9	8.2
Former USSR & Eastern Europe	681.3	665.5	628.5	14 616.3	-5.6
North America	567.6	592.6	609.6	14 176.7	2.9
Latin America	88.9	91.0	86.2	2 004.7	-5.3
Asia	136.5	143.9	157.9	3 672.1	9.7
Africa	66.1	69.1	66.4	1 544.2	-3.9
Middle East	104.3	110.4	114.6	2 665.1	3.8
Australia & New Zealand	25.5	26.6	21.8	507.0	-18.0
World	1 849.2	1 888.6	1 879.0	43 697.7	-0.5

(1) toe: tonnes of oil equivalent.
Source: BP Statistical Review of World Energy, Eurostat

its market share between 1990 and 1994 as the proximity of the EU market provided an obvious destination for rising Norwegian exports; in 1994, Norway accounted for almost 18% of EU crude oil imports, second only to Saudi Arabia, as an individual country supplier. After marginally increasing its share in the EU import slate in 1991 to 33%, imports from Africa have fallen to 27% in 1994, with Nigeria, Libya and Algeria the principal crude oil suppliers.

Natural gas

The share of EU natural gas demand met by indigenous production fell steadily over the 1980s to a low point of 60% in 1989. As larger quantities of gas, mainly from the United Kingdom, have been brought on stream, EU natural gas self-sufficiency rose to 66% in 1994.

Natural gas imports to the EU totalled 4.33 million terajoules (TJ) (93.9 million toe) in 1994, 4.6% above 1993's figure. The greatest proportion of imports, almost 48%, came from the former Soviet Union, followed by Algeria and Norway , each supplying just over 25% of the total. Germany accounted for the greatest proportion of gas imports into the EU in 1994, taking 35.4% of the total. France and Italy were the other principal EU gas-importing countries.

Intra-EU trade takes the form principally of exports from the Netherlands to its neighbouring countries, although Denmark has begun to export small quantities of gas to Germany. Exports from the Netherlands to the rest of the EU declined by almost 9% in 1994 versus 1993, totalling 1.33 million TJ.

Table 5: Exploration and distribution of crude oil and natural gas
Imports by Member State - Crude oil (1)

(million tonnes)	1992	1993	1994
EUR 12	499.4	504.8	502.4
Belgique/België	32.5	32.6	31.6
Danmark	5.6	5.6	5.6
Deutschland	98.3	99.1	106.3
Ellada	16.3	16.3	14.8
España	55.0	55.0	54.8
France	75.1	76.3	77.6
Ireland	2.0	2.0	2.3
Italia	88.6	89.3	85.8
Luxembourg	0.0	0.0	0.0
Nederland	56.2	59.3	56.7
Portugal	11.8	11.3	13.8
United Kingdom	58.0	58.0	53.1

(1) Including feedstocks.
Source: Eurostat

MARKET FORCES

Demand

Demand for crude oil is conditioned by demand for refined petroleum products. This is treated in more detail in the chapter concerning refining and distribution of oil products. In most cases the only outlet for crude oil as such is as an input into oil refining, which transforms crude oil into products which are used in end-use sectors of demand. In recent years, there has been slow growth in crude oil demand in the refining sector, with 1994 EU-12 refinery production running at 2.5% above 1993 levels.

Demand for natural gas is expanding in most end-use sectors, apart from the transportation sector, where petroleum products are likely to remain dominant for the foreseeable future. Natural gas is also making significant inroads into the power generation sector. These trends have led to a significant increase in the role of natural gas in the energy demand mix of the EU. Detailed sectoral demand trends are treated in the chapter concerning transmission and distribution of natural gas. In overall terms, the expansion in natural gas demand has been owed both to its improved availability in the major markets of the EU as well as its favourable economics and environmental advantages relative to other fuels in many applications.

Supply and competition

83% of EU crude oil production originates from fields on the British continental shelf. Another 13% come from the North Sea sectors of Denmark and the Netherlands, making the North Sea the overwhelmingly dominant source of supply for indigenous crude oil production in the EU.

Exploration and development activity provides one indicator of prospects for future developments in indigenous EU crude oil production. This is measured by the number of wells drilled. In both 1993 and 1994, the number of wells drilled in the EU totalled between 430 and 440, a mere 0.7% of the world's total drilling activity, and less than half the levels experienced in the mid-1980s. However, drilling activity is declining everywhere as advances in technology improve the rates of drilling success. Globally, the number of wells drilled annually has dropped by 37% since 1985, but world reserve additions have outpaced oil consumption over the whole of this period.

With regard to natural gas, the Netherlands provides 38% of total EU natural gas production, almost 80% of which is from on-shore fields (principally from the giant Groningen gas field). Gas production in the Netherlands is a source of supply for several countries in the EU, notably Belgium, Germany, France and Italy, as well as providing a significant portion of the Netherlands own energy needs. The United Kingdom now has a similar level of natural gas production as the Netherlands has, after continually boosting output over recent years. United Kingdom's output, however, is solely devoted to its

Table 6: Exploration and distribution of crude oil and natural gas
Extra-EU imports by country of origin, 1994 - Natural gas

(thousand TJ, GCV) (1)	Former USSR	Algeria	Norway	Libya	Total
EUR 12	2 061.4	1 110.3	1 097.2	56.6	4 325.5
Belgique/België	0.0	165.0	92.1	0.0	257.1
Deutschland	1 092.7	0.0	439.8	0.0	1 532.5
España	0.0	188.9	42.8	54.5	286.2
France	443.8	321.4	297.0	0.0	1 062.2
Italia	525.0	435.0	0.0	2.1	962.1
Nederland	0.0	0.0	109.3	0.0	109.3
United Kingdom	0.0	0.0	116.2	0.0	116.2
Share in total extra-EU imports(%)	47.7	25.7	25.4	1.3	100.0

(1) TJ: terajoule; GCV: gross calorific value.
Source: Eurostat

national market, there being no infrastructure linkages with the continental European gas transmission system. This situation could change over the next few years when a proposed pipeline interconnector linking the United Kingdom with Belgium is constructed. This would permit British exports of gas to continental Europe in its early years of operation, and later imports of gas to the United Kingdom as British production declines in the early years of the next century.

Production process

Exploration and production of oil and gas requires a highly skilled and experienced work force. The fact that the vast majority of exploration in the EU takes place offshore only heightens these requirements. By the same token, the EU is in a position to export highly trained and skilled labour in this sector.

R&D activity in the industry has traditionally been high. The nature of R&D programmes reflects the significant proportion of offshore operations undertaken in the upstream oil and gas sector. The high price of crude oil during the first half of the 1980s encouraged research into enhanced recovery methods. To reduce costs, improvements were made in the tools and operating efficiencies of exploration and production. Most of these programmes produced excellent results and generated significant growth in terms of services and equipment installation within the EU. Even so, the depth and the sometimes harsh operational environment of the North Sea have assisted EU companies involved in oil exploration and production to acquire unparalleled offshore operational experience.

Since the late 1980s, the increased emphasis on the development of smaller and deeper fields has led to further technological developments, many of which streamline or increase the efficiency of production. Some of the important technological advances made in the North Sea include: improved and streamlined platform designs; development of sophisticated floating production systems; improved platform safety systems such as interlocking fireproofing panels, multimedia on-platform safety monitoring systems and offshore escape systems; more efficient sub-sea completion systems such as highly flexible and durable flowline swivel joints; the development of dynamically positioned drilling vessels capable of operating at depths of 2 000 metres; the completion of the first commercial horizontal drilling operation; the development of deep-diving techniques and submarine vessels for underwater activities; improved measurement of static and dynamic statistics; the development of sophisticated pigs such as high friction reversible safety pigs; improved pigging techniques; and better geophysical data acquisition systems such as real-time processing of short offset 3D data. These developments have particularly contributed to the maintenance of commercial viability of offshore deep-sea production in the North Sea in a period of extended moderation in oil-prices, relative to the late 1970s and early 1980s , when high oil-prices triggered the expansion in North Sea development activity.

The industry's CRINE (Cost Reduction In a New Environment) initiative has, in addition to technological advancement, contributed to increased activity in the North Sea.

INDUSTRY STRUCTURE

Companies

Although almost 50 companies operate oil production sites in the EU, actual output is dominated by giants, Shell, Esso and BP (with Shell and Esso often operating as joint-venture partners in oil and gas production in the North Sea). Principally by virtue of their long-established presence as operators of some of the most important producing fields in the United Kingdom, these companies produced 38% of EU crude oil production in 1994 (and 45% of United Kingdom oil pro-

Table 7: Exploration and distribution of crude oil and natural gas
Intra-EU imports by country of origin - Natural Gas

	1992		1993		1994	
(thousand TJ, GCV) (1)	Nederland	Danmark	Nederland	Danmark	Nederland	Danmark
EUR 12	1480.5	30.0	1465.4	31.3	1334.2	34.3
Belgique/België	170.2	0.0	182.9	0.0	175.5	0.0
Deutschland	874.0	30.0	871.8	31.3	793.6	34.3
France	187.5	0.0	150.1	0.0	172.7	0.0
Italia	227.1	0.0	238.1	0.0	169.7	0.0
Luxembourg	21.7	0.0	22.5	0.0	22.7	0.0

(1) TJ: terajoule; GCV: gross calorific value.
Source: Eurostat

Table 8: Exploration and distribution of crude oil and natural gas
Number of wells drilled

(units)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR 12	1000	850	720	790	590	716	860	663	434	439
Share in World total (%)	1.0	1.4	1.3	1.5	1.3	1.4	1.3	1.2	0.7	0.7
USA	69 700	39 400	34 500	33 700	31 252	27 019	26 571	23 998	25 337	25 156
Share in World total (%)	72.2	65.6	60.4	63.8	66.8	53.5	40.7	42.7	41.6	41.5
World (1)	96 600	60 100	57 100	52 800	46 800	50 517	65 357	56 263	60 853	60 567

(1) Including former USSR and other Eastern European countries from 1991 onwards.
Source: CPDP

duction). Other important players, each with important activities in the British North Sea, were Elf, Amerada Hess, Mobil, and Agip. In the Danish sector of the North Sea, which accounts for 6% of EU oil output, all production is carried out by the Danish Underground Consortium (DUC). This is a joint-venture between Danish shipping company AP Moller and two oil companies, Shell and Texaco.

With regard to gas production, the British sector has a similar variety of companies operating as for oil production. B.P., Shell, and Esso are again important operators. British Gas is also involved in gas production, particularly as owner and operator of the Morecambe Bay field off the north-west coast of England. Other important operators are Mobil, Conoco, Amoco, Elf, Phillips, and Total. Deregulation of the United Kingdom gas market has encouraged several of these companies to develop direct marketing operations in the United Kingdom in competition with British Gas. The advent of competition, together with the increase in United Kingdom gas production and the lack of outlets other than the United Kingdom market, has caused the spot price of United Kingdom gas to tumble since 1994, causing severe financial problems to British Gas, which negotiated long-term "take-or-pay" contracts with suppliers when prices were much higher and its competitive position in the market much stronger. This situation is unresolved at the time of writing this chapter.

In the Netherlands, gas production is dominated by NAM, a joint-venture between the state and two companies, Esso and Shell. NAM operates the giant onshore field of Groningen which supplies the bulk of the Netherlands gas output. Amoco, Lasmo and Unocal are also present, alongside NAM, in the offshore Dutch North Sea sector.

As with oil, Danish gas production is entirely under the control of the Danish Underground Consortium.

REGIONAL DISTRIBUTION

The production of crude oil and natural gas in the EU is extremely polarised towards the major hydrocarbon reserve basin which is the North Sea. Of the EU countries, the United Kingdom, the Netherlands, Denmark, and Germany have access to North Sea production, with Norway also accounting for a significant proportion of North Sea reserves and output. The United Kingdom dominates EU crude oil output, accounting for 83% of total EU oil production in 1994. As for natural gas, the Netherlands and the United Kingdom each account for around 37% of EU production. Italy, Germany and Denmark also contribute in a more limited way to EU oil and gas output.

ENVIRONMENT

Stringent regulations are applied to all oil and gas exploration and production operations in the EU. These include regulations concerning oil spills and discharges of cuttings and oil mud. Safety regulations are also very strict, having been tightened in the wake of several accidents that occurred in the North Sea at the end of the 1980s, especially the explosion and fire aboard the Piper Alpha platform.

Work is also being undertaken to clarify rules and standards for the abandonment of disused offshore installations and structures. This became a particularly sensitive issue in 1995, when Shell was forced to abandon its plans, otherwise approved by the British government, to sink the disused Brent Spar platform in deep waters in the North Atlantic. Environmental activists protested against the plan, and Shell was forced to withdraw when it became clear that other parts of its business were being hit by the protests, despite evidence that deep-sea dumping was the most environmentally-friendly option for the platform's disposal. The incident ensured that future installation disposal decisions will be subject to intense public scrutiny, and the industry must ensure that its case is well-presented.

REGULATIONS

In 1994 the Council adopted Directive 94/22/EC of the European Parliament and of the Council on the conditions for granting and using authorisations for the prospection, exploration and production of hydrocarbons (the Hydrocarbons Licensing Directive 'HLD'). This Directive entered into force on 30 June 1994. It sets up common rules for ensuring that the procedures for granting authorisations for the prospection, exploration and production of hydrocarbons must be open to all entities possessing the necessary capabilities. Authorisations must be granted on the basis of objective and published criteria. The conditions under which authorisations are granted must likewise be known in advance by all entities taking part in the procedure.

OUTLOOK

EU crude oil production will reflect developments in the North Sea, particularly with respect to the British sector, which is expected to continue to dominate total EU production. Output is expected to peak at the end of the 1990s at around 177 million toe. Thereafter, EU oil production will begin a long-term decline as new discoveries will tend to be much smaller, and insufficient to replace depleting production from the North Sea's giant fields. By 2015, EU oil production is expected to have dipped below 100 million tonnes oil equivalent.

The outlook for natural gas production is similar to that for oil, with output peaking in the year 2000, at 182 million toe, 15% above 1994 levels. Thereafter, production will also enter a period of gradual long-term decline as reserves are depleted. This decline will be slower than that of oil, such that, by 2015, gas production should still be in excess of 150 million toe. The United Kingdom and the Netherlands will continue to provide the bulk of EU gas production.

Written by: DRI Europe

Nuclear fuels

NACE (Revision 1) 12 and 23.3

The development of nuclear powered electricity generation facilities in the EU is now occurring at a much slower rate than in the 1980s, following the slowdown in growth in European electricity demand. Only France currently has a continuing construction programme of nuclear power stations. With no immediate demand for new plants in Europe, the industry has turned its marketing efforts to expanding markets in the Far East. European companies are working on new advanced reactor designs, although the industry does not anticipate significant new reactor orders in the EU countries until justified by expanding electricity demand and public acceptance.The industry is also investing in new technology for enrichment and MOX fuel fabrication and expanding its capacity to reprocess spent fuel.

INDUSTRY PROFILE

Description of the sector

NACE (Rev.1) 12 covers the mining of uranium and thorium ores, and thus relates specifically to the supply of raw materials to the nuclear fuels industry. NACE (Rev.1) 23.3 covers the processing of nuclear fuels, involving the following key activities:

- the conversion of uranium concentrates to a gaseous state, uranium hexafluoride (UF6);
- the isotopic enrichment of UF6 to fissile levels, which involves increasing the concentration of Uranium 235 (which is the most active isotope);
- the fabrication of enriched uranium into fuel pellets for use in a power station;
- the removal of spent fuel for reuse (reprocessing) or final disposal in a storage facility.

In previous years, both supply and processing activities of nuclear fuels were classified under NACE 15.

Companies active in the field of nuclear fuel cycle involve both dedicated nuclear companies and those providing a wide range of engineering services. The most important nuclear fuel companies in the EU include ABB-Atom AB in Sweden, which is a private company, BNFL in the United Kingdom, which is state-owned, and COGEMA, which is owned by the French State and the private oil company Total. Other companies are ENUSA, a 60% privately held Spanish company and, in Germany, Siemens, also privately held.

Recent trends

Capacity in uranium production within the EU has been on a downward trend since the early 1990s. Most of the cuts in production capacity have taken place in France, which more than halved its uranium output between 1992 and 1995. Germany has also cut back its output in response to high production costs.

International comparison

EU electric utility companies need about 20 000 tonnes natural of uranium per year to operate their reactors. The EU produces 7% of these annual uranium requirements, production being concentrated in France which accounts for 74% of the EU total. France produced about 1 000 tU in 1995. The EU accounted for 10% of total OECD production of natural uranium in 1995 with 1 364 tU (tonnes of uranium). Canada remained the largest uranium producer with almost 10 500 tU, and is also the world's largest exporter. The EU is thus largely dependent upon imports primarily from Canada, Australia, South Africa and the countries of the former Soviet Union to meet the majority of its requirements.

France also has the largest capacity for converting uranium into UF6 among the OECD countries, with EU countries accounting for over 50% of the OECD total. Two-thirds of this conversion occurs in France and the rest occurs in the United Kingdom. The two companies concerned, Comurhex (F) and BNFL (UK), have production capacity of 14 000 and 6 000 tU/yr respectively. Export markets in Asia and the USA are very important for this industry.

The EU had a total enrichment capacity in 1994 of 14.1 million separative work units (SWU per year, a measure of a plant's enrichment capacity), rather more than the region's annual requirements of 11 million SWU. Over 75% of this capacity uses the gas diffusion process (used by Eurodif, a French company) and the remainder uses gas centrifuge technology (used by Urenco, a consortium of companies in the United Kingdom, the Netherlands and Germany). The USA produces enriched uranium solely by the diffusion process. Russia also produces significant quantities of SWU.

The EU has a number of world class companies providing a complete range of fuel fabrication capabilities. These include fuel elements for light water reactors, gas cooled reactors, and fast breeder reactors, as well as a growing mixed oxide fuel (MOX) capability.

Companies in Belgium, France, Germany, Spain, Sweden, and the UK compete in supplying the light water reactor fuel fabrication market. EU production capacity for LWR fuel pellets (for both PWR and BWR reactors) is approximately 3 500 tHM/yr (tonnes of heavy metal per year), with western world total production around 10 000 tHM/yr. Companies in Belgium, France and the UK also produce mixed oxide fuel (MOX) which uses recycled plutonium.

For countries who have chosen to reprocess their spent fuel (Belgium, France, Germany and the UK), there are two plants in Europe: COGEMA's La Hague facility, with an annual capacity of 1 600 tHM, and BNFL's Sellafield plant, which has a nominal capacity of 850 tHM/y.

Foreign trade

Pursuant to the treaty that bears its name, Euratom has to ensure the principle of equal access to sources of supply and, in this regard, is involved in both imports and exports of nuclear material.

The EU imports a considerable amount of its natural uranium requirements, over 90% in 1994. However, the EU has a strong commercial position in the conversion and enrichment business, where it is a net exporter with significant market share in the Far East. Spent fuel from nuclear reactors bound for reprocessing is also traded, France and the United Kingdom being the world leaders in the reprocessing trade.

MARKET FORCES

Demand

The demand for nuclear fuel services is closely linked to the use of nuclear power in the production of electricity. The EU had 120 GWe of net nuclear electric capacity at the end of 1995. Four new plants are under construction in France. With the exception of France, and the United Kingdom (Sizewell B) on a smaller scale, there has been no expansion in nuclear power plants in the EU since the mid-1980s.

Asia is the only other region currently constructing new nuclear power plants with almost 33 000 MWe of new capacity planned for production by 2005, in China, Japan, South Korea and Taiwan. In the countries of the former Soviet Union, governments continue to support the expansion of their nuclear programmes, but financing construction remains a major issue.

Table 1: Nuclear fuels

Natural uranium production (tonnes uranium/year)	Actual production 1992	Actual production 1993	Actual production 1994	Actual production 1995
Total EU Member States	2 641	2 106	1 420	1 364
Belgique/België (1)	45	45	40	40
Deutschland (1)	232	116	47	35
España (1)	186	183	256	255
France	2 150	1 730	1 053	1 016
Portugal	28	32	24	18
Canada	9 337	9 155	9 647	10 450
USA	2 171	1 178	1 289	1 327

(1) NEA secretariat estimate for the year 2000.
Source: OECD/NEA Nuclear Energy Data, 1996, with some corrections supplied by BNFL

Table 2: Nuclear fuels

Conversion capacities and requirements in the EUR15 (tonnes uranium/year)	1992	1993	1994	1995	Capacities 2000
Comurhex (F)	14 000	14 000	14 000	14 000	15 500
BNFL (UK)	6 800	6 000	6 000	6 000	7 200
Total	20 800	20 000	20 000	20 000	22 700
Requirements	16 609	16 808	18 505	18 998	17 910

Source: NEA

Table 3: Nuclear fuels

Enrichment capacities and requirements in the EUR15 (tonnes SWU/year) (1)	1992	1993	1994	1995	2000
Capacities					
Eurodif (F)	10 800	10 800	10 800	10 800	10 800
Urenco (D, NL, UK) (2)	2 750	2 800	3 300	3 450	4 000
Total	13 550	13 600	14 100	14 250	14 800
Requirements	10 844	10 992	11 119	11 055	11 198

(1) SWU: Separative Work Unit.
(2) NEA secretariat estimates for the year 2000.
Source: NEA

Table 4: Nuclear fuels

Capacities and requirements for the fabrication of LWR and MOX fuel elements in the EUR15 (1) (tonnes HM/year) (2)	1992	1993	1994	1995	2000
Capacities					
Belgique/België	435	435	435	435	435
France	1 165	1 165	1 165	1 285	1 285
Deutschland (3)	875	975	975	950	400
España	250	250	190	220	250
Sverige	400	400	400	400	600
United Kingdom	200	202	202	208	458
Total	3 325	3 427	3 367	3 498	3 428
Requirements	3 308	3 151	3 531	3 391	2 734

(1) LWR: Light Water Reactor.
(2) HM: Heavy Metal.
(3) Excluding mixed oxide fuel for light water reactors for the years 1995 and 2000.
Source: NEA

Table 5: Nuclear fuels
Nominal reprocessing capacities of LWR fuel elements in the EUR15 (1)

(tonnes HM/year) (2)	1992	1993	1994	1995	2000
Cogema (F)	1 200	1 200	1 600	1 600	1 600
BNFL - Thorp (UK)	0	0	850	850	850
Total	1 200	1 200	2 450	2 450	2 450

(1) LWR: Light Water Reactor.
(2) HM: heavy metal.
Source: NEA/BNFL

The demand for different types of fuel elements stems from the different types of nuclear reactors. The main reactor designs currently in large scale use in Europe are:

- PWR (Pressurised Water Reactor), the most common reactor type which uses enriched uranium or MOX fuel;
- BWR (Boiling Water Reactor), which uses enriched uranium fuel or MOX fuel;
- AGR (Advanced Gas-Cooled Reactor), in use in the United Kingdom only and requires enriched uranium fuel;
- GCR/MAGNOX (Gas Cooled Reactor) now only used in the United Kingdom (MAGNOX), and requiring natural uranium fuel;
- FR (Fast Reactor), not yet commercially available, but one large scale plant is in operation in France (another large FR is operating in Japan). FRs use plutonium fuel, which is separated from spent fuel from other reactor types.

Supply and competition

Uranium production

The EU itself has an annual uranium production of less than 1 400 tU, with the remainder of its requirements being imported. This level of production has declined sharply in recent years, cutting back by almost half between 1992 and 1994. Electricity producing companies have tended to diversify their sources of supply in order to guard against unexpected interruptions. They have also built-up stockpiles which can vary from two to four years' worth of consumption.

Within the EU, uranium is produced by just a few Member States, with 74% coming from France, the balance being produced in Spain, Germany, Belgium and Portugal. The EU accounts for 10% of OECD uranium production. This contribution has declined steadily as economic resources of uranium in the EU have been depleted.

France is by far the leading EU producer, with annual production of 1 016 tU in 1995. However, production has been declining rapidly, and the only producer, COGEMA, is increasingly looking elsewhere for uranium resources in the higher ore grades.

Spain is the second most important producer in the EU, and production is owned and managed by the government organisation, Empresa Nacional de Uranio SA (ENUSA). Almost all the uranium produced in Spain comes from the Sealices el Chico mine works at Ciudad Rodrigo from ore extracted from the uranium deposits at Fe. The remainder was produced by the small Haba experimental mine situated at Don Benito (which has an annual output capacity of around 30 tU).

Less than 50 tU were produced in Germany in 1995. Production capacity is about 150 tU per annum, but limited ore supplies means that capacity is under-utilised. There are no plans to increase uranium production in Germany. Production at the former eastern German mine Wismut is limited to material derived from their reclamation production.

European companies have invested in other producing countries such as Australia, Canada and South Africa. The French producer, Cogema is developing the McClean orebody in Canada.

Conversion of uranium

At present, two companies carry out conversion operations in the EU, BNFL in the United Kingdom and Comurhex, a wholly-owned subsidiary of COGEMA in France. The EU conversion capacity is currently 21 300 tU/yr, and therefore has a utilisation rate of almost 85%. The only other OECD region with significant conversion capacity is North America, where there is approximately the same capacity as in the EU.

The main importing region is north-east Asia, where between Japan and South Korea there is a demand for nearly 10 000 tU/yr, and no significant conversion capacity.

Despite strong competition, BNFL (United Kingdom) and Comurhex (F) have been able to obtain a significant proportion of non-EU European markets and have thus been able to ensure adequate utilisation of their facilities.

Uranium enrichment

Uranium enrichment accounts for about 25% of the cost of the nuclear fuel cycle. The process increases the content of U_{235} (fissile uranium) in the fuel from 0.7% to between 2 and 5%. Most modern reactors (PWRs, BWRs and AGRs) require enriched uranium fuel.

Currently there are two commercial processes used for uranium enrichment, firstly gas diffusion and secondly centrifugal separation. Gas diffusion is a widely used technology, but is more energy intensive.

Production in the EU is in the hands of two groups, Eurodif (F), using gas diffusion technology, and Urenco (UK, NL, D), using gas centrifuge technology. The Eurodif consortium has a large diffusion plant at Tricastin in France, with a nominal capacity of 10.8 million SWU.

Urenco Ltd (UK) was formed on the basis of an equal equity split between Uranit GmbH (D), British Nuclear Fuels Plc (UK) and Ultracentrifuge Nederland (NL). The company was established to develop and apply, on an industrial scale, the centrifugal enrichment technique.

The present capacity of the Urenco group of plants is around 3.5 million SWU/yr, split between their three plants at Almelo, in the Netherlands, Capenhurst, in the U.K., and Gronau, in Germany. However, Urenco plans to expand production at its German site and may have approximately 4.5 million SWU capacity after 2005.

Several new technologies for enriching uranium using lasers to separate the U235 atoms from the other uranium atoms are undergoing research and development. These technologies are called MLIS and AVLIS (Molecular Laser Isotopic Separation and Atomic Vapour Laser Isotopic Separation). AVLIS has been selected by Cogema, USEC (in the US) and in Japan, but there are currently no plans to build a new enrichment plant until after 2000. MLIS is a chemical laser separation process which has been under investigation in a number of countries and a demonstration plant may be built in South Africa.

Fabrication

Fuel fabrication investment is low in comparison to the value of the product. International markets are not developed, since fuel assemblies have to comply with certain specific criteria (technology, local regulation etc.), so most of the countries in the EU with established nuclear programs have a fuel fabrication plant, and are self-sufficient in fuel element fabrication. Only the Netherlands has no fabrication facilities of its own. For the EU as a whole, fuel requirements in 1994 amounted to just over 3 000 tonnes, compared with a capacity of almost 3 450 tonnes.

The largest producer of fuel elements for light water reactors (LWR) within the EU is FBFC, a subsidiary of the French companies Framatome and COGEMA, with plants in Belgium (Dessel) and France (Romans and Pierrelatte). Other EU producers include ABB Atom AB (Sweden), Siemens (Germany), ENUSA (Spain), and BNFL (U.K.). BNFL produces fuel assemblies for both LWR and GCR (MAGNOX and AGR).

The production capacity of fuel elements has been relatively stable, and is expected to remain so. However, there is a small but expanding market for the fabrication of plutonium into MOX fuel. Companies in Belgium, France and the UK are all providing this additional service for customers who choose to reprocess and recycle their spent fuel. With the start of France's MELOX plant in 1995, current European MOX production capacity is nearly 200 tonnes of heavy metal per year which will expand soon with the start of a 120 tMH/y plant at Sellafield in the UK, tobe operated by BNFL, which is scheduled to be commissioned at the end of 1997.

Storage and reprocessing of discharged fuels

After the fuel is burned in the reactor for a specified period of time, it is removed and placed in temporary storage. Then, depending upon which option has been chosen in a country, the waste will either be reprocessed or sent to a facility for storage and then burial. In some countries both options are possible. According to a recent OECD study, fuel reprocessing and waste management represent about 25% of the total fuel cost.

Direct Disposal Option: If direct disposal is the preferred method, as in the case of Sweden for example, the spent fuel is stored temporarily, to be buried eventually in a deep geological facility. To prevent leaks and ensure the safety of workers and the public, the spent fuel is encapsulated in stainless steel containers which will be placed in specially engineered facilities for long term storage and then burial. Research on preferred storage facilities is well under way and in many EU countries a first site will be selected for a facility around 2000.

Reprocessing Option: For those countries which have selected reprocessing, the fuel will be placed in a canister and transported to a special facility for reprocessing. The spent fuel is processed in order to separate the uranium and plutonium, and the remaining material (about 3% of the total) is vitrified and then sent to a high level waste facility. The reprocessing process removes the metal rod from around the fuel and then dissolves the fuel in hot, concentrated nitric acid. Then the uranium and plutonium are separated using chemical processes which also purify it so that it may be fabricated into MOX fuel and recycled to make electricity. Plutonium may also be used in the fast neutron reactor program in France (Phenix, Superphenix). COGEMA has a 1 600 tHM/yr reprocessing capacity and BNFL has a nominal capacity of 850 tHM/yr.

Production process

Uranium is produced from open pit or underground mining methods, and as a by-product of phosphate production in Europe. The natural ore is then concentrated by milling and a leaching process. Elsewhere in the world, a chemical extraction method called in-situ leaching (ISL) or uranium produced as a by-product of copper and gold mining is also used.

The conversion process converts uranium oxide into uranium-hexafluoride, which lends itself to subsequent processing (enrichment and fabrication) and which possesses the required chemical purity. Conversion represents only about 3% of the total cost of the fuel.

Enrichment is the process in the fuel cycle where the fissile isotope content of the uranium is increased. This stage is necessary in the case of fuel destined for light water reactors (either PWR or BWR) and for advanced gas cooled reactors (AGR). Three processes used for uranium enrichment exist. Two are currently commercially used. The technology based on gas diffusion is the sole process used in France. In the United Kingdom, Germany and The Netherlands, centrifuge technology is used. Since this technology uses far less power, it is the cheapest based on marginal costs. However, since centrifugal shops have a small capacity, this technology does not benefit from the economies of scale enjoyed by the much larger diffusion plants.

A new process now exists, known as atomic vapour laser isotope separation (AVLIS) which could cut costs even further, although this is not yet available commercially. This technology is being developed in France and in the USA, where the diffusion methods are also used.

Fabrication of the fuel elements comprises the operations during which uranium fluoride, enriched or otherwise, is used to produce the final fuel elements to be placed into the reactors. This stage represents about 11% of the total fuel cost.

Reprocessing is a complex chemical operation performed on spent fuel discharged from nuclear power stations. This fuel is a mixture of reusable products (unspent uranium and plutonium created during the fuel irradiation in the power station's reactor) and fission products, which are highly radioactive and are akin to the ashes from using fissile material.

The reprocessing operation enables the various products to be separated. Recycling recovered uranium and plutonium reduces the demand for natural uranium. Plutonium may be recycled in LWR as MOX, or in fast breeder reactors.

The only OECD countries with reprocessing capabilities are France, the United Kingdom and Japan. Reprocessing is also practised for industrial purposes by Russia.

ENVIRONMENT

Environmental considerations of the nuclear fuel cycle mainly stem from radioactive waste produced by nuclear installations. To this end, it should be noted that the volumes generated by nuclear energy are negligible compared to both the volume of ashes from fossil fuels combustion, and the volume of industrial wastIn an attempt to limit the volume of waste material, nuclear refuse is concentrated into solid and solidified forms. The amount of radioactive waste generated in a country depends upon whether direct disposal or reprocessing is selected. Radioactive waste comes from a variety of sources, medical, chemical, agricultural as well as nuclear electricity production. The volume of waste generated by the nuclear industry is small compared with other types of energy generation. This is because uranium creates a large amount of energy in proportion to its use: the complete fissioning of one tonne of uranium is equivalent to burning 2.7 million tonnes of coal (OECD/NEA Radioactive Waste Management in perspective 1996).

There are three main categories of waste: low level, intermediate and highly active wastes. Low-level waste (LLW) forms the vast bulk of waste material. LLW is defined as material which emits so little radiation there is no need for special protection, simple protection such as rubber gloves

is adequate. The material is either held in surface or near surface installations where the composition of the waste is controlled over a maximum period of 300 years. Prior to 1982, some of the low-level waste was dumped in special containers at sea. However, following the adoption of the Convention on the Prevention of Marine Pollution from the Dumping of Waste and Other Matters, the practice was curtailed in the OECD.

Intermediate level waste (ILW) can be divided into: a) material that has been contaminated by radionuclides which have a long half-life (the period of time taken for the level of radioactivity to fall to half of its initial level) but produce little heat because of their moderate concentration of radioactive elements; and b) material containing and emitters only, but containing intermediate levels of radioactivity that produce no significant amount of heat. ILW generally requires more protection for workers, either metal or concrete shielding and remote handling devices. This waste generally has a longer half life than the LLW material and thus most often is stored with the higher level waste.

High-level waste (HLW) consists of irradiated fuel discharged from a nuclear reactor (when it is not intended to reprocess and recycle them), and vitrified fission products produced after the reprocessing of spent fuel. This material has a very high radioactive toxicity some of which can persist over thousands of years. High level waste material requires isolation from the environment for a long period of time before radioactivity has decayed sufficiently to protect current and future generations and therefore deep geological disposal has been widely accepted as the solution which is both technically possible and ethically appropriate.

REGULATIONS

The nuclear fuel industry operates under an extremely tight system of safety regulations. These have been developed both on a national basis, and with a considerable amount of international co-operation through a number of institutions including the International Atomic Energy Agency, the Nuclear Energy Agency (OECD), and the EU. Regulations cover all aspects of the industry including such factors as the emissions of nuclear particles to the environment (air, land and water), the exposure of the public and employees to radiation and the control of plant construction and operation through licensing procedures.

Apart from regulations covering the civil use of radioactive materials, the nuclear fuel industry is also subject to measures to control the spread of nuclear materials for military applications. Within Europe, Euratom was established in 1957, with its general objective being, inter alia, to ensure that nuclear materials do not get diverted to purposes other than those for which they were intended. The Euratom safeguards system is founded in European law, with strong sanctions for infringements. Aside from ensuring that the material is not being diverted from the declared uses, Euratom also checks to see that declarations of specific use are correct and that the suppliers obligations are being respected. These regulations are designed to ensure that no material in the civil fuel cycle is used for military purposes. The strict materials control and accounting procedures of the EURATOM Safeguards Inspectorate in Luxembourg verifies that all the civil material is safeguarded. This system applies to nuclear material that is produced or imported into the territory of the EU.

Regulations cover all aspects of the industry including the control of facility operation and construction through licensing procedures. Separately environmental regulations must also be met including monitoring emissions to the air, land and in rivers or the sea.

Workers exposure to radiation must be monitored as well as potential exposure to the public.

OUTLOOK

The long term future of the nuclear fuel industry is linked to that of the use of nuclear power in electricity generation.

Since 1983, two thirds of the electricity capacity increase of the major OECD countries (USA, Japan, Germany and France) is owed to nuclear energy. Today, France is the only country within the EU that is continuing to build new nuclear power plants, and that at a much slower rate than in the past. The current generation of nuclear plants are licensed to operate well into the next century. Until there is substantial new growth in electricity demand there will not be a need for new nuclear electricity generating capacity in most of Europe. After 2010 existing plants will begin to reach the end of their licensed operating life.

Recent expansion of reprocessing facilities should mean that current capacity of 2 450 tonnes will be available to the turn of the century. This should ensure sufficient capacity to reduce the backlog of material that has been in storage. Taking account of quantities to be reprocessed from countries outside the EU, it is estimated that interim storage requirements could be about 20 000 tU from 1995 to 2000. The necessary storage capacity to cover these requirements is already in place.

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Refining and distribution of oil products

NACE (Revision 1) 23.2

EU inland demand for petroleum products was almost unchanged in 1994 from 1993 levels, but slow growth in demand is expected to resume over the second half of the decade. The structure of the demand barrel will continue the current trend of growth for middle distillates at the expense of both heavy and light products, as dieselisation of the road transport fleet, and increasing air travel, boost consumption of diesel fuel and jet fuel. EU refineries will have to continue to invest to meet these changing market requirements.
Another major challenge for the refining and distribution sector in the mid-1990s comes from requirements for investment to meet changing environmental standards, both in the quality of fuels produced, and emissions from the refineries. Standards may be subject to significant change over the next few years, and refiners will have to carefully position themselves to optimise investment and maintain viability of their operations. Under the pressure of investment needs and weak refining margins, a new wave of capacity restructuring in the sector is widely expected to take place over the next few years.

INDUSTRY PROFILE

Description of the sector

NACE (Revision 1) 23.2 is defined as the manufacture of refined petroleum products. Inputs to this process are crude oil and semi-finished petroleum feedstocks. The main final products of this process include liquefied petroleum gases (LPG), naphtha, motor gasoline, aviation fuels, kerosene, gasoil (diesel fuel and heating oil), residual fuel oils and lubricants. The classification also usually includes distribution of refined petroleum products to consumers, including the operation of storage facilities, transport and retail outlets.

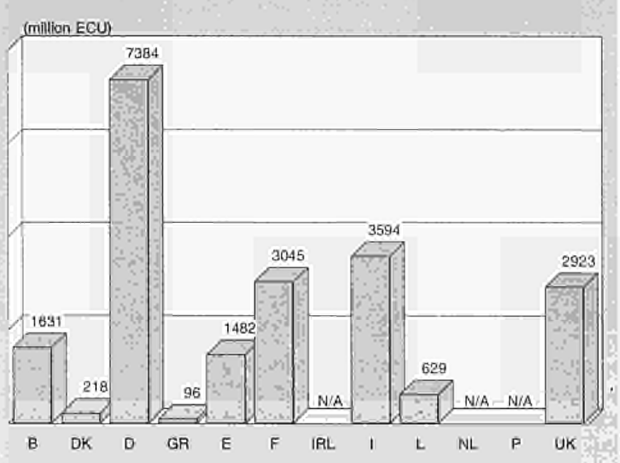
Recent trends

Total EU inland petroleum product demand in 1994 was 494 million tonnes (excluding refineries own consumption and marine bunker fuels). This total represented a 1.4% annual increase relative to 1993, and resulted in inland demand returning to 1992 levels. This total excludes fuel used for marine bunkers, totalling an additional 34 million tonnes in 1994, again equivalent to 1992 demand levels.

The share of oil in total primary energy demand in the EU was 45.2% in 1994, virtually unchanged from 1992 and 1993, after having fallen to about 42% in 1989. The potential for substitution of other fuels for oil products is reducing as demand for oil becomes increasingly concentrated on the transport sector, in which few commercially viable alternatives to oil currently exist. This is also a growth sector for energy demand. At the same time, the incentive for investment in energy conservation and efficiency is much lower now than it was in the early 1980s, because of continuing moderation in oil prices.

These long term trends in energy and oil use have significantly modified the structure of oil demand, with lighter products taking a larger share, and heavy residual products a declining share of demand since the early 1980s. The share of residual fuel oil in total EU inland oil demand has declined from 23% in 1984, to 13.6% in 1994, as it has lost markets in industry, the residential and commercial sector, and power generation to natural gas and electricity.

Figure 1: Refining and distribution of oil products
Total exports of refined oil products by Member State, 1994



Source: Eurostat

Trends in production from EU refineries have generally followed the pattern of demand, with output volume and output structure adapting to the changing needs of the market. Since the early 1980s, the EU refining industry has shown considerable flexibility and ability to position its activities to respond to the needs of the market and the changing regulatory environment through a dual process of bringing total production capacity into line with demand, and investing in new production processes to ensure the mix of products corresponds to the structure of consumption. Refinery margins, however, have been low in recent years across most EU Member States, leading to increasing pressure to embark on a further round of rationalisation of refining capacity in the region.

Oil companies are also continually examining opportunities for rationalisation in their marketing activities, where margins have also bee weak in recent years. Most markets have seen closure of service-stations and asset swaps between marketers. The most spectacular example of this recently was the announcement of the merging of the refining, retail fuels marketing and lubricants marketing businesses of B.P. and Mobil in Europe.

International comparison

Demand for refined products in the EU, about 530 million tonnes in 1994, remains significantly lower than in the USA, the world's largest national market for petroleum products. 1994 refined product demand in the USA totalled just over 800 million tonnes, 50% higher than in the EU, although the USA has a population less than 75% that of the EU. The USA is thus a far more oil-intensive economy than the EU, principally because of the greater development of the transport sector on the other side of the Atlantic. In the USA, transport sector demand is dominated by gasoline, which has led to the development of significantly more upgrading capacity in the American refinery system than in Europe.

In Japan, the market for refined petroleum products is slightly over half that of the EU, totalling just under 270 million tonnes in 1994. The population in Japan is 125 million, thus per capita oil consumption is higher than the EU level. The main reason for this is that Japan still burns large quantities of oil in the power generation sector, as well as having a well-developed captive market for oil in the transport sector. Japan imports about 20% of its refined product demand needs as demand growth has outstripped local refining capacity. These imports are generally supplied from Singapore or the Middle East.

Table 1: Refining and distribution of oil products
Main indicators in volume

(million tonnes)	1992	1993	1994	Change 1993/94(%)
Imports of crude oil and feedstocks	499	498	502	0.8
Net production of refineries	514	537	552	2.9
Total imports of refined products (1)	172	179	165	-7.8
Total exports of refined products (1)	164	169	166	-1.8
Foreign trade balance of refined products	-8	-10	1	-110.0
Inland deliveries	494	487	494	1.4
Bunkers	34	35	34	-2.9

(1) Includes intra-EU trade.
Source: Eurostat

Table 2: Refining and distribution of oil products
Imports of petroleum products, 1994

(million tonnes)	Total imports	Change 1993/94 (%)	Extra-EU imports	Change 1993/94 (%)	Intra-EU imports	Change 1993/94 (%)
EUR12	165.3	-0.2	75.9	-10.3	89.6	-4.9
Belgique/België	12.9	2.4	3.0	3.4	10.2	5.2
Danmark	5.5	12.2	4.4	15.8	1.2	9.1
Deutschland	41.1	-10.1	10.1	-20.5	31.0	-6.1
Ellada	4.3	-25.9	3.5	-34.0	0.8	60.0
España	10.4	4.0	7.4	5.7	3.0	0.0
France	18.8	-19.7	7.4	-20.4	11.2	-20.6
Ireland	3.9	2.6	0.0	0.0	3.9	14.7
Italia	22.2	-7.5	13.3	-8.9	8.9	-5.3
Luxembourg	1.9	0.0	0.0	0.0	1.9	0.0
Nederland	31.1	-2.8	19.8	-8.3	11.3	8.7
Portugal	3.1	-32.6	0.8	14.3	2.3	-41.0
United Kingdom	10.1	0.0	6.2	-1.6	3.9	2.6

Source: Eurostat

Table 3: Refining and distribution of oil products
Inland deliveries of petroleum products in the EU, 1994

(million tonnes)	All products	Change 1993/94 (%)	Motor fuel	Change 1993/94 (%)	Gas/ diesel oil	Change 1993/94 (%)	Residual fuel oil	Change 1993/94 (%)
EUR12	494.1	0.1	110.0	-0.2	190.6	3.0	67.2	-7.9
Belgique/België	19.2	4.9	2.8	0.0	9.4	3.3	2.3	4.5
Danmark	8.5	6.3	1.9	5.6	4.0	-2.4	1.1	37.5
Deutschland	126.7	-0.8	30.3	-4.1	61.7	-2.2	7.5	-1.3
Ellada	12.5	3.3	2.7	3.8	4.5	2.3	2.6	0.0
España	48.8	8.4	9.2	3.4	16.6	5.1	7.6	10.1
France	80.4	-3.2	15.2	-3.8	38.8	-5.1	4.6	-8.0
Ireland	5.1	8.5	1.0	11.1	2.0	5.3	1.4	16.7
Italia	84.2	-1.9	17.0	2.4	23.7	-6.3	27.3	-3.5
Nederland	20.8	2.5	3.9	2.6	5.9	0.0	0.4	0.0
Luxembourg	1.9	0.0	0.5	0.0	0.9	-10.0	0.2	-33.3
Portugal	11.5	-0.9	1.8	0.0	3.1	6.9	3.2	-13.5
United Kingdom	74.5	-1.1	22.9	-3.0	20.9	6.6	9.2	-14.8

Source: Eurostat

Foreign trade

The EU is an open market for petroleum products, with most Member States both importing and exporting products on a regular basis to match supply and demand. Refineries are also able to tailor production to more global trends in product demand, for example exporting products across the Atlantic to the USA when demand is high and prices are favourable. In the very recent past, the introduction of reformulated gasoline in some regions of the American market has limited European refineries opportunities to participate in this trade, however, as few European refineries are geared up to meet reformulated gasoline specifications.

In 1994, the EU Member States imported a total of 165 million tonnes of petroleum products, of which 76 million tonnes were supplied by non-EU countries. The principal non-EU suppliers were OPEC countries, representing 29% of the total, and the former USSR, representing 20%. Norway and the USA each supplied almost 9% of EU imports from outside the Union.

Intra-EU trade totalled 90 million tonnes in 1994, 5% down on 1993 levels.

Extra-EU exports of refined products from EU countries totalled 76 million tonnes in 1994. The region as a whole was thus in balance with respect to refined products trade.

MARKET FORCES

Demand

Although refined petroleum products are used in a wide variety of applications, the transport sector is becoming the key market, not only in the EU, but also in most other regions of the world. In 1994, almost 37% of EU refined product demand was consumed in the transport sector (including road, marine and air transport), whereas 17% was consumed in industry, 21% in the residential and commercial sectors, and 8% as an input fuel into electric power generation. Of these sectors, the only one where oil consumption is enjoying growth is the transport sector, where ready substitutes for oil are not yet available on a large scale.

The 1994 EU refined product demand, totalling 528 million tonnes, was almost at the same level as 10 years earlier in 1984. However, increasing substitution away from oil in most end-use demand sectors apart from transport, together with significant gains in energy efficiency in the early part of this period, have led to changes in the structure of demand. Thus, over this ten-year period, the share of residual fuel oil in total demand for petroleum products (including demand for marine bunker fuels) has declined from 25% to 16.5%, as industry and power generation have switched to competing fuels, including natural gas, coal and electricity in industry, and nuclear power and natural gas in the power generation sector.

Supply and competition

Supply

Although the EU is an open market for petroleum products, EU-based refiners supply the vast majority of the region's petroleum product demand. This is owed to the historical development of the EU refining industry over the last 30 years, during which most Member States developed domestic refining capacity to cover their own needs while export-oriented refinery centres also developed in some zones, such as Rotterdam and Southern Italy. Such development was partly owed to the economics of transporting and refining oil, since it is generally less costly to ship crude oil and refine it close to consuming markets than to refine it close to the source of production and ship the refined products. Despite the rationalisation of refining capacity that took place in the 1980s, after the slowdown in EU demand growth, EU refineries still cover practically all of the region's needs, with trade serving to balance supply and demand for specific products. Indeed, the reduction in capacity has meant an improvement in capacity utilisation rates from below 70% in the early 1980s to over 90% today, thus improving the viability of those refineries which remain in operation. However, refining margins still remain weak, leading several European refiners to assess the options for further rationalisation. Still, as of early 1996, no large-scale closures have been implemented.

The following paragraphs describe some of the more important changes in the structure of supply in the recent past, with regard both to manufacturing (in refineries), and marketing and distribution (via retail outlets).

Refining

The decade of the 1980s saw the EU refining industry undergo profound restructuring. Capacity which had been constructed or planned in the 1970s, before the oil price shocks put a brake on regular demand expansion, was progressively taken out of service in order to bring overall capacity back in line with demand. At the same time, refiners made large investments in upgrading facilities designed to produce more of the lighter products and less residual fuel oil, in line with the evolution of market demand. This process saw total primary distillation capacity in the EU decline to 569 million tonnes/year in 1990. At the end of 1995, EU primary distillation capacity stood at about 605 million tonnes/year. This represents a small increase over the 1994 total shown in Table 4, and is accounted for by small capacity increases at several refineries in Spain, the United Kingdom, Italy and France, rather than any major new construction. The three new Member States, Austria, Finland and Sweden, have an additional primary distillation capacity of about 42 million tonnes per year. All Member States have some refining capacity with the exception of Luxembourg. The four countries with the most refining capacity are Italy, Germany, the United Kingdom and France.

The most recent plant-size addition to the EU refining network occurred in autumn 1991, when the 7.8 million tonne/year former Mobil refinery at Wilhelmshaven, in Germany, was brought back into operation. The refinery was acquired by Beta Refining & Marketing, a company jointly owned by trading companies Bulk Oil and Dreyfus. Other capacity increases have generally involved debottlenecking or new upgrading units at existing refineries.

The only major project entailing additional refining capacity in the EU is the construction of a new refinery at Leuna in Germany, where the former 5 million tonne/year refinery is to be decommissioned and replaced by a new refinery of about 9 million tonne/year capacity. This refinery is being built and will be operated by a consortium led by Elf. Since Elf was privatised, there has been some uncertainty over the company's commitment to the Leuna project, but this appeared to have been resolved in early 1995, when Elf agreed to reduce its stake from 67% to 43%, by selling a 24% share to Russian oil group Rosneft. Rosneft will be the sole supplier of crude oil to the refinery.

The principal recent refinery closure has been that of the Mobil refinery at Woerth in Germany, with a capacity of just over 5 million tonnes per year, which closed in mid-1995.

However, the pressures of weak margins on refinery operations are currently causing many oil companies to look closely at the future of their refining operations, and further closures or joint-venture arrangements could follow over the next couple of years. For example, in early 1996, B.P. announced its intention to dispose of its 10 million tonne/year refinery at Lavera, in Southern France, as well as a significant reduction in capacity at its joint-venture refinery (with Texaco) in Rotterdam. B.P. and Mobil also announced the creation of a new joint-venture, combining the fuels' refining and marketing

operations of the two companies in Europe. This could, in time, lead to further capacity rationalisation among the production units of the two companies.

Fuel retailing

The drive to cut costs and increase productivity in petroleum product distribution over the last 15 years has had its most visible effect in the reduction in the number of service-station retail outlets across the EU. During the 1980s, the number of service-stations decreased by 26%, as oil companies closed low-volume and rural outlets, to concentrate on higher volume service-stations. Rationalisation of the retail network did not occur uniformly across the EU, the most reductions in the number of outlets took place in the Netherlands, France and Germany, whereas the networks grew, and are still growing in Greece and Spain, where the number of outlets has historically been very low by the standards of other European countries. In addition, regulatory restrictions limiting the development of new service-stations in Spain have gradually been lifted over the last five years, allowing new market participants to establish and expand their retail networks. The total number of service-stations in Spain has recently been estimated at 7,000, up by 2,000 over the 1991 levels reported in Table 5.

Network rationalisation has also taken the from of joint-ventures and asset swaps between marketers, as each company attempts to concentrate its activities where it has critical mass or a supply cost advantage. The B.P.-Mobil joint-venture, noted earlier, should result in the achievement of critical mass for the venture in most European countries On a smaller scale, there has been consolidation in the Austrian market, where OMV purchased Total's marketing operations in early 1995; in France, where both Repsol and Petrofina purchased a number of B.P. outlets; and in the Benelux countries, where Elf sold its outlets in Belgium and Luxembourg to Shell, and its outlets in the Netherlands to Mobil.

Competition

The petroleum product refining and distribution sector in the EU is generally recognised as being truly competitive. Several factors serve to safeguard this state of affairs. Firstly, each member state now has a number of major and independent oil companies operating within its market, competing for market share and profits. Secondly, there are no or few restrictions on trade, either between Member States, or between the EU and other suppliers, thus enabling product to be readily moved between markets in response to changes in the demand or price environment, and enabling new suppliers to take market share. Thirdly, there is a high degree of price transparency, with daily published quotations for all principal products in the Mediterranean and North West Europe, allowing refiners, distributors and consumers knowledge of movements in market prices.

Competition in the distribution chain is also reinforced by the presence of non-traditional fuel marketers such as hypermarket and supermarket chains, which have gained significant market shares in France and the UK, and to a lesser extent in Benelux and Germany. Their low-cost operations and access to international supplies serve to maintain serious price competition right down to the final consumer.

Production process

The evolution in EU refining processes over the last ten years has focused around the increase in upgrading capacity, designed to produce more lighter products and less heavy products, and the installation of new production processes to manufacture unleaded gasoline in conformity with national and EU octane specifications. Although some Member States' refining industries moved earlier and faster on these developments, notably Germany, the United Kingdom, Denmark, the Netherlands and France, there is now a notable tendency to convergence, as southern European refining systems, in Spain, Portugal, Greece and Italy have invested, and are continuing to invest, in these trends.

The major challenges for production processes in the EU refining industry over the next ten years are the increased proportion of middle distillates in the demand barrel, which will require different upgrading techniques from those used in the past to maximise light product yields, and the trend towards more stringent product specifications, notably the reduction in the sulphur content of gasoil, both for transport and heating use. These requirements will likely imply the need for further heavy investment by the refining industry in hydrotreatment and hydrodesulphurisation over the next few years. Although the costs of this investment will ultimately be reflected in prices paid by consumers, such price increases could dampen demand growth over the long term.

An additional major challenge to the production process is the lightening of the barrel over the last few years with increased North Sea and Saudi Light production.

INDUSTRY STRUCTURE

Companies

Refining

Of the 95 refineries operating in the EU at the end of 1995, 49 plants, accounting for over 61% of crude oil distillation capacity in the region, were owned and operated by just 10 companies. Multinationals Exxon and Shell head this list, with Agip Petroli of Italy in third place. Although Total of France is currently the fourth largest refiner in the EU, it will be displaced by the joint-venture of B.P. and Mobil when this is operational. Such will constitute the most important change in the competitive structure of the refining market in the EU in recent years.

The other important long-term trend currently drawing to a close is the withdrawal of state control of refining and marketing companies in the EU. This trend began with the privatisation of B.P. in the 1980s in the United Kingdom, and, more recently, the phased disengagement of French state interests in Elf and Total. More recent examples of this move into the private sector have occurred in Spain and Portugal, while in Italy and Greece, privatisation has been on the agenda since the early 1990s.

In Spain, the state floated a further tranche of Repsol shares in early 1995, reducing the state holding to 21%. Mexican oil company, Pemex, also holds 10% of Repsol capital.

In Portugal, the process of privatising Petrogal, which owns and operates the country's two refineries, began in 1992 with the sale of a minority interest to a consortium including several Portuguese financial institutions, and French oil company Total. Although initially, the consortium took only a 25% stake, commitments were made to increase this to 51%. However, following disagreements over responsibility for Petrogal's pre-privatisation debt, and the investments needed to modernise its refining and distribution assets, Total withdrew from the consortium in 1995, and the remaining members increased their stake to 45%, rather than the 51% originally envisaged. Thus, for the moment, Petrogal remains under majority state ownership. The intention, however, is to reduce further the state holding over time.

In Greece, plans to privatise state-owned energy activities, including DEP, the holding company for Greece's two state-owned refineries, were put on hold following elections and a change in government at the end of 1993. However, the decision to privatise DEP has since been revived, principally to raise revenues for modernisation of the refineries.

In Italy, where the domestic refining and distribution sector is dominated by state-owned Agip Petroli and Italiana Petroli-

Table 4: Refining and distribution of oil products
Capacities of primary distillation

(million tonnes/year)	1980	1988	1989	1990	1991	1992	1993	1994
EUR 12 (1)	891	591	573	569	611	610	604	595
Belgique/België	54	32	32	32	35	34	34	35
Danmark	11	9	9	9	9	9	9	9
Deutschland (1)	150	83	79	79	110	111	112	113
Ellada	20	18	18	18	18	18	18	18
España	70	62	62	62	60	60	60	60
France	168	99	88	88	90	91	91	90
Ireland	3	3	3	3	3	3	3	3
Italia	177	117	117	113	121	117	113	102
Nederland	90	66	60	60	61	63	60	60
Portugal	18	14	14	14	14	14	14	14
United Kingdom	130	88	91	91	90	90	90	91

(1) Including former East Germany from 1991 onwards.
Source: Eurostat

-each part of the ENI group--privatisation has been on the political agenda for the past two or three years. Several proposals and timetables have been put forward for privatising the group, but the timing of the privatisation has still not been finalised as of early 1996.

Fuel retailing

In petroleum product distribution and retailing, the major companies with refining assets continue to have a dominant position, even during years of recession, as they have invested large amounts to protect their market share. They now account for nearly 30% of the EU retail outlets. Shell has the dominant market share, closely followed by BP. Esso is also an important player in several markets. The B.P. brand will become even more visible over the next few years, since the service-stations included in the B.P.-Mobil joint-venture are intended to be branded with B.P.'s colours.

Hypermarket and supermarket outlets, usually without a major oil company brand, are continuing to consolidate their position as significant alternatives to the traditional branded outlets. Their share is particularly important in France, where a third of automotive fuel is sold by supermarkets (their market share is over 40% for gasoline alone) and the United Kingdom where their current market share is estimated at around 20%. Hyper/supermarket fuels retailing operations generally sell on the basis of low prices, ensuring competitive supplies by regular purchasing on a spot-market related basis, either from imports or local refineries.

Strategies

While each company involved in the refining and marketing sector pursues its own strategy in terms of its geographical positioning, the markets it chooses to serve, its investments in research and development, production processes and technology, its control of operating costs, and the diversification of its business mix, the issues which face the sector in the mid 1990s are requiring an increasingly co-operative approach in order to preserve the industry's future.

Environmental compliance will require potentially heavy investments by refiners and distributors of petroleum products. The industry is already co-operating through its industry association, Europia, to review the impact of proposed environmental legislation. It is highly likely that this co-operation will extend to new agreements or joint-ventures between refineries to ensure that investment is optimised. The B.P.-Mobil joint-venture is the most spectacular example of this search for new optimisation opportunities, and is likely to be followed by other initiatives at the local or national level.

REGIONAL DISTRIBUTION

Activities of refining and distribution of petroleum products are fairly well distributed around the EU Member States, with infrastructure having been developed to serve each national market. More broadly, the EU market is generally perceived as being divided into two major zones. These are north-west Europe and the Mediterranean. The north-west Europe zone covers the Benelux countries, the United Kingdom, Germany, Denmark and France's northern half and Atlantic seaboard, together with new Member States Finland and Sweden. The Mediterranean zone includes Italy, Spain, Greece, Portugal and southern France, plus Austria. Separate price quotations are generated for each of these zones, based upon trade from the principal refineries in each zone. In north-west Europe, these are the refineries of Rotterdam, Antwerp and the Thames, while in the Mediterranean they are the refineries located in southern Italy, including Sicily.

The unification of Germany in 1990 also increased the importance of supply linkages and price formation involving Russia and the Baltic region, which do not always follow patterns established for the other regions.

ENVIRONMENT

Environmental considerations remain high on the EU's policy agenda, and the energy sector has a particularly important role to play in meeting environmental targets.

As a response strategy to the threat of global climate change, the EU committed itself to stabilising CO_2 emissions at the 1990 level by the year 2000 and signed the Climate Convention at the Rio de Janeiro conference. Although specific plans to achieve this target have been relatively slow to develop at the national level, the implications of succeeding in meeting the target would be both a substitution of low carbon content fuels for high carbon content fuels and a reduction in the growth rate of overall energy demand. Both of these would result in a relative decline in demand for petroleum products, and hence the activity of the EU refining industry. However, in the absence of a co-ordinated EU approach, it is increasingly uncertain that national measures alone would result in CO_2 emission reduction and stabilisation.

The move to reduce emissions of other toxic substances, such as SO_2, Nox, CH_4, particulates and VOCs (Volatile Organic Compounds) also have a direct impact on the refining and distribution sector.

The process of reducing sulphur content in gasoil (for both heating and automotive applications) is well-advanced. The maximum sulphur content of diesel fuel was reduced to 0.2%

Table 5: Refining and distribution of oil products
Trends in the number of petrol retail outlets

(units)	1985	1986	1987	1990	1991	1992	1993	1994
EUR 12 (1)	144 115	142 763	138 275	126 618	122 068	N/A	N/A	N/A
Belgique/België	6 207	5 633	5 448	6 273	6 010	N/A	N/A	N/A
Danmark	3 622	3 515	3 364	3 031	2 930	2 858	2 777	N/A
Deutschland (1)	18 448	20 320	19 501	17 807	18 958	18 836	18 646	18 300
Ellada (2)	5 800	5 800	6 000	6 386	6 600	6 600	6 600	N/A
España	4 616	4 799	4 855	4 998	4 958	N/A	N/A	N/A
France	34 600	33 200	31 100	25 700	23 700	21 700	20 000	19 000
Ireland (2)	3 428	3 375	3 300	3 100	3 000	N/A	N/A	N/A
Italia	35 800	35 300	34 700	31 000	28 490	28 030	27 598	N/A
Luxembourg	448	442	420	385	351	320	295	N/A
Nederland	8 106	7 858	7 560	6 602	6 024	N/A	N/A	N/A
Portugal (2)	1 900	1 880	1 830	1 871	1 900	N/A	N/A	N/A
United Kingdom	21 140	20 641	20 197	19 465	19 247	18 549	17 969	16 971

(1) Including former East Germany from 1991 onwards.
(2) CPDP estimates from 1991 onwards.
Source: National Statistics, CPDP

by weight (wt.) as from October 1994, and will be further cut to 0.05% wt. as from October 1996. The sulphur content of heating gasoil was also reduced to 0.2% wt. from October 1994.

The regulation mandating closed systems with vapour recovery to minimise VOC emissions during storage and transport (Stage I) was approved by the Council in December 1994. The means for vapour recovery during refuelling of cars (Stage II or large carbon canister) are still under discussion in the Commission services.

Further changes in fuel quality specifications and VOC abatement measures are possible over the rest of the decade. In order to prepare a sound basis for debate, a unique initiative took place over 1994 and 1995 involving a joint study by a tripartite group representing the European Commission, the oil industry, and the auto industry which discussed the most cost-effective measures to obtain an improvement in air quality in the EU. This group studied a wide range of options to further curb emissions, including enhanced vehicle inspection and maintenance, traffic management, vehicle technology and fuel composition. The study group found that NO_X was the pollutant which should be the main target of emission reduction measures. As of early 1996, the detailed proposals regarding the implications for fuel specifications have not yet been published.

Over the past decade, the most visible change to petroleum product specifications in response to environmental concerns has been the introduction of unleaded gasoline, following reduction in the lead content in the early 1980s. An EU directive adopted in 1985 required that unleaded gasoline be marketed in all Member States from 1 October 1989. This date coincided with the date when all large cars produced (above 2 litres) were to be equipped with catalytic converters. Unleaded gasoline is now widely available in all European countries. Moreover, all cars produced after 1 October 1990, whether they are equipped with catalytic converters or not, must be able to run on unleaded gasoline (Eurograde 95 research octane number [RON). Although there has been some derogation for old-type engines, 90% of cars produced can run on Eurograde.

The directive encouraged Member States to introduce tax incentives in favour of unleaded gasoline in order to accelerate its penetration, which all countries have done. In addition, in order to allow a larger proportion of the existing car population to run on unleaded gasoline, most oil companies introduced an unleaded fuel with a higher octane level, Super-premium unleaded (98 RON). Super-premium is marketed in most EU countries.

From the beginning of 1993, all new gasoline-powered cars registered in the EU had to be fitted with three-way catalytic converters to meet exhaust emissions standards. This presages the universal use of unleaded gasoline. However, the speed with which unleaded gasoline gains 100% market share depends on the rate at which owners of pre-1993 cars opt for unleaded fuel and the rate at which old cars, able to use only leaded fuel, are scrapped. The effect will be relatively small in Germany, Denmark and the Netherlands, where the purchase of catalyst-equipped cars has been favoured for some time by tax incentives. However, in other countries, the new emission rules will give a significant push to sales of unleaded gasoline.

Unleaded gasoline accounted for almost 60% of gasoline sold in the EU in 1994, up from 47% in 1992. It is the only grade available in Denmark (and also in new Member States, Austria and Sweden). Greece, Spain and Portugal are lagging the rest of the EU in the rate of take-up of unleaded gasoline, with a market share of less than 30% in these three countries in 1994.

REGULATIONS

Petroleum product quality

EU legislation relating to fuel quality addresses the content of lead, benzene and oxygenates of gasoline and the sulphur content of diesel and other gasoil (national standards specify other fuel properties). The European Standard Organisation (CEN) adopted European specifications for unleaded gasoline (EN228), for automotive diesel (EN590) and LPG (EN 589).

The maximum authorised lead level in leaded gasoline is 0.4g/litre, but EU countries are encouraged to use a maximum limit of 0.15 g/litre. All EU countries, except Portugal, have now adopted this lower limit. The maximum benzene content of gasoline is set at 5% for both leaded and unleaded grades.

CEN EN228 specifies the octane quality of Eurograde unleaded (95 RON/85 MON [motor octane number]), the benzene content (5% vol. max.) and the lead content (0.013g/litre). The sulphur content is currently set at 0.05% wt. maximum.

A directive requires that Member States permit fuel blends containing oxygenates and specifies the maximum content. If this maximum is exceeded, then the pumps must be clearly labelled. Most countries restrict limits below the maximum,

Table 6: Refining and distribution of oil products
Excise taxes on petroleum products, January 1996 (1)

(ECU/thousand litres)	Premium gasoline	Unleaded gasoline	Automotive diesel oil	Heating gas oil	Heavy fuel oil HTS (ECU/tonne)	Heavy fuel oil BTS (ECU/tonne)
Belgique/België	546	485	302	14	19	7
Danmark (2)	0	449	300	241	285	285
Deutschland	573	520	329	42	16	16
Ellada	411	359	249	136	42	42
España	409	375	273	80	14	14
France	617	576	354	78	24	18
Ireland	380	349	303	50	18	18
Italia	537	494	361	361	44	22
Luxembourg	416	362	263	5	14	7
Nederland	609	542	327	82	32	32
Österreich	0	430	301	79	0	38
Portugal	478	443	315	0	28	13
Suomi/Finland	0	548	291	37	0	37
Sverige	0	479	291	189	0	213
United Kingdom	463	406	406	28	22	22

(1) Calculated using the monthly average exchange rates for January 1996.
(2) Premium gasoline is a mixture of 33% leaded and 67% unleaded gasoline in Denmark.
Source: European Commission, DG XVII

with only four countries (Belgium, Denmark, Ireland and Luxembourg) permitting levels equal to, or exceeding, this level.

A 1993 directive mandated a reduction in the sulphur content of all gasoil to 0.2% by October 1994. A further reduction is to be implemented by 1 October 1996 for the sulphur content of automotive diesel (to 0.05% by weight), as this is required to meet the exhaust emissions limits for diesel engines.

Emissions

As part of the EU policy to limit the emissions of harmful substances to the atmosphere, in 1988 the EU passed the Large Combustion Plant Directive (LCPD) and on 14 June 1994 the 2nd Sulphur Protocol was signed in Oslo. The LCPD applies to all industrial plants above 50 MW capacity, and applies to all existing refineries. Its objective is for plants to achieve a phased reduction of SO_2 emissions from 1990 levels totalling 60% by 2003, by limiting the amount of SO_2 present in flue gas emissions. To meet these targets, refineries and other industrial plants and power generation facilities have been obliged to choose between burning lower sulphur fuels in their boilers, generally at higher cost than the high sulphur coal or residual fuel oil traditionally used, or to invest in flue-gas clean-up technology, such as FGD (flue-gas desulphurisation). Refineries have largely chosen to reduce the sulphur content of their own-use fuel. The LCPD will soon be due for review and revision. If tighter standards are introduced, conversion to natural gas firing for refinery boilers could be the only way to meet new standards.

Reserve or strategic stocks

Reserve or strategic stocks consist of quantities of crude oil or refined products which can be called upon at any time by a country to bridge a temporary oil shortage situation. This withdrawal would have to be made according to the provisions of existing EU emergency legislation and IEA Rules. Directive 68/414 required the creation and maintenance of reserve stocks at the EU level initially representing 65 days' consumption; this was then increased on 1 January 1975 to 90 days' consumption for three categories of product: petrol, middle distillates and heavy fuel oils. Since the directive merely imposed the obligation to achieve an end result, the EU Member States have established over the years systems quite different from one another and which can be divided into two categories depending on whether a centralised stockholding authority has been established.

A maximum of 15% can be deducted by the EU Member States from the stockholding obligations to take account of indigenous production used to satisfy inland demand. This reduces the 90-day stockholding requirement to 76.5 days for qualifying countries. The maximum of 15% is, for the time being, only attained by the United Kingdom and Denmark, among EU Member States.

EU countries with a central reserves administration

Five countries have a central reserves administration: Denmark, Germany, France, the Netherlands and Spain.

Denmark has had legislation governing reserve stocks for over 30 years; the reserves are administered by the Foreningen Danske Olieberedskabslager (FDO), a non-profit making foundation established in 1959 with voluntary membership. The FDO is financed by contributions from its members. The 1959 legislation related chiefly to fuels and was amended when Denmark joined the EU by the law of the 24 May 1972 which widened the stockpiling commitment to the three product categories specified in the EU directive. As of 1 January 1993, Denmark reduced its total reserve requirement from 125 days to a 90 day reserve of stocks.

In Germany, the lion's share of the stockpiling requirement of 80 days' consumption is administered by the Erdölbevorratungsverband (EBV), a national body with public corporation status financed by means of a special tax. At least 90% of the reserves stocked by the EBV are its own property. The refineries themselves ensure a mandatory 15 days supply. In addition, the federal government has amassed stocks of crude oil equivalent to a 30 day supply.

France long ago established legislation requiring the stockpiling of oil reserves (the commitments to create and maintain safety reserves can be traced back to the law of the 10 January 1925). In 1988, France established a central reserve administration, the Société Anonyme de Gestion des Stocks de Sécurité (SAGESS). which was responsible for half the total legal stockpiling requirements. In January 1993, SAGESS was replaced by a new organisation, the Comité Professional des Stocks Stratégiques Pétroliers (CPSSP). Under the new law, registered operators were to establish stockholding obligations of up to 50% of their commitments, but this progressively

Table 7: Refining and distribution of oil products
Net production of EU refineries (1)

(million tonnes)	1987	1988	1989	1990	1991	1992	1993	1994
LPG	14.1	14.7	14.6	14.7	14.7	15.2	16.7	16.7
Naphtha	14.7	16.2	17.1	15.5	17.7	17.6	26.6	33.9
Motor spirit	103.4	109.1	110.8	113.9	117.0	121.8	126.7	126.8
Kerosene	30.0	32.9	34.5	36.2	33.7	34.6	35.2	38.4
Fuel oil & diesel oil	150.6	160.3	159.9	164.0	180.3	185.7	192.6	198.2
Residual fuel oil	95.1	92.0	91.2	95.0	99.6	101.5	101	92.8
Other products	29.1	32.3	31.8	32.5	35.1	37.6	37.8	45.2
Total	437.0	457.5	459.9	471.8	498.1	514.0	536.6	552.0

(1) Including former East Germany from 1991 onwards.
Source: Eurostat

decreased to 20% by 1 January 1996. The balance of the stockholding obligation is met by the payment of fees to CPSSP. CPSSP uses these fees to build and maintain strategic stocks equivalent to 90 days imports. Unregistered operators are obliged to pay fees for their total commitments.

In the Netherlands, the collective administration of stocks is entrusted since 1986 to the Central Organ Vorraadsvorming Ardolie-produkten (COVA), a public body which maintains 70 days of reserves of the light and medium distillation fractions. COVA is financed out of a levy on oil products that is additional to excise tax. The refineries are required to maintain a 50 day stockpile and sixteen and two-thirds days are maintained by the independents. The stockpiling of heavy fuel oils has been administered since 1 January 1987 by the Union of electricity generators (SEP).

Spain is attempting to adapt to EEC regulations with regard to stockpiling. Since 1988, much legislation has been enacted in order to facilitate the transition from a state monopoly to a free market. The Royal Decree of 22 December 1992 provides for an entity to build-up, maintain and manage strategic stocks under the authority of the Ministry of Industry, Commerce and Tourism. Under the law, oil distributing companies and consumers are required to maintain emergency stocks of up to 120 days of yearly sales or consumption.

EU countries with no central reserves administration

In Belgium, compulsory stockpiling represents one quarter of domestic supplies made during the previous calendar year; the responsibility is assumed by refineries and importers who are both required to maintain 90 days of reserve stocks.

In Greece, distributors are principally required to maintain 90 day reserve stocks, however this obligation may be assumed by the local refineries which supply the distributors. Distributors only commit themselves to the products which they actually import.

In Ireland, stockpiling is ensured by importers by means of coverage contracts signed with the state refinery company located at Whitegate.

In Italy, the compulsory 90 day reserves are administered by various bodies: the refiners, importers, ENEL, the national electricity generating company, as well as the government, itself, whose strategic stocks are handled by ENI.

For Portugal, Law Decree 77/91 of 16 February 1991 obliges all importers of crude oil products to maintain emergency reserves corresponding to one-quarter (for jet fuel) and one-third (for gasoline, diesel oil and fuel oil) of their previous 12 months net imports. In addition, stock utilisation depends on government authorisation, although a certain operational flexibility exists. The early use of stocks at the beginning of an oil crisis, or their utilisation in a sub-crisis situation, will be considered by the authorities when it appears necessary.

OUTLOOK

Overall growth in inland petroleum product consumption in the EU (both the EU-12 and the EU-15) is expected to average around 1.5% per year between 1994 and 2000, with the growth rate slowing to only 0.5% per year between 2000 and 2010. This growth is likely to be heavily concentrated in the middle

Table 8: Refining and distribution of oil products
Structure of production by product, 1994 (1)

(%)	LPG & refined gas	Naphtha	Motor spirit	Kerosene	Fuel oil & gas diesel	Residual fuel oil	Others
EUR 12	3.1	5.8	21.5	6.5	33.7	15.8	13.6
Belgique/België	1.6	2.9	18.0	5.4	36.2	15.6	20.4
Danmark	2.3	1.5	18.0	2.8	46.3	24.8	4.3
Deutschland	3.2	7.9	22.0	2.4	40.6	10.5	13.4
Ellada	3.5	3.3	21.0	9.7	22.1	30.0	10.5
España	3.2	4.1	16.3	8.4	29.8	22.3	15.9
France	2.1	4.4	21.5	6.6	37.8	11.5	16.1
Ireland	1.3	2.3	15.3	0.5	41.2	35.1	4.4
Italia	2.9	3.7	20.5	4.9	35.2	20.6	12.2
Nederland	5.7	13.1	19.2	7.6	25.4	15.7	13.2
Portugal	3.5	6.4	16.4	7.8	29.7	26.5	9.7
United Kingdom	1.2	3.0	29.6	11.4	29.1	12.2	13.4

(1) Output as a percentage of refinery input.
Source: Eurostat

Table 9: Refining and distribution of oil products
Share of unleaded petrol in total motor fuel sales (1)

(%)	1988	1989	1990	1991	1992	1993	1994	Sales 1994 (thousand tonnes)
EUR 12 (2)	N/A	N/A	N/A	N/A	47.0	53.2	59.8	65 289
Belgique/België	0.5	15.3	24.5	37.4	46.1	57.4	64.8	1 842
Danmark	33.0	40.1	56.6	63.4	69.6	75.6	98.0	1 856
Deutschland (2)	44.5	57.5	67.8	76.9	84.0	88.7	92.3	27 935
Ellada	e	e	1.8	7.3	16.4	22.9	27.6	745
España	0.1	0.3	0.9	3.1	6.2	6.9	22.2	2 032
France	0.2	2.4	14.5	25.0	33.9	40.8	50.0	7 579
Ireland	e	6.4	18.8	23.9	30.2	38.5	48.6	483
Italia	0.7	2.1	5.1	6.7	13.1	23.7	32.6	5 528
Luxembourg	10.2	20.2	29.9	44.7	57.9	69.0	75.6	411
Nederland	26.0	32.3	42.2	52.7	69.5	75.1	80.0	3 129
Portugal	e	e	e	8.2	13.1	20.9	30.0	548
United Kingdom	1.1	19.4	34.0	40.8	46.8	52.0	57.6	13 201

(1) e = infinitesimal amount.
(2) Including former East Germany from 1991 onwards.
Source: Eurostat

distillate segment of the barrel (specifically diesel and jet fuel), with its share of total petroleum product demand (including bunkers) in the EU reaching 44% by 2000, and 46% by 2010, compared with 41% in 1994. This change in demand structure alone will place constraints on refiners who will need to invest heavily in hydrotreatment to increase production of these products.

In addition, refiners will have to face the investment needs and higher operating costs associated with reducing emissions and producing fuels with new and tighter specifications.

Under such an environment, it is becoming increasingly likely that further rationalisation of EU refining capacity will take place over the next few years, as higher-cost refiners see their margins and profitability eroded by additional costs and stagnant demand.

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Electricity generation and distribution

NACE (Revision 1) 40.1

Electricity demand growth in the EU began to pick up again in 1994, after the economic slowdown in the early 1990s translated directly into sluggish growth in electricity consumption. The remainder of the decade should confirm the 1994 upturn, but, in the longer term, high electricity demand growth rates cannot be expected, given the maturity of EU energy markets.

The major trend affecting EU electricity markets is the change in market structure to bring increased competition to the sector. Spurred partly by the European Commission's Internal Energy Market proposals, and partly by changes in national policy, a wave of privatisation, restructuring, unbundling, and more open competition is transforming the electricity supply sector. The agreement reached in June 1996 for a phased opening-up of electricity markets to competition in the EU should make an important, if gradual, contribution to bringing the competitive structure in all Member States into line with those which have made early moves towards increased competition.

INDUSTRY PROFILE

Description of the sector

This chapter covers the activities of electricity production, transmission and distribution, encompassed by NACE Rev.1 40.1. The definition of this activity normally includes generation of electric power by public suppliers from conventional thermal plants, hydro plants and nuclear plants; the operation of public electricity transmission and distribution systems; and the production by non-public suppliers of electricity for their own consumption.

The supply of electricity involves numerous commercial and industrial activities, including: fuel purchasing; power station construction and electricity generation; expansion, maintenance and operation of transmission and distribution networks; trading bulk electricity (both nationally and internationally); supply and metering; and operation of customer billing and accounting systems.

Recent trends

The European economic recession in the early 1990s led to a significant slowing down of electricity demand in the EU, compared with the 1980s. Between 1991 and 1994, EU electricity demand grew by only 0.5% per year, on average, compared to average annual growth rates of around 3% during the 1980s. Growth in demand was slightly stronger in 1994, up by 0.8% across the EU compared with 1993, as the major economies began to pick up. Only in Germany did electricity demand continue to decline, as it has since 1991, in response to economic restructuring in the new Länder and the ongoing sluggishness of the overall German economy.

There has been little change in the concentration of electricity production over the past decade. The largest four countries in the EU (Germany, France, Italy and the United Kingdom) have consistently accounted for around 78% of the region's electricity production, with France, in particular, having an important role in exporting electric power to its neighbouring countries.

The electricity intensity of GDP across the EU has been very stable since 1991, as continual improvements in the energy efficiency of equipment have been offset by the broadening of applications which use electricity as their only energy source (such as computing and advanced communications, air-conditioning and intelligent building systems). The pattern of trends in electricity intensity of economies varies considerably among the EU Member States, with countries in the southern half of the EU tending still to register increases in electricity intensity as the rate of penetration of electric appliances in the residential and commercial sectors remains on an upward path compared to the more mature levels of equipment installed in the wealthier northern countries of the EU. In the latter countries, turnover of the equipment stock leads to lower electricity consumption as more efficient equipment replaces older appliances.

Electricity steadily increased its penetration of total final energy consumption over the 1980s, rising from less than 15% in the early 1980s to reach 18% in 1989. Its share has since remained roughly constant. The share of electricity in final energy consumption varies substantially between countries, reflecting the structure of industry, the level of automation in industry, the use of electricity for space heating, the level of appliance ownership in the domestic sector, and the availability of natural gas to compete with electricity for space-heating, water-heating and cooking in households and the commercial sector. The Benelux countries, for example, have low shares of electricity in the final energy demand mix mainly because of the maturity of their natural gas supply systems, developed as a consequence of the high availability of natural gas reserves in the Netherlands. Within the EU, France is the country where electricity has the highest penetration, as a consequence of that country's decision to develop its nuclear power generating capacity as its principal strategy in reducing dependence on imported energy sources after the oil price and supply shocks of the 1970s.

Electricity has an important role in all end-use energy demand sectors except transport. In transport, electricity represents a very small component of overall transport energy consumption, although railway transport is increasingly using electricity as its favoured energy source. The energy needs of road, marine and air transport are overwhelmingly supplied by petroleum products, and there is little prospect of widespread introduction of electric-powered vehicles in the short to medium term. Thus, most electricity consumption is split between industry and the residential and commercial sectors. Almost 100% of potential consumers in the EU have access to electricity via transmission grids and low or medium voltage distribution networks. Electricity demand growth has been faster in recent years in the residential and commercial sectors than in industry. Increased levels of appliance ownership, together with the development of new electricity-specific applications, such as personal computing, advanced communications technologies and automated buildings management systems are the main reasons for this trend.

International comparison

The EU, which comprises the majority of Western Europe, is one of the world's most mature regional markets for electricity, alongside North America, Japan and Eastern Europe and the Former Soviet Union. All these regions are characterised by relatively low growth rates in electricity demand, stable or declining levels of electricity intensity of GDP, and development of capacity in line with, or ahead of, demand trends. The contrast is with the developing world, particularly in Asia, where, over the last 10 years, economic growth and electricity demand growth have moved at a faster pace than the ability of utilities to add new generation capacity. In response, there has recently been an upsurge in new power generation project activity in Asia and Latin America, with independent power producers being invited in to markets to accelerate capacity development.

The structure of electricity production capacity in the EU is similar to that of North America, with the exception that North America has significantly more gas-fired capacity and less

Table 1: Electricity generation and distribution
Net electricity production by country

(billion kWh) (1)	1980	1991	1992	1993	1994	Change (%) 1992/93
EUR 12 (2)	1327.0	1841.3	1851.7	1857.9	1891.8	1.8
EUR 15 (2)	N/A	N/A	N/A	N/A	2144.5	N/A
Belgique/België	51.0	68.1	68.4	67.1	68.6	2.2
Danmark	26.0	34.1	28.3	32.0	37.8	18.1
Deutschland (2)	347.0	500.5	497.8	491.4	488.6	-0.6
Ellada	21.0	32.7	34.4	35.3	37.4	5.9
España	104.0	148.4	150.8	148.9	154.3	3.6
France	247.0	432.1	441.8	452.9	454.5	0.4
Ireland	10.0	14.3	15.0	15.4	16.1	4.5
Italia	177.0	210.5	214.2	211.3	220.2	4.2
Luxembourg	1.0	1.3	1.1	1.0	1.1	10.0
Nederland	62.0	71.5	74.2	72.8	76.5	5.1
Österreich	N/A	N/A	N/A	N/A	51.9	N/A
Portugal	15.0	27.9	27.7	28.2	30.2	7.1
Suomi/Finland	N/A	N/A	N/A	N/A	62.1	N/A
Sverige	N/A	N/A	N/A	N/A	138.7	N/A
United Kingdom	266.0	299.9	298.0	301.6	306.5	1.6

(1) kWh: kilowatt hour.
(2) Including East Germany from 1991 onwards.
Source: Eurostat

Table 2: Electricity generation and distribution
Main indicators (1)

(billion kWh) (2)	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	1 626	1 677	1 727	1 774	1 814	1 967	1 976	1 984	1 999
Net production	1 524	1 568	1 611	1 656	1 698	1 841	1 852	1 857	1 892
Share in final energy consumption (%)	16.8	17.1	17.5	18.0	18.2	18.0	18.3	17.5	N/A

(1) Electricity delivered to market (excluding electricity consumed and losses within power stations). Including East Germany from 1991 onwards.
(2) kWh: kilowatt hour.
Source: Eurostat

Table 3: Electricity generation and distribution
Electricity intensity of GDP (1)

(kWh/thousand ECU) (2)	1990	1991	1992	1993	1994
EUR 12 (3)	319	331	331	333	330
EUR 15 (3)	337	348	348	351	348
Belgique/België	383	391	397	409	420
Danmark	288	288	291	290	281
Deutschland (3)	322	340	330	326	319
Ellada	442	440	459	470	486
España	324	324	328	331	340
France	321	338	344	351	346
Ireland	335	344	351	349	342
Italia	248	251	254	258	260
Luxembourg	506	495	487	478	490
Nederland	329	331	334	337	339
Österreich	346	349	341	341	335
Portugal	443	457	467	470	483
Suomi/Finland	555	599	628	662	662
Sverige	666	682	682	765	699
United Kingdom	357	373	375	373	362

(1) Defined as final electricity consumption divided by GDP at constant prices of 1990.
(2) kWh: kilowatt hour.
(3) Including East Germany from 1991 onwards.
Source: Eurostat

Table 4: Electricity generation and distribution
Share of electricity in total final energy consumption, by sector and by country

(%)	1989 Total	Industry	Hh (1)	Transports	1993 Total	Industry	Hh (1)	Transports
EUR 12 (2)	18.0	25.7	25.3	1.4	17.5	26.3	23.7	1.6
EUR 15 (2)	N/A	N/A	N/A	N/A	18.3	27.0	24.5	1.6
Belgique/België	15.7	22.7	18.3	1.4	16.7	24.4	20.0	1.4
Danmark	18.8	30.3	25.9	0.4	18.2	29.0	24.7	0.4
Deutschland (2)	18.4	25.6	23.9	1.9	16.8	25.4	20.3	2.1
Ellada	18.0	26.1	34.1	0.1	17.0	26.7	30.1	0.2
España	20.5	30.3	41.1	1.4	19.1	28.7	37.1	1.5
France	20.3	26.7	30.6	1.9	19.8	28.7	27.5	1.8
Ireland	14.3	20.1	19.6	0.1	16.8	26.6	22.5	0.1
Italia	16.8	26.2	21.0	1.4	17.1	27.0	22.5	1.6
Luxembourg	10.9	12.8	20.4	0.5	10.5	13.8	21.4	0.5
Nederland	14.2	22.9	16.9	0.9	14.5	22.6	16.8	1.0
Österreich	N/A	N/A	N/A	N/A	18.3	28.2	21.8	4.3
Portugal	21.2	28.4	44.0	0.8	17.8	26.5	28.3	0.6
Suomi/Finland	N/A	N/A	N/A	N/A	24.8	29.2	31.7	0.1
Sverige	N/A	N/A	N/A	N/A	32.4	36.9	44.9	2.7
United Kingdom	17.1	24.3	25.5	0.6	17.4	26.0	25.1	1.4

(1) Hh: Households, etc: consumption by households, agriculture, fisheries, administration, services and others.
(2) Including East Germany from 1991 onwards.
Source: Eurostat

nuclear capacity than in the EU. In both regions, coal-fired capacity remains the most important element of base-load capacity. In comparison to Japan, the EU has higher coal, nuclear and hydro components and less oil-fired capacity.

There is, however, a wide variation among the developed regions in the level of power generation capacity per capita of population. North America has an installed capacity of 3.24 kilowatts (kW) per capita, far ahead of the EU, with an installed capacity estimated at only 1.29 kW per capita. Installed capacity in Japan is at an intermediate level, estimated at 1.82 kW per capita. This mirrors the far higher electricity intensity of the North American economies than that of other regions. In the US. and Canada, electric equipment and appliances have a much greater penetration than in other regions of the world, and energy efficiency has been less developed than in Europe and Japan, which have a greater dependency on energy imports.

Foreign trade

The flow of electricity between EU Member States has increased considerably over the past 20 years, with exchanges of electricity becoming more important not only for seasonal and daily load-balancing between neighbouring countries, but also as long-term sources of supply for countries which have not developed generating capacity at the same rate as growth in national demand. Thus French electricity exports have expanded rapidly over recent years, reaching 67 terawatt hours (TWh) in 1994, equivalent to 15% of French electricity production. France supplies base-load power to neighbouring countries Italy, Belgium, Germany, Spain, Portugal and the United Kingdom

In 1994, exports by EU countries totalled 119.3 TWh, and imports 130.1 TWh. The net import requirement was principally met by imports from Norway and Sweden (in the latter case, prior to its accession to the EU) via interconnectors with Denmark and Germany. These figures represent a small increase compared with the previous year. However, throughout the past decade the amount of electricity traded has risen faster than consumption such that, in 1994, imports accounted for around 6.5% of gross inland consumption, up from only 1% in the mid-1980s.

Trade with countries outside the EU is still very limited owing to the lack of interconnections between countries. Currently only Switzerland and Norway exchange significant amounts with the EU. Switzerland has, for many years, traded electricity with other European countries on both a daily and seasonal basis. Norway, with its excess of hydro-capacity, has historically exported power to Denmark. However, this trade has fluctuated considerably in recent years both as a result of reduced precipitation and changes in the electricity market in Norway which have reduced the incentive for generators to export power. Reinforced transmission grid interconnections in the Nordic region over the next few years should, however, bring increased potential for electricity trade between Norway and the other countries in the region.

Equally, opportunities for electricity trade with Central and Eastern European countries has historically been limited by the lack of grid interconnection. This should now change since the network of former East Germany was linked up with West Germany in 1995, and Poland, the Czech Republic, Slovakia and Hungary (already interlinked in the Centrel grid), are also now linked up with the West European UCPTE grid.

The UCPTE grid is a co-operative organisation of the electricity authorities in Austria, Belgium, France, Germany, Italy, Luxembourg, Netherlands, Switzerland, Greece, Portugal, Spain and former Yugoslavia. It co-ordinates electricity transfers between countries which have been negotiated on a bilateral basis between national utilities. A similar organisation in the Nordic countries, known as NORDEL, co-ordinates electric power exchanges between Denmark, Norway, Sweden and Finland.

The electric utilities enter into a range of commercial arrangements for the exchange of electrical energy. These fall into three main categories: hour-by-hour exchanges on a cost basis, including back-up in the event of grid difficulties; contracts (usually short-term) for net transfers; longer term contracts, including permanent arrangements for the transfer of energy from joint-owned production plants in a neighbouring country.

It has been the intention of the European Commission since the beginning of the 1990s to stimulate greater competition in electricity markets by measures to develop an Internal Energy Market. The cornerstone of this new structure would be

the opening up of access to transmission grids for large consumers and distributors, who would thus be able to choose suppliers on an economic basis, irrespective of national boundaries. Such a system would inevitably lead to an important increase in electricity trade among EU Member States. The recent decision by the Council, on the 20 June 1996, to agree a new framework for gradual liberalisation of European electricity markets represents a significant step forward in this direction.

Among the main barriers to further increases in electricity trade remain technical constraints to ensure the safe and stable operation of transmission systems; losses on transmission lines, which can become significant if electricity is dispatched over long distances; procedures for commissioning new transmission lines; and market restrictions due to monopolistic industry structures or restrictive contractual arrangements. The latter barrier is expected to be gradually eroded within the EU over the next 10 years, with the implementation of the agreement on market liberalisation.

MARKET FORCES

Demand

Electricity is used in all almost every sphere of human activity in developed regions such as Western Europe, where electricity supply is available to all classes of consumers in virtually all areas. Thus, electricity demand trends are very closely correlated with economic growth. Improvements in the energy efficiency of electric equipment, which would tend to slow demand growth, are often offset by the penetration of new equipment or, increasingly, new applications for electricity. Thus, between 1986 and 1994, electricity consumption in the EU-12 has grown at an average annual rate of 2.6%, compared with average real GDP growth over the same period of 2.3% per year.

Societal trends towards higher living standards and technical developments in industrial processes are resulting in increasing electricity consumption, and a higher share of electricity in the final energy demand mix of all end-use sectors except transport. For these reasons, since 1980, electricity's share of total final energy consumption has risen from 14.4% to almost 18% by 1994. Electricity's share of non-transport final energy consumption over the same period has risen from 18% to about 25%. Higher appliance ownership, higher heating standards and greater use of air-conditioning have been responsible for demand increases in the domestic and commercial sectors. At the same time, a move towards electricity specific processes in the industrial sector, either owed to technical necessity or overall process economics, has raised the electricity intensity of industrial production.

Supply and competition

There is considerable variation in the structure of the electricity supply industry in EU Member States, reflecting the historical development of regulation and state involvement, as well as recent developments in the direction of liberalisation and privatisation in several Member States. Some countries still have an industry dominated by a single, often state-owned, vertically-integrated electric utility; others are becoming far more decentralised with a separation between generation and distribution; others have a mixture of small municipal distribution companies and much larger vertically-integrated companies. France and Italy are the most prominent examples of the first category, while England and Wales and the Netherlands have decentralised structures. Germany is the best example of the third category.

In most EU countries electricity prices and service standards are set by either national or local governments, or are agreed between the utility and government following some form of consultative procedure. In some cases, price controls can take the form of an explicit formula, and customer service standards may be subject to some form of objective measurement. Where utilities are state-owned, government finance targets play an important role in setting consumer prices.

Therefore, despite the lack of direct competitive pressures, most European electricity industries operate in a manner designed to achieve least cost supplies. This objective is pursued through government supervision and/or industry co-operation. For their part, electric utilities seek to control costs by basing the utilisation of plant on short run marginal costs, and are usually required to demonstrate that new investment provides a least cost option for meeting future needs.

A significant exception to this pattern is the United Kingdom, where a competitive supply market was introduced in 1990 for customers having a maximum demand of 1 MW. This competitive market was extended further in 1994 to cover all customers with a maximum demand of over 100 kW. This market covers over 50,000 customers, and about half the total electricity supplied in the United Kingdom. Price controls are only applied to residual monopoly businesses. The privatisation process in the United Kingdom was accompanied by a formalisation of price controls and other performance objectives for electricity supply to domestic consumers. Prices to this market segment are set according to an explicit formula, and each of the regional electricity suppliers is monitored against a set of customer service standards. In April 1998, full competition for supply is scheduled to be extended to all consumers, although it is likely that regulators will maintain a watching brief on tariffs to small consumers.

The Nordic countries are also now well-advanced in the creation of a competitive market in electricity. First Norway and then Sweden, have instituted systems separating generation and distribution from transmission, and allowing free competition in generation and distribution. An active spot market for electricity is now operational in Norway.

Partly as a result of experiences in the U.K. and in the Nordic countries, it is now becoming more widely accepted that whilst

Table 5: Electricity generation and distribution
Breakdown of electricity consumption by sector (1)

(%)	1980	1987	1988	1989	1990	1991	1992	1993
Industry	48.4	44.0	44.8	44.8	44.3	43.3	43.1	43.1
Transport	2.5	2.4	2.4	2.3	2.5	2.6	2.6	1.9
Households	28.6	30.3	28.9	28.4	28.7	29.3	29.5	29.4
Other	20.5	23.3	23.9	24.5	24.5	24.8	24.8	25.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(1) Including East Germany from 1991 onwards.
Source: Eurostat

Table 6: Electricity generation and distribution
Breakdown of final electricity consumption by country and by sector

(%)	1993 Industry	Hh (1)	Other	1994 Industry	Hh (1)	Other
EUR 12	43.1	55.0	1.9	43.4	54.6	2.0
EUR 15	43.4	54.5	2.1	43.7	54.1	2.2
Belgique/België	49.4	48.5	2.1	50.6	47.3	2.1
Danmark	29.6	69.7	0.7	30.6	68.6	0.8
Deutschland	44.7	51.9	3.4	45.4	51.1	3.5
Ellada	36.4	63.2	0.4	35.6	64.0	0.4
España	48.4	48.4	3.2	44.0	52.4	3.6
France	36.3	60.9	2.8	36.3	60.8	2.9
Ireland	37.3	62.6	0.1	38.0	61.9	0.1
Italia	49.1	47.9	3.0	49.6	47.5	2.9
Luxembourg	60.0	38.5	1.5	66.0	32.4	1.6
Nederland	44.2	54.0	1.8	44.1	54.1	1.8
Österreich	38.1	55.1	6.8	38.9	54.3	6.8
Portugal	48.2	50.6	1.2	46.9	51.5	1.6
Suomi/Finland	54.0	45.3	0.7	54.6	44.7	0.7
Sverige	41.4	56.7	1.9	41.1	56.9	2.0
United Kingdom	33.8	63.6	2.6	33.9	63.6	2.5

(1) Hh: Households, etc: consumption by households, agriculture, fisheries, administration, services and others.
Source: Eurostat

transmission may remain a natural monopoly, electricity generation, and particularly the construction of new plants, need not be. Several countries are now in the process of opening their electricity generation industries to competition by inviting independent power producers to develop capacity in addition to that built by the utilities in place. In the United Kingdom, liberalisation and opening up to competition of the generation business followed privatisation in parallel with competition in supply to end-users. Other markets where independent power producers are being particularly encouraged are Portugal, Spain and Italy.

Furthermore, it has also been demonstrated that transmission and distribution systems can be opened to competitive suppliers, by the use of Third Party Access (TPA) regulations. The promotion of wider and more effective competition in energy markets stimulated the long-standing policy of the European Commission to develop an Internal Energy Market in the EU. A cornerstone of this policy has always been the introduction of a form of TPA, and the agreement reached at the June 1996 EU Energy Council incorporated a negotiated TPA system as one of the two types of allowable model for the electricity supply industry within the EU (alongside the Single Buyer System).

Production process

The key steps along the electricity supply chain are fuel procurement and storage, electricity generation and delivery to the high voltage transmission network, transmission to substations near demand centres and distribution to final consumers on lower voltage lines and cables.

A variety of technologies are available for electricity production. The most common type of power plant is the traditional fossil fuel fired power plant using a conventional steam power cycle. These are thus powered by coal, oil or natural gas. More recent developments in fossil-fuel fired technology include gas turbines used in a combined steam and gas power cycle, coal gasification, and coal fluidised bed combustion plants.

A second category of power generation technologies is often referred to as primary electricity. This category includes nuclear plants and hydro-electric plants, and is termed primary because it does not involve the combustion of one energy form to produce another type of energy, as does fossil-fuel-fired thermal power generation. In hydro-electric power generation, turbines are driven by the controlled release of water, normally from an artificial lake created by damming a river. Nuclear power generation produces electricity from heat generated by a nuclear reaction following scission of uranium-based fuel rods. These primary electricity sources were largely developed over the 1970s and 1980s in response to the energy price shocks of the 1970s, which underlined the region's potential vulnerability to dependence on high-price imported fossil fuels.

In recent years, other renewable or alternative sources of electricity have been developed, such as wind power, geothermal power, the combustion of municipal and industrial waste, the combustion of biomass, and the use of solar photovoltaic cells. Although several EU Member States are actively supporting the development of these technologies, their overall contribution is still quite limited, with the exception of wind power which has succeeded in becoming quite a significant contributor to new capacity in Denmark and Germany, and is also growing in importance in Italy and the U.K.

The mix of generation capacity in each Member State varies considerably, reflecting access to the various primary energy sources, and differing responses to the policy need to promote security and diversity of energy supply.

Thermal capacity, based on fossil-fuel inputs, made up 58.5% of the EU-12 power generation capacity mix in 1993, and was responsible for 54% of electricity production. The majority of this consisted of output from coal-fired plants, which made up almost 34% of total EU-12 electricity output. Coal has traditionally been the source of much of the region's baseload capacity, although its predominant role has been somewhat eroded in recent years by the increased availability, favourable economics and environmental advantages of natural gas. Gas has increased its share of electricity production from 6.5% in 1988 to 8.7% in 1993, a figure which is still growing. Oil-fired capacity, contributing just under 10% to total output in 1993 is becoming increasingly confined to intermediate and peak load generation. Only in some Southern European countries, particularly Italy, Spain, Portugal and Greece does oil--fired generation retain an important role.

Hydro-electric power remains an important contributor to the EU generation mix, accounting in 1994 for 18% of installed capacity and 10.7% of electricity produced. (Expansion of the EU to 15 countries has increased the importance of hydro-electricity in the EU, with its share totalling 21.5% of EU-15 capacity. In particular, it has a share of 65% of capacity in Austria and 47% in Sweden.) The development of hydro-electric power depends on the availability of exploitable water resources. Many of the most attractive sites have been already developed, and with increasing environmental opposition to large-scale hydro schemes, it is expected that there will be little further development in EU hydro-electric capacity over the next few years.

The development of nuclear power during the past decade has been mixed. Expansion of nuclear power was fastest in the 1980s following the oil-price shocks of the 1970s, as several countries saw nuclear development as a vital policy to ensure energy independence. However, various factors have led to a slowdown in expansion of the nuclear sector since the end of the 1980s. Increased availability of natural gas and moderation in all fossil-fuel prices since 1986 have significantly improved the economics of thermal generation relative to nuclear. In addition, nuclear accidents such as Chernobyl, and public concerns over nuclear waste disposal and land-use have created a climate which is much less favourable to nuclear than 15 years ago. Thus, with the exception of France, no new orders for construction of nuclear power plants (which have not subsequently been cancelled or indefinitely postponed) have been placed in Europe since the early 1980s. Indeed in two countries, Italy and Denmark, nuclear power is banned, and in two others, Spain and the Netherlands, there is a moratorium on new construction. New construction of nuclear facilities in Germany is effectively prevented by the difficulty in obtaining the necessary consents and licences to build and operate nuclear plants. In Sweden, one of the new EU Member States, the government intended to phase out nuclear power completely by 2010. However, the lack of viable alternative options, given other commitments to limit CO_2 emissions, and to abstain from developing much of the country's remaining hydro potential, has led to an effective easing of the nuclear decommissioning timetable. Sweden's nuclear reactors are now expected to serve their full economic life, but no new construction of nuclear capacity is planned. Finally, early in 1996 it was announced that there would be no new nuclear construction in the United Kingdom in the foreseeable future, despite the successful commissioning in early 1995 of the Sizewell B nuclear power station, originally intended to be the first of a series of pressurised water reactor units in the country.

Electricity production from renewable sources remains small, although there are considerable efforts at the EU and national government level to promote and subsidise their development. Excluding hydro-electricity, only geothermal and wind power have made real inroads into the public supply sector, although across the EU there are wide variations in the use of renewable sources. Of these two energy forms, Denmark has the highest share of wind power, 1% of total generation, while Italy has the highest EU level of geothermal power, 1.5% of total generation. The principal limitations to the development of renewable sources are high investment costs, and concern over siting in a number of countries. However, more recently, considerable interest has been shown in the use of biomass and waste as a source of fuel for electric power plants.

INDUSTRY STRUCTURE

Companies

Although there is considerable variation in the structure of the electricity industry among EU Member States, as described above, the industry has essentially developed along national lines in all countries of the region. This pattern will only begin to break down with the gradual implementation the Internal Energy Market, bringing an expansion of competition across national boundaries.

In Austria, the electricity industry comprises the federal power board, VbG, together with nine regional supply and distribution companies and a small number of independent generators. The VbG is involved in power generation and is also responsible for capacity planning, electricity trade, and transmission. The regional companies also generate part of their power needs. The state is required by law to own at least 51% of the country's electric utilities, although plans are on the table to repeal this law, allowing private capital to enter the sector to fund capacity expansion.

In Belgium, the three former private generating companies (Ebes, Intercom, Unerg) were grouped together in July 1990 to create Electrabel. Electrabel accounts for about 94% of

Table 7: Electricity generation and distribution
Trade in electricity

(TWh) (1)	1993 Total imports	Total exports	Net exports	1994 Total imports	Total exports	Net exports
EUR 12	130.2	113.0	-17.2	130.1	119.3	-10.8
EUR 15	154.3	130.8	-23.5	152.2	135.3	-16.9
Belgique/België	7.6	5.4	-2.2	9.1	5.1	-4.0
Danmark	6.3	2.9	-3.4	1.8	6.6	4.8
Deutschland	33.1	32.7	-0.4	35.9	33.6	-2.3
Ellada	1.1	0.3	-0.8	0.8	0.4	-0.4
España	4.6	3.3	-1.3	5.1	3.3	-1.8
France	3.4	65.1	61.7	3.7	66.9	63.2
Italia	40.3	0.7	-39.6	38.7	1.1	-37.6
Luxembourg	4.4	0.4	-4.0	5.0	0.6	-4.4
Nederland	10.6	0.3	-10.3	10.8	0.3	-10.5
Österreich	8.1	8.8	0.7	8.2	9.0	0.8
Portugal	2.1	1.9	-0.2	2.3	1.4	-0.9
Suomi/Finland	8.0	0.4	-7.6	7.2	0.6	-6.6
Sverige	8.0	8.6	0.6	6.7	6.4	-0.3
United Kingdom	16.7	0.0	-16.7	16.9	0.0	-16.9

(1) TWh: terawatt hour.
Source: Eurostat

Table 8: Electricity generation and distribution
Maximum nuclear output capacity and the share in electricity generation.

(GWe) (1)	1994 Capacity	Share (%)	1995 Capacity	Share (%)	1997 Capacity	Share (%)
EUR 12	107.3	35.0	108.9	34.8	111.9	34.0
EUR 15	N/A	N/A	N/A	N/A	124.2	34.2
Belgique/België	5.6	55.8	5.5	53.5	5.6	54.5
Deutschland	22.8	29.3	22.6	35.0	22.1	29.0
España	7.1	35.0	7.1	30.0	7.1	34.0
France	58.6	75.3	59.9	77.5	62.9	79.0
Nederland	0.5	4.9	0.5	4.2	0.5	4.5
Suomi/Finland	N/A	N/A	N/A	N/A	2.3	33.3
Sverige	N/A	N/A	N/A	N/A	10.0	43.1
United Kingdom	12.7	25.8	13.3	19.6	13.7	21.6

(1) GWe: Gigawatts of electricity.
Source: European Commission, DG XVII

power generation in Belgium. Most of the remainder is supplied by the municipalities, whose generation assets are grouped into the Société Coopérative de Production d'Electricité (SPE). Electrabel is responsible for transmission, while municipal companies are responsible for local distribution within local monopoly supply areas.

In Denmark, the majority of electricity generation rests in the hands of eight companies, grouped into two associations, Elsam and Elkraft, which are responsible for planning, load dispatching, operation of the transmission grid, and power exchanges with other countries. Electricity distribution is provided by 105 companies, 53 of which are municipal companies and 52 of which are co-operatives or foundations. There is also a significant private power generation sector in Denmark, with the government encouraging private wind power and combined heat and power (CHP) schemes. These account for about 7% of Denmark's electricity supply.

In Finland there are about 130 utilities, most of them owned by local authorities, but including some large private companies. The largest of these are Imatram Voima and Tellisuuden Voima, which account for about 50% of the country's generation capacity, and also own and operate the country's two transmission grids. The electricity sector was reformed in 1995 and early 1996 with the introduction of open access to transmission and distribution networks and the removal of local monopoly franchise rights for distributors. Discussions are also proceeding with a view to merge the country's two transmission grids into one system, under a single grid operating company.

In France, the monopoly for electricity generation, transport and distribution was given to state-owned Electricité de France (EdF) in 1946. EdF operates 88% of installed capacity and 96% of electricity distribution. The remainder is accounted for by auto-producers and a few municipal distributors. EdF is the largest electric utility in Western Europe and one of the largest in the world.

In Germany, the electricity supply industry is highly decentralised, with some 960 individual public electricity companies. The electricity companies operate on a commercial basis, subject to state supervision in accordance with energy and cartel legislation. Nine large utilities own and operate 80% of generation capacity, including all the nuclear power stations and almost the entire national high-voltage grid. These companies include EVS, PreussenElektra, RWE, HWE, VEW, Bewag, Bayernwerk and Badenwerk. In the former East Germany, the main generator and transmission system operator, VEAG, has been privatised, with shares taken up by three of the biggest West German electricity companies. The former East German transmission grid was linked up to the West European UCPTE grid in 1995.

In Greece, the state-owned Public Power Corporation (PPC) holds the monopoly for generation, transmission and distribution. Electricity generation by auto producers, or small independent producers exploiting renewable energy sources up to a maximum of 50 MW or co-generation potential, is also permitted, with all output sold to PPC at government-controlled prices.

The Irish electricity industry has been substantially reorganised in order to give it greater flexibility and cost transparency, and to accommodate potential developments in regulation at the European level. The state-owned Electricity Supply Board (ESB) now has a horizontal structure, with the main activities of generation, transmission and supply, separated into different divisions. The new structure specifically allows for the development of independent power generation, although the extent to which ESB's monopoly will be allowed to be eroded is extremely uncertain.

In Italy, the electricity industry largely consists of a single state-owned company, ENEL, responsible for electricity generation, imports, exports, transmission and distribution throughout the country. The only exceptions to this are: municipal companies in existence before 1962; auto producers; production by small producers of less than 15 GWh per year; production by combined heat and power plants of less than 3 MW; and generation from renewable resources. In recent years, Italy has greatly encouraged the development of independent power generation and cogeneration, Currently, ENEL produces about 78% of electricity generated in Italy, and distributes about 83% of all power to final consumers. In July 1992, ENEL was incorporated as a joint company following a decision by the Italian government to privatise its industrial and commercial activities. Progress towards privatisation was advanced in 1995 with the signing of a concession act in December, the passing of a law creating a new regulatory authority in November, and the publishing of guidelines for privatisation and industry restructuring, also in November 1995. As soon as the regulatory authority is functioning, privatisation is expected to follow quite quickly, but a precise timing has not yet been settled as of early 1996.

The vast majority of Luxembourg's electric power is supplied by its neighbours, principally Germany. Thus national utility CEGEDEL acts primarily as a distribution company.

In the Netherlands, electricity generation, transmission and distribution is in the hands of municipal and provincial companies. Since the coming into force of the Electricity Act of 1989, there are four major generating companies (EPON, EPZ,

Table 9: Electricity generation and distribution
Structure of electricity production (1)

(%)	1988	1989	1990	1991	1992	1993	1994
Hydro	12.6	8.7	9.2	9.4	9.5	9.5	10.7
Nuclear	33.9	35.7	34.8	33.3	34.4	36.3	34.9
Thermal, of which:	53.4	55.6	55.9	57.2	55.9	54.0	54.2
Oil	9.4	10.7	10.4	10.2	10.7	9.6	N/A
Natural Gas	6.5	7.3	7.2	6.8	6.9	8.7	N/A
Solid Fuel	35.5	35.7	36.2	38.3	36.5	33.9	N/A
Other	2.0	1.9	2.1	1.9	1.9	1.8	N/A
Total (billion kWh) (2)	1611	1659	1703	1847	1863	1857	1891

(1) Including former East Germany from 1991 onwards.
(2) kWh: kilowatt hour.
Source: Eurostat

EZH and UNA) which co-operate within a pooling system operated by SEP, the electricity producers' co-operative. SEP accounts for about 85% of the Netherlands' installed capacity and about 80% of electricity produced. Forty five municipal companies distribute electricity and are grouped within an electricity association, VEEN. In December 1995, the Netherlands government issued a White Paper on energy, part of which aimed at restructuring the electricity sector in order to prepare it to compete in a future liberalised European electricity market. It was proposed to merge the current four main regional generators into one organisation.

In Portugal, state-owned, vertically-integrated utility Electricidade de Portugal (EdP) previously held the quasi-monopoly for generation and transmission, except in areas not covered by its system. However, EdP has now been substantially reorganised. This process was completed in 1994 with the creation of a generation company, CPPE, a transmission grid company REN, and four regional distribution companies, all under an EdP holding company. The first stage of privatisation of the restructured company, involving flotation of 25% of CPPE, was originally scheduled for the summer of 1995, but this was postponed because of elections. It is expected that this process will be resumed in the near future. In the meantime, a new framework for the structure of the market is being introduced in 1996, in which a public electricity service, involving long-term contracts between the generators (CPPE and large private generators) and the transmission grid, will exist alongside an independent electricity system which will be able to market electricity directly to final consumers. A regulatory body will oversee the functioning of both systems. The new framework was largely inspired by the new system implemented in Spain. A significant role is being developed in Portugal for private, independent power producers, who are expected to account for the majority of Portugal's capacity addition needs over the next few years. They already have a foothold in the market, starting with EdP's sale of its 1200 MW Pego operations to an international consortium. Two other consortiums are advanced in planning new gas and hydro generating capacity.

In Spain, the electricity industry has seen quite significant restructuring in recent years. This has resulted from the need to consolidate the financial position of some companies following the nuclear moratorium and insufficient return on equity during the 1980s. The industry, however, still consists of a large number of companies, about 650, including 150 fully integrated utilities and over 300 distribution companies. Nevertheless, the sector is dominated by just four companies which own, or have effective control over, virtually all generating plant. These are Iberdrola (controls 40% of capacity), Endesa (54% state-owned, 40% of capacity), Union Fenosa (15% of capacity), and Hidroelectrica del Cantabrico. The national transmission system is owned and operated by Red Electrica de España, in which the state has a 51% interest. In 1994, the Spanish government approved a new electricity law designed to introduce greater competition into the sector. The new system will function under the oversight of a regulatory body, the National Electricity System Commission (CSEN). There will be two parallel components of the system. Firstly, there is the Integrated System, supplying electricity under uniform nationwide tariffs, and encompassing most of the activities of the current utilities. Secondly, there is the Independent System, which will allow power to be traded at prices freely negotiated between generators and consumers. Power from both the Integrated System and the Independent System will have access to the transmission grid at transparent and equitable prices.

In Sweden, state power authority, Vattenfall, accounts for just over half of national electricity production, with the remainder supplied by municipal and private utilities. The national grid is run by a separate company, Svenska Kraftnat, spun off from Vattenfall in 1992. There are about 270 distribution companies, made up of Vattenfall, controlling about 30% of distribution ,and municipal companies that control the remaining 70%. Liberalisation of the Swedish electricity supply system was finally implemented in 1996, allowing competition in both generation and distribution. Access to the transmission system is guaranteed for all participants in the market at non-discriminatory tariffs, overseen by a new network authority within the Swedish Board for Business and Technical Development (NUTEK).

The United Kingdom undertook the bulk of its privatisation and re-structuring programme in 1990 and 1991. This created 15 public electricity suppliers, which have a monopoly until 1998 on local distribution to smaller customers within their service areas, and an obligation to supply. In England and Wales, transmission is carried out by the National Grid Company whilst in Northern Ireland and Scotland transmission and distribution are both controlled directly by the public suppliers. Nuclear-powered generation remained in state-owned hands in the original privatisation, but passed into the private sector in the summer of 1996. Nuclear Electric, operating in England and Wales, and Scottish Nuclear, were combined under a new holding company, British Energy, be floated into the private sector in July 1996. (Older nuclear power plants, of the Magnox type, will remain in state ownership under British Nuclear Fuels Ltd.) The electricity sector in the United Kingdom has undergone a flurry of merger and acquisition activity since early 1995, with several regional electricity companies being acquired by other utilities, both from the UK and abroad. Some measure of vertical reintegration was heralded by the purchase of distributor Manweb by Scottish Power, and by the agreed purchase of generation assets by Eastern Electricity, in April 1996. Still, this process seemed to be halted by the decision of the Secretary of State

Table 10: Electricity generation and distribution
Power generating output capacity by country, 1993

(MW) (1)	Nuclear	Thermal	Hydro	Other	Total
EUR 12	106 581	271 283	83 806	1 552	463 222
EUR 15	118 850	294 611	114 259	1 572	529 292
Belgique/België	5 485	7 161	1 402	5	14 053
Danmark	0	9 853	10	492	10 355
Deutschland	22 657	82 834	8 803	86	114 380
Ellada	0	6 243	2 523	24	8 790
España	7 020	20 447	16 395	30	43 892
France	59 020	23 460	24 925	240	107 645
Ireland	0	3 411	516	6	3 933
Italia	0	43 346	19 669	471	63 486
Luxembourg	0	106	1 132	0	1 238
Nederland	505	16 922	37	135	17 599
Österreich	0	6 080	11 274	0	17 354
Portugal	0	4 548	4 174	11	8 733
Suomi/Finland	2 360	8 986	2 731	0	14 077
Sverige	9 909	8 262	16 448	20	34 639
United Kingdom	11 894	52 952	4 220	52	69 118

(1) MW: megawatt.
Source: Eurostat

for Trade and Industry to disallow bids by major generators National Power and PowerGen for two regional distributors.

Strategies

During the 1970s and early 1980s, most countries saw a decline in the amount of electricity produced by non-public suppliers. This reduction was largely owed to the widespread use of oil-fired capacity which had become uneconomic. At the same time utilities typically had policies of purchasing excess generation from such plants at prices reflecting their own short-run marginal cost, thus making investment in non-utility generation unattractive.

However, since the mid-1980s, there has been a gradual reversal of this trend. Firstly, governments are increasingly requiring utilities to base purchase prices on full avoided costs. Secondly, the widespread availability of gas and technical developments in power plant have increased the attractiveness of self-generation, and in particular co-generation of heat and power. Finally, partly in response to national legislation (and anticipation of future EU requirements), and partly owed to their own financial constraints, many utilities are themselves turning to independent generators to meet capacity needs. The role of independent generation is thus becoming increasingly important in many markets in the EU.

Since this trend implies increased competition in markets which have relatively low growth prospects by global standards, many traditional EU utilities have set up international investment arms to seek project opportunities in faster-growing markets elsewhere, especially in Asia and Latin America. Among the most notable utilities which are following this route are EdF, National Power, PowerGen, Endesa, Union Fenosa and ESB, all of whom are actively advancing projects in developing countries.

ENVIRONMENT

The use of electricity at end-user level has little discernible negative impact on the environment, with no emissions of pollutants or greenhouse gases. However, the generation of electricity can be the source of a number of potentially harmful environmental impacts, including airborne emissions of sulphur dioxide (SO_2), nitrogen oxides (NOx) and CO_2 from fossil-fuel fired thermal plants. Furthermore, whilst nuclear power generation generally results in very low direct negative environmental impact, the associated fuel cycle, and especially the transport and disposal of radioactive waste, can give rise to important environmental concerns.

All countries have their own national regulations and strategies for controlling environmental impacts. The main piece of EU legislation in this area is the Large Combustion Plant Directive, or LCPD (no. 88/609). This controls emissions of SO_2 and NOx from boilers with thermal capacity above 50 MW, as well as imposing national emission targets. Under the directive, all new large combustion plants were made subject to a licensing procedure to ensure that the plant meets specified emission standards for SO_2, NOx and particulates. The second part applies to existing stationary combustion sources (those for which authorisation was given prior to 1st July 1987), and specifies target values for reduction of emissions based on the 1980 level. Reductions in emissions are targeted at different levels by country; compared to 1980, overall EU SO_2 emissions must be reduced by 60% by the year 2003, and NOx emissions by 30% by 1998, the former in three stages, the latter in two phases. Plants authorised prior to 1987 and built before 1990 must either conform to the new plant standards or be taken into account in the global ceiling value. A revision of the LCPD is currently under discussion, and is expected to result in lower emission limits to be specified.

The strategies used to meet emission targets vary from country to country, once again reflecting the resource base. In Germany, compliance has been achieved by the widespread use of flue gas treatment plant (both for SO_2 and NOx). In other countries, fuel switching is the main abatement option. In France the expansion of nuclear power has ensured that emission targets for the power generation sector have been met. In Italy switching from high sulphur fuel oil to low sulphur fuel oil has been the main route, whilst in the United Kingdom, the expansion of gas-fired capacity at the expense of coal-fired units has greatly contributed to emissions reduction.

REGULATIONS

The supply of electricity is subject to a number of technical and safety regulations. These are mostly established at a national level, although interconnections and international cooperation have insured that there is a level of uniformity across countries. At the EU level, the key regulatory developments

have been in the implementation of the Single Market and moves towards the Internal Energy Market. To this end, the Council has adopted a number of directives which constitute the first stage towards the completion of an internal market in electricity. An agreement reached in June 1996 completed this process by defining a phased implementation of market liberalisation in the electricity sector.

The Commission's original plans for the Internal Energy Market foresaw implementation of a number of measures in three stages, originally designed to be fully implemented by 1996.

The first stage included the transit directive and the price transparency directive. The transit directive (no. 90/313/30), approved by the Council on 30th October 1990, provides that "each high voltage transmission utility shall facilitate power exchanges between other utilities through its grid, provided that transmission reliability is not affected." Meanwhile, the price transparency directive (no. 90/185/16), approved by the Council in June 1990, provides that "electricity and gas utilities shall supply to the Statistical Office the rates they charge to all categories of customers on the understanding that published aggregate figures will respect confidentiality."

Following several years of debate regarding the measures required to make further progress towards an Internal Energy Market in the electricity sector, and in particular regarding an acceptable definition of a Third-Party Access (TPA) régime, an agreement was finally reached at the June 1996 EU Energy Council Meeting. The agreement sets out three stages towards opening up a minimum share of each Member State's electricity market to competition. In the first phase, starting in 1997, the target is for electricity demand equivalent to 22.5% of the total market to be open to competition. This percentage corresponds to the EU average share of consumption enjoyed by consumers using over 40 GWh per year of electricity. After three years this threshold rises to 28.5%, and then to 32% after another three years. This final figure is calculated to include all users who consume more than 10 GWh per year of electricity. Each Member State will, however, have the right to decide which categories of consumers will be eligible to benefit from competition, as long as it can demonstrate that the minimum thresholds are respected. (Member States will, of course, be free to liberalise faster, or to higher thresholds, than specified in the agreement). Also, each Member state will be allowed to decide whether it will implement a negotiated TPA (nTPA) system, or a Single Buyer System (SBS). The nTPA system allows negotiated access, at non-discriminatory fees, to transmission and distribution grids for eligible consumers, and a tendering system for new generation and transmission systems. The SBS system permits a single entity to purchase and resell electricity, manage the transmission grid, and tender and contract for new capacity. Under this system, eligible consumers which elect to shop around for power from different generators in their own country or in other Member States, would pass the obligation to purchase this power to the Single Buyer, which would then resell power to the eligible consumer.

OUTLOOK

Although growth in electricity demand in the EU is expected to pick up over the rest of this decade, longer term prospects are for relatively slow growth. Between 1994 and 2000, final electricity demand is expected to grow by 2.6% per year, on average, spurred by the revival in EU economies. Between 2000 and 2005, this rate of growth is expected to slow to 1.7% per year, on average, and to decline even further to a growth rate of 1.4% per year, on average, between 2005 and 2010.

On the supply side, development of hydro-electric and nuclear power is expected to be limited over the next decade. The reasons for this are that most economically exploitable hydro resources have been developed, while, in the case of nuclear, all EU Member States with the exception of France have now decided not to proceed with further nuclear power plant construction. The completion of capacity currently under construction, and firmly committed capacity, will lead to a peak in nuclear generation production in Western Europe in the late 1990s. The share of nuclear power in the generation mix is thus expected to begin to decline in the early 21st century, owed to increasing electricity demand and plant retirement. New construction in France after the year 2000 will not be sufficient to offset the steady decline in nuclear generation capacity. By 2010, nuclear is expected to account for just under 18% of the EU's generating capacity, compared to an estimated 23% in 1995.

The slowly declining shares of nuclear and hydro-electric power over the next decade will be offset by expansion of the share of conventional thermal power. In particular, gas-fired capacity is expected to increase from almost 11% of the EU generation mix in 1995 to over 19% in 2010. Most gas-fired capacity is expected to be developed in the United Kingdom, Germany, Italy and Spain, although the arrival of natural gas in Portugal and Greece will also lead to the use of natural gas in power generation in these markets.

Despite a decline in its share of the EU generating capacity mix, from 28% in 1995 to 23% in 2010, coal-fired generation will remain the most important type of capacity in operation. The economics of using coal in power generation are expected to improve with the phasing out of the obligation to purchase high-cost, indigenously produced coal in several EU countries, and advances in clean coal-burning technologies are expected to resolve some of the remaining environmental concerns associated with coal combustion.

The major uncertainty facing the electricity sector over the next few years involves the implications of the Internal Energy Market. It is significant, however, that, even in advance of the recent agreement, several EU Member States unilaterally embarked on a process which should bring greater competition in electricity supply to their national markets, via privatisation, unbundling, the breaking up of distribution monopolies, and the introduction of independent power generation. This process started to bring change to the traditional structures of electricity supply in the EU irrespective of implementation of the Internal Energy Market. The phased introduction of competition across the whole of the EU should act to accelerate this process, eventually bringing all Member States into a new competitive environment for electricity supply.

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Transmission and distribution of natural gas

NACE (Revision 1) 40.2

Natural gas is still growing in importance in the EU energy demand mix, with a market share in 1994 remaining above 20%, and prospects good for further expansion of demand over the next 10 years. Its increasing market penetration is being encouraged by environmental concerns, but also by abundant and increasingly diversified supplies of natural gas and its continuing cost-competitiveness versus other fuels. New gas markets are being developed, or will be developed over the next few years, in Spain, Portugal and Greece. In more mature markets the principal motor of natural gas demand growth is a growing role in the power generation sector, where it is displacing coal and oil-fired capacity for economic and environmental reasons, and also as an opportunity to displace nuclear capacity as existing nuclear stations are decommissioned over the next 20 years.

Gas demand growth is likely to be accompanied by changes to the competitive and regulatory structure, as the EU continues to promote measures to open up markets to more competition. Some progress has been made on these issues, but there is likely to be a continuing debate over the most appropriate solutions to promote competition while preserving security of supply.

On the supply side, the EU has several important producers, but imports are growing in importance as demand growth is outstripping growth in EU production capacity, dominated by the Netherlands and the UK. Increased output from principal suppliers Russia, Norway and Algeria is expected to allow EU natural gas markets to continue to grow, as these countries have abundant reserves of commercially viable gas and are all reinforcing the gas supply infrastructure to the EU.

INDUSTRY PROFILE

Description of the sector

NACE Rev.1 40.2 is defined as the manufacture of gas and the distribution of gaseous fuels via mains (pipeline systems). In the EU, this sector is now dominated by the transmission and distribution of natural gas, which has come to play a significant role in the energy mix over the past 20 years.

Natural gas is a hydrocarbon fuel composed mainly of methane, which is produced from natural deposits, sometimes containing just gas, and sometimes containing both oil and gas. This chapter concerns solely the transmission and distribution of natural gas to final consumers. Exploration and production of natural gas is dealt with in the same chapter as oil exploration and production, since the two activities are often closely linked. It should be noted, however, that, in many instances, companies involved in exploration and production activities are also involved in transmission and distribution.

Transmission activities typically involve:

- the bulk purchase of natural gas supplies, normally under long-term contracts with gas producers;
- the transport of gas via high-pressure, high-capacity pipeline systems from the point of purchase to the principal areas of demand;
- the storage of natural gas for strategic or load-balancing purposes; and,
- the bulk sales of natural gas to distribution companies, other transmission companies or large-volume industrial or power generation customers.

Distribution activities involve the movement of gas through local low-pressure pipelines to final consumers in the residential, commercial and industrial sectors, together with associated meter-reading, invoicing and account administration services.

Recent trends

In 1994 EU-12 natural gas consumption was reported to have increased by over 1.2% in 1993. Between 1985 and 1993 gross consumption in the EU-12 had risen by 3.5% per year, on average, a rate of growth faster than that of any other fossil fuel. The natural gas share of total gross energy consumption in the EU-12 (excluding Portugal, where natural gas is not yet available) stabilised at 20.4% in 1994.

The rise in gas consumption was predominantly supplied by rising imports from outside the EU in 1994, which turned out 4.5% ahead of 1993 levels. 38% of EU natural gas consumption is now supplied by imports from non-EU countries (primarily from Algeria, Norway and the former USSR).

Reinforcement of the gas supply system for Europe has continued to be a priority, with several pipeline projects advancing towards completion, most notably the Maghreb pipeline from Algeria to Spain, additional capacity in the TransMed pipeline system from Algeria to Italy, and the opening up of new pipeline routes from both Russia and Norway.

Other moves towards greater integration and competition in EU natural gas markets, notably the proposals of the European Commission to create an Internal Energy Market, have not significantly advanced over the past year. As of early 1996, the issues relating to competition in electricity markets have been the focus of attention, and are still some way from being resolved. Depending on the outcome of the debate relating to electricity, natural gas should then be the next sector where Internal Energy Market questions will need to be agreed.

International comparison

The West European natural gas market is the third largest in the world, currently estimated to account for over 15% of total world natural gas demand. The only major regions which have higher levels of natural gas demand are Eastern Europe and the former Soviet Union (29% of the world total), and North America (34% of the world total). Other areas of the world are growing fast, however, with natural gas demand in both Asia and the Middle East doubling since 1985.

Natural gas represents 20.4% of gross energy demand in the EU-12, a proportion which has been growing and is expected to continue to grow over the remainder of the decade. This level of penetration is less than in North America, where a mature natural gas supply and transmission system has contributed to a share of natural gas in primary energy demand currently estimated at just under 25%. The role of gas has been favoured since the early 1990s by deregulation of the natural gas transmission and distribution industry in the USA, which has promoted competition, price transparency, and end-user natural gas prices which are very competitive with other fuels.

Until the early 1990s, Eastern Europe and the former Soviet Union was the largest gas-consuming region in the world. It has been overtaken by North America largely as a result of the economic depression, and the decline in industrial activity which followed the collapse of the collectivist system. Thus total gas demand in this region is estimated to have fallen by 17% between 1990 and 1995. Natural gas is still the most important component of the energy mix, however, at 43% of total primary energy demand, stimulated by good resource

Table 1: Transmission and distribution of natural gas
Main indicators

(thousand TJ, GCV) (1)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Gross consumption	8 570	8 659	9 211	8 957	9 370	9 656	10 775	10 656	11 303	11 435
Primary production	5 914	5 798	6 002	5 509	5 826	6 036	6 722	6 770	7 126	7 252
Extra-EU Imports	2 859	3 094	3 427	3 488	3 731	3 820	4 149	4 178	4 408	4 580

(1) TJ: terajoule; GCV: gross calorific value.
Source: Eurostat, Eurogas

Table 2: Transmission and distribution of natural gas
Trends in consumption and usage of natural gas

(thousand TJ, GCV) (1)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Gross consumption	8 570	8 659	9 211	8 957	9 370	9 656	10 775	10 656	11 303	11 435
share in total gross consumption of energy (%)	18	18	19	18	18	19	19	19	21	19
Final non-energy consumption	627	530	527	531	535	528	533	438	529	526
Transformed in power stations	1 055	1 020	1 108	1 099	1 244	1 289	1 303	1 338	1 310	1 404
Final energy consumption, of which:	6 537	6 699	7 194	7 017	7 248	7 479	8 182	8 475	9 998	10 028
industrial	2 377	2 342	2 633	2 682	2 851	2 940	2 890	3 245	4 142	4 378
domestic and commercial	4 149	4 356	4 550	4 325	4 387	4 529	5 282	5 220	5 856	5 650

(1) TJ: terajoule; GCV: gross calorific value.
Source: Eurostat, Eurogas

Table 3: Transmission and distribution of natural gas
EU trade by origin

(thousand TJ, GCV) (1)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Primary production	5 914	5 798	6 002	5 591	5 825	6 036	6 722	6 770	7 126	7 252
Intra-EU trade	1 297	1 116	1 124	964	1 131	1 199	1 362	1 519	1 505	1 393
Extra-EU imports	2 858	3 094	3 427	3 488	3 739	3 850	4 149	4 178	4 408	4 580
Norway	1 030	1 039	1 133	1 127	1 058	1 031	996	1 005	997	1 097
ex-USSR	980	1 215	1 295	1 352	1 475	1 684	1 883	1 800	1 880	2 056
Algeria	798	798	962	970	1 041	1 078	1 165	1 287	1 246	939
Other	50	42	38	39	165	58	105	86	58	261
Share of extra-EU imports in gross consumption (%)	33.3	35.7	37.2	38.9	39.9	39.9	38.5	39.2	37.5	37.1

(1) TJ: terajoule; GCV: gross calorific value.
Source: Eurostat, Eurogas

Table 4: Transmission and distribution of natural gas
Share of natural gas in gross consumption of energy

(%)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR 12 (1)	17.9	17.9	18.6	17.9	18.3	18.8	19.1	19.1	20.5	20.4
Belgique/België	16.8	14.6	16.1	15.6	17.1	17.3	17.5	17.6	19.4	19.2
Danmark	3.0	5.5	6.9	7.8	8.9	9.8	10.9	11.7	12.0	13.2
Deutschland	15.5	15.5	17.1	16.5	17.6	17.7	16.9	17.0	17.9	18.4
Ellada	0.4	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.5	0.2
España	3.3	3.6	3.6	4.2	5.3	6.2	6.2	6.5	6.6	6.5
France	12.5	12.3	12.5	11.8	11.7	11.9	12.7	12.7	13.2	12.1
Ireland	22.2	15.1	14.4	17.2	19.6	19.8	18.6	18.5	21.4	20.3
Italia	20.6	21.5	22.8	23.5	24.7	25.8	27.0	26.8	28.8	26.4
Luxembourg	9.7	9.8	11.4	11.3	12.0	12.1	11.9	12.4	12.8	12.7
Nederland	52.8	51.2	51.5	47.3	47.9	46.7	49.6	48.1	48.8	47.1
United Kingdom	23.1	23.2	23.3	22.1	21.6	22.4	23.5	23.1	27.1	27.4

(1) Excluding Portugal, not relevant.
Source: Eurostat

availability, an extensive transmission and distribution system, and low end-user prices.

In Japan, which has no indigenous resources of natural gas, natural gas only represents about 11.5% of primary energy demand, and is mainly delivered to the power generation sector and to local distribution grids in some of Japan's major cities. Japan currently imports all of its natural gas requirements in the form of liquefied natural gas (LNG), and is the principal market for natural gas exporters in the Asian and Middle East regions.

Foreign trade

Since production of natural gas in the EU-12 is primarily focused in the United Kingdom and the Netherlands (with smaller contributions from Denmark, France, Germany and Italy), and EU-12 production satisfies only 64% of demand, foreign trade is an important component of the natural gas supply mix in the EU. The importance of the investments required to develop gas transport and transmission infrastructure, either by long-distance pipeline or by LNG, have favoured the existence of long-term relationships between suppliers and transmission and distribution companies in EU Member States. Imports continue, therefore, to be primarily sourced from three major suppliers: Algeria, Norway and the former Soviet Union. Russia is the most important supplier, accounting for 52% of EU-12 imports, followed by Norway (24%), and Algeria (24%) in 1994. Total imports from outside the EU rose by 4.1% in 1994 versus 1993 to 4580 Petajoules (PJ), representing 38% of gross EU consumption. Since 1985, total extra-EU imports of natural gas have risen by 4.7% per year, on average, as rising demand has outpaced increases in EU indigenous production.

Natural gas transmission links between the EU and its suppliers are continuing to be developed in anticipation of future growth in EU natural gas demand, and to assure the possibility of continuing diversity of gas supply sources. All of the EU's major gas suppliers have been active in augmenting their gas delivery capacity.

The three existing major pipelines from Norway to the European Continent, Norpipe, Zeepipe and Europipe, with a combined capacity of about 46 billion cubic metres (bcm) per year, are to be augmented by two significant new pipeline developments. The Norfra pipeline will deliver gas directly to France, while Europipe 2 will consist of a third link with Germany. These pipelines will lift Norway's export capacity to the Continent to about 70 bcm/year, allowing Norway to participate in satisfying increasing EU demand levels.

Algerian gas is either transported by pipeline via Tunisia and into the Italian grid, or is imported as LNG from liquefaction plants at Arzew and Skikda to reception and regasification terminals in Belgium, France and Spain. Within a few years Greece will also receive Algerian natural gas in this manner. An extension of the Trans-Med pipeline from Algeria to Italy is currently under way and will see its capacity double to 25 bcm/year during 1996. The liquefaction plants, including the oldest in the world, are, in parallel, being refurbished and should reach a capacity of 30 bcm/year in 1996. Finally, work on the EuroMaghreb pipeline started in 1994, and is on schedule to be completed late in 1996. This 9 bcm/year pipeline will run through Morocco and supply Spain after crossing the Straits of Gibraltar. In 1997, an off shoot will provide 2.5 bcm/year to Portugal, allowing a new natural gas market to be created.

Russian gas is currently supplied through major gas pipelines from the Western Siberia gas-producing fields, crossing Ukraine and former Czechoslovakia to the German border. A number of projects are being developed for new pipeline routes including a line through Belarus and Poland, and a pipeline from the major gas fields in the Yamal Peninsula. In addition, Russia is scheduled to supply Greece with natural gas by pipeline over the next few years. These developments are expected to reinforce the position of the former Soviet Union as a major supplier to the EU over the next 10 to 15 years.

Another recent planned pipeline development is the Interconnector project which will link the UK to the continental system for the first time, allowing the export of UK North Sea gas, and later the import of Russian gas to the UK when North Sea gas production begins to decline.

MARKET FORCES

Demand

EU-12 gross natural gas demand has increased at 3.2% per year, on average, between 1985 and 1994, a faster rate of growth than any other fossil fuel, as natural gas has continued to increase its penetration in all major consumption sectors except transport, principally at the expense of solid fuels and oil. Increased availability of natural gas, its environmental advantages versus other fuels, and pricing which is designed to ensure the competitiveness of natural gas in most applications, have all contributed to the growing importance of natural gas in the overall energy mix.

The residential and commercial sector accounts for just 45% of total gross natural gas consumption in the EU-12. Natural gas has become a very strong competitor in this sector, often causing a large-scale and permanent displacement of other fuels once local distribution networks are established. It is used principally as a space-heating, water-heating and cooking fuel. Natural gas is now the most important component of residential and commercial energy demand in the EU, at about 37% of sectoral energy consumption. However rates of penetration vary enormously across the region, ranging from zero in Portugal, where there is no natural gas yet available, to 72% in the Netherlands, which has the longest established and most complete gas supply infrastructure of any EU Member State.

Industry, the next biggest sector for natural gas demand, accounts for over 38% of total gross gas consumption. Natural gas is also the largest element in the energy demand mix for industry, making up almost 30% of industrial energy demand in the EU-12. The use of natural gas has derived considerable impetus over the past 15 years, firstly because of perceptions of oil price volatility after the supply and price disruptions of the 1970s, and subsequently because of the role of gas in satisfying more stringent environmental constraints, such as the airborne emissions limits for industry imposed by the Large Combustion Plants Directive.

In 1994, power generation represented 12% of total gross natural gas consumption in the EU-12. This has been the fastest growing segment of natural gas demand over the past 10 years, growing by an average of almost 5% per year between 1985 and 1994. Natural gas now represents about 10% of fuel inputs into the power generation sector. Over the past 10 years several developments have increased the attractiveness of gas as a power station fuel. Firstly, increasing environmental concerns have in particular led to tighter emission norms: emissions of SO_2 and CO_2 are lower for natural gas than for other fossil fuels. In addition, the European Community repealed in 1991 a 1975 Directive that limited the use of natural gas in power plants. Thirdly, technological developments have increased the efficiency of gas plants to over 55% for a combined cycle system, compared to an efficiency of only 35%-40% for oil or coal plants. Fourthly, structural and institutional changes in the electricity industry have contributed to the growth of natural gas demand, with privatisation in some countries and the widespread development of independent power generation in others favouring the use of gas, because of the lower capital cost and shorter construction lead time for gas plants. Finally, the reduction

Table 5: Transmission and distribution of natural gas
Gross inland consumption by Member State

(thousand TJ, GCV) (1)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR 12 (2)	8 570.4	8 659.2	9 211.4	8 956.8	9 369.5	9 655.9	10 775.5	10 655.6	11 299.6	11 374.6
EUR 15 (2)	8 825.0	8 921.5	9 500.2	9 243.1	9 697.3	10 029.2	11 165.3	11 050.4	11 715.9	11 808.5
Belgique/België	340.9	308.4	340.1	335.6	373.0	380.0	406.3	421.0	437.5	450.0
Danmark	26.3	47.8	60.8	64.8	69.3	83.1	94.6	99.0	112.3	125.2
Deutschland	1 918.2	1 908.5	2 115.8	2 069.6	2 175.6	2 245.5	2 685.3	2 642.3	2 776.7	2 846.5
Ellada	3.3	4.6	5.2	6.2	6.3	6.4	6.3	5.9	4.3	2.2
España	109.4	118.8	121.9	155.7	206.5	231.2	260.5	272.4	267.2	292.9
France	1 129.1	1 131.8	1 168.3	1 104.5	1 137.6	1 157.4	1 313.1	1 305.6	1 347.2	1 294.4
Ireland	90.5	63.2	62.8	75.7	85.4	88.1	89.2	88.3	100.3	102.0
Italia	1 265.2	1 343.3	1 491.5	1 561.5	1 716.6	1 815.0	1 928.9	1 912.5	1 951.5	1 885.8
Luxembourg	14.1	14.0	16.0	16.5	18.9	20.0	20.8	21.7	22.5	22.7
Nederland	1 503.7	1 512.9	1 563.6	1 416.7	1 451.9	1 433.3	1 602.7	1 552.9	1 594.3	1 552.0
Österreich	214.0	207.8	216.5	206.2	221.3	243.6	252.9	250.4	264.1	271.8
Suomi/Finland	37.2	46.0	60.9	65.2	86.6	105.2	111.2	115.2	119.6	132.3
Sverige	3.5	8.5	11.5	14.9	19.9	24.6	25.8	29.2	32.6	29.8
United Kingdom	2 169.5	2 205.8	2 265.5	2 149.8	2 128.6	2 195.8	2 367.7	2 334.0	2 685.8	2 800.9

(1) TJ: terajoule; GCV: gross calorific value.
(2) Excluding Portugal, not relevant.
Source: Eurostat

in coal production, supported by high-price, government sponsored contracts with the electric power industry in the UK, Belgium, France, Germany and Spain, has opened up new markets for natural gas in power generation

Supply and competition

With 3.3 trillion cubic metres (tcm) of proved natural gas reserves at the end of 1994, the EU accounts for 2.2% of world reserves. Additionally, Norway, which decided to remain outside the EU in its 1994 referendum, accounts for 2.9 tcm of reserves, over half the region's total. The EU is thus relatively undersupplied in relation to its position as the third largest gas consuming region in the world. While EU production is a higher proportion of the world total, at 8.5% in 1994, than its reserves, the region still maintains a substantial import requirement.

The principal indigenous producers in the EU are the Netherlands, the United Kingdom, Denmark, Germany and Italy. The principal suppliers of gas from outside the EU are Russia, Algeria and Norway, with smaller quantities supplied from Libya.

Natural gas is usually secured from these supply sources by national gas transmission and distribution companies purchasing under long-term contracts, with prices linked to oil prices via indexation formulae. Such long-term arrangements permit the huge investments needed in supply infrastructure, while retaining price flexibility to ensure the competitiveness of natural gas versus other fuels at the end-user level. This pattern of supply arrangement is beginning to show some erosion in parts of the EU, however. The most striking example is in the UK, where British Gas has rapidly lost market share through Government ruling in the years following privatisation, as increasing competition has been forcefully introduced. New entrants have been able to purchase gas at low prices, because of a situation of oversupply to the U.K gas market, whereas British Gas has continued to be bound by long-term "take-or-pay" contracts for large quantities of higher priced gas. This dilemma is currently the subject of negotiations between British Gas and its suppliers, but has not yet been resolved. Since the UK gas supply system is not yet linked with the European Continent, there is no alternative outlet for UK gas production, thus helping keep spot prices low.

INDUSTRY STRUCTURE

Companies

The structure of gas markets in Western Europe is still dominated by central or local/regional government-owned entities, which purchase or import gas, store and transport it and deliver it to the end user. The major exceptions to this state of affairs are Germany and the United Kingdom. In both countries private capital now controls most of the major gas companies (although final distribution to small and medium sized customers is usually controlled by municipalities in Germany), and competition is becoming more a feature of the market place.

Since the early 1990s, the European Commission has been promoting its proposals to create an Internal Energy Market, whose principal features would be a series of measures designed to increase the level of competition in electricity and natural gas markets. The cornerstone of the proposed reforms would be the creation of Third Party Access (TPA) for electricity and natural gas transmission networks. This would allow a greater level of choice by consumers as to their source of supply, irrespective of the position of their local gas company or of national boundaries. However, there has been little progress on advancing towards TPA in the gas market over the past couple of years. So far the Internal Energy Market debate has focused on the electricity industry, where there have been prolonged disagreements between the various governments and utilities concerned. There is also disagreement within the gas industry as to the usefulness and applicability of TPA, and it is thus unlikely to be implemented in the near future. Changes in the structure of EU natural gas markets are thus primarily occurring at the national level.

The UK has seen perhaps the most radical changes in its market structure since the privatisation of monopoly transmission and distribution company British Gas (BG) in 1986. Under the influence of a regulatory regime which set out to introduce real competition in the market, BG has seen its monopoly supply position stripped away with regard to the industrial and commercial markets, and is in the process of losing its monopoly in the small domestic market. A number of independent suppliers have begun operations in UK gas supply, and have made significant headway in winning business from BG. BG has responded by a series of reorganisations, culminating in the announcement in early 1996 that it would split into two separate companies in 1997. One company,

British Gas Energy would be responsible for gas trading and sales in the U.K, and would also inherit BG's large Morecambe Bay gas field. The other company, Transco International would manage gas transportation and storage, international operations and exploration and production (excluding Morecambe Bay).

In Germany the major gas companies until recently enjoyed virtual regional monopolies. However, the advent of new market entrant WinGas, a subsidiary of Wintershall in joint-venture with Russian gas supplier, Gazprom, has introduced a new element of competition into the market. WinGas is competing directly with the gas companies already in existence to supply industrial users and municipalities as their current contracts come up for renegotiation. WinGas also has ambitions to significantly expand its activities, not only in Germany, but also as a supplier of Russian gas to other West European countries. In the former East Germany, restructuring of the gas industry involved the sale of transmission company VnG to a consortium of companies, dominated by Ruhrgas, one of the principal West German gas companies. Wingas also received 20% of VnG, along with smaller minority shares for Elf, British Gas, and Gazprom of Russia.

In Belgium, the state's 50% participation in the gas import and transmission company Distrigas was sold off in 1994, partly to municipalities and partly through an open stock market flotation. However, the Belgian government retained a "golden share" enabling it to intervene in matters of national interest. The remaining 50% of Distrigas is still held by Tractebel (33%), and Shell (17%).

In Portugal, the consortium of state-owned banks, insurance and energy companies which comprise the ownership of Transgas, the company charged with importing and transporting gas purchased from Algeria, is planned to be opened up progressively to private capital over the next five years. A number of European gas companies are interested in taking a strategic stake in order to participate in one of Europe's last remaining new markets for natural gas. Private companies are expected to take up 75% of the capital, with interested parties including Gas Natural of Spain, Gaz de France, Elf, British Gas, National Power, Shell, Ruhrgas, BP, Statoil of Norway and Distrigaz of Belgium. In addition main gas supplier Sonatrach of Algeria is expected to take up at least 5% of Transgas.

In Greece, arrangements for the import of Russian gas supplies by pipeline, including new pipeline developments, have been changed several times. State gas company DEPA was initial signatory to the contract, prior to losing and then regaining monopoly transport and marketing rights to the gas. Prometheus Gas, a joint venture between Greek interests and Gazprom of Russia, is driving the development of a pipeline infrastructure and possible LNG export terminal, and could end up competing with DEPA in gas supply in the Greek market once the gas starts arriving.

In Italy, privatisation of state energy holding company ENI, which includes gas importer and transporter SNAM, has been the objective of successive Italian governments since the beginning of the 1990s. Political changes, together with the need to achieve consensus on the structure and role of the privatised companies, have delayed the process, but it is still expected that ENI will enter the private sector before the year 2000, with SNAM remaining part of an integrated energy group.

REGIONAL DISTRIBUTION

The development of natural gas markets in the different European countries has been quite uneven, because of differences in indigenous resources and in pipeline access. The most developed, and mature, market is the Netherlands, where the share of gas in gross energy consumption is over 47%. The other two countries where there is significant indigenous gas production, Italy and the UK are the only others where the gas share of gross energy consumption exceeds 25%. The development of nuclear power in France and Belgium has limited the potential penetration of gas, while abundant indigenous coal resources in Germany, supported by guaranteed outlets in the power generation and iron and steel industries have been a constraint on the share of gas.

At the other end of the scale are new markets for natural gas, in particular Portugal and Greece. Here, natural gas has virtually no market presence, but the development of supply and distribution infrastructure should allow these markets to take off in the years surrounding the turn of the century.

Finally there is a middle tier of lesser developed markets, with the market share of gas ranging from 6.5% in Spain to 12%-20% in some of the more mature markets such as France, Germany and Belgium. The share of gas in Spain is low because gas was only recently introduced but the market should now expand rapidly, with the development of the appropriate infrastructure, and the conclusion of new gas supply agreements with Algeria and Norway.

Among the three new Member States in the EU, natural gas plays a relatively small role in Finland (9% of gross energy consumption), and Sweden (1.5% of gross energy consumption), but is more developed in Austria (22% of gross energy consumption).

ENVIRONMENT

The environmental advantages of natural gas compared to other fuels have been one of the major factors in its success in increasing its market share in the EU. Natural gas contains very little sulphur and it emits less NO_x per unit of energy than other fossil fuels. It also contributes less emissions of CO_2 and other greenhouse gases than oil or coal, and is thus perceived as a lesser contributor to the threat of global climate change.

Initiatives taken within the EU, such as the Large Combustion Plant Directive (LCPD), and internationally, such as the Framework Convention on Climate Change, under which the EU has set targets to limit its CO_2 emissions to 1990 levels by the year 2000, have contributed to a favourable climate for increased penetration of natural gas. The economics of burning natural gas versus the cost of installing emissions clean-up equipment and burning other fuels, has favoured gas in many industrial and power generation sector applications.

REGULATIONS

The regulatory environment in the EU embracing the natural gas transmission and distribution industry is gradually moving towards one designed to support a more competitive environment. Although the evolution towards TPA is currently moving quite slowly, and the final shape of TPA, if implemented, is still difficult to forecast as of early 1996, other measures have been enacted. One such supporting measure was the gas transit directive, adopted by the EU in 1991. This directive is aimed at facilitating the transit of gas between high pressure transmission grids. Companies owning or controlling high pressure gas pipelines in one EU Member State are obliged to allow a counterpart company in another State to carry gas across its transmission system if capacity is available and subject to price and quantity negotiations. Article 3 of the Directive requires all transit requests and the outcome of negotiations to be notified to the Commission.

OUTLOOK

In the years leading up to 2000, natural gas is expected to continue its recent strong growth path, with average annual demand increases in the EU running at 3.6%. This will lead to natural gas increasing its share of total primary energy

demand in the region to 22% by the year 2000. Expansion of demand will continue in the longer term, with the share of natural gas in primary energy demand in the EU expected to reach 23% in 2005, and 24% in 2010. These gains will be mainly at the expense of oil and of nuclear energy, although coal is expected to succeed in regaining its competitive position versus gas over the next 10 years. This trend remains due to the abundant supply of gas, reinforced by capacity increases in supply infrastructure, its continuing price competitiveness versus other fuels, and its environmental advantages. In addition, over this period new natural gas markets will develop, in Greece and Portugal, and there should be a significant expansion in gas demand in Spain, which is currently a relatively immature market.

On the supply side, most of the increase in demand in the EU will have to be met by imports. Although there is some scope for a build up of production in the final years of this century, primarily from the UK and Danish sectors of the North Sea, this will not be sufficient to meet increased demand. By 2000, extra-EU imports are thus expected to increase to 42% of the EU's natural gas requirements, compared with 38% in 1994. As EU production then begins to decline after the year 2000, the import requirement will correspondingly increase, reaching 48% in 2005 and 55% in 2010. Of the major EU gas producers, while the Netherlands is expected to remain an important exporter over the next 20 years because of its relatively small national market and long-term production policy, the UK is expected to begin to need to import natural gas in significant quantities after 2005, as its indigenous production levels decline. Fortunately there are plentiful supplies of natural gas close to the EU, with Russia, Norway and Algeria all actively building up their export capacity.

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Renewable energy

Renewable energies are continuing to provide a small but growing proportion of Europe's energy needs, both as inputs to electricity generation and as sources of direct heat. An annual growth rate of over 3% per year for electricity generated from renewable energy sources has been sustained since the early 1990s. In 1993, primary electricity generation from renewable energy sources accounted for almost 10% of EU-12 electricity production, while total energy production, including electricity and heat, from renewable energy sources contributed around 3.3% to total gross inland energy consumption in the EU-12. The renewable share of primary energy production was even higher, at 6.2%. The largest contributions to these totals are made by large scale hydro-electricity production and the combustion of biomass to produce heat. Hydro-electricity production dominated electricity production from renewable energy sources with a 91% share and biomass accounted for 98% of EU-12 heat production from renewable sources in 1993.

Expansion of the role of renewable energy is playing an increasingly important part in EU energy and environmental policy, as well as that of most of the Member States and a number of programmes are in place to promote its development. Renewable energies have the advantages of minimising CO_2 emissions, of being an indigenous energy resource, and, in general, of having low operating costs. However, some of the newer renewable energy technologies have higher investment costs and lower efficiency rates than classical forms of electricity production. The objective of many of the programmes in place is to overcome these disadvantages and accelerate the achievement of commercial viability for new renewable energy technologies. The outlook is positive for the continued expansion of the renewable energy sector over the next 15 years.

INDUSTRY PROFILE

Description of the sector

The renewable energy industry does not have a NACE classification. The industry involves the development, manufacture and operation of technologies which use sources of energy which are not depleted by their exploitation to produce electricity, heat or liquid fuels. The principal types of renewable energy are hydro-electric power, biomass, geothermal energy, wind power and solar energy. The following paragraphs classify each type of renewable energy according to the type of output produced.

Electricity

Hydro-electric power generation involves the controlled release of water, normally from an artificial lake damming a river, to drive sets of turbines. Large-scale hydro-electric power schemes make a significant contribution to electricity production in the EU, and in many other areas of the world, and this is considered a mature technology. Small-scale hydro-electricity generation uses the same principles as large scale hydro-electricity, but plants use different types and sizes of turbines. Small hydro is an emerging sector, which benefits from many of the support programmes available to new renewable energy technologies.

Tidal power extracts energy from tides using similar principles to hydropower facilities but captures the tidal ebbs and flows rather than the flow of a river to generate electricity.

Wind power generation uses turbines placed on elevated structures to generate electricity. The turbines are driven by blades which rotate in the wind.

Solar photovoltaic systems use panels composed of silicon crystals or thin silicon film to convert solar radiation into direct current electricity.

Heat and/or electricity

Geothermal energy use takes heat from the earth directly for heating purposes, or uses it for electricity generation. The temperature determines the application.

Biomass is considered all matter that can be derived directly or indirectly from plant photosynthesis. Thus, this category includes wood or wood residues, and various types of energy crops. Indirect sources include by-products available from animal husbandry and the food industry. Biomass can be used directly for heat production, or used in electricity production, via either direct combustion or gasification.

Heat

Solar thermal energy technologies produce heat by capturing solar radiation. They usually consists of a series of collectors, a heat exchange and energy transport system to move the heat to the point of use, an electronic control system and an energy storage system.

Liquid fuels

Some types of biomass can be converted into liquid fuels for use in the transport sector. This was pioneered in Brazil in the 1980s, using sugar-cane as the source for an ethanol based fuel. In the EU, recent developments have focused on the use of colza as significant component in automotive diesel fuel, and of sugar-beet to provide an augmented oxygenate component for gasoline.

In addition to the development and operation of new renewable energy technologies, a number of traditional industries are also associated with the renewable energy sector. They fall into two types:

Industries that provide feedstock, such as the agricultural products industries which provide feedstocks such as straw, slurry and wood residues for biomass-derived renewable energies; the pulp and paper and wood processing industries which produce waste products and residues which can be used as feedstocks; and the waste and recycling industries which provide low cost feedstock for combustion.

Manufacturing industries that provide components for use by renewable energy technologies: e.g., the mechanical engineering industry, involved in the manufacture of renewable energy equipment, the most important being turbines (water turbines for hydroelectric plants, aero-turbines for wind farms and steam turbines for geothermal power stations); agricultural equipment used for biomass collection and processing; and the electrical engineering industry which, in addition to manufacturing electrical components for control equipment, provides semiconductor material for photovoltaic cells.

Recent trends

Mature renewable energy technologies such as biomass combustion and large-scale hydroelectric power have long been a significant part of EU energy supply. The energy supplied from other renewable sources has grown more recently, though it is still a very small fraction of total energy supply. An important stimulus to the development of "new" renewable energy sources has been the growing concern about CO_2 emissions and the potential climate change effect. Commitments made by governments and the EU to stabilise CO_2 emissions at their 1990 level by 2000 have stimulated the implementation of programmes to promote the development of renewable energy sources as part of a wider emission control strategy.

Just under 10% of EU-12 electricity generation was met by renewable energy sources in 1993. Hydro-electric power generation accounts for over 90% of the renewable electricity supply. Biomass and hydro together make up 97% of the

Table 1: Renewable energy
Electricity production from renewable energy sources, 1993 (1)

(GWh) (2)	Hydro	Biomass	Geo-thermal	Wind	Solar (PV) (3)	Total	Share in overall electricity generation (%)
EUR 12	172 496	10 273	3 671	2 304	18	188 721	9.6
EUR 15	299 496	18 763	3 671	2 352	18	324 259	14.5
Belgique/België	251	522	0	8	0	781	1.1
Danmark	28	603	0	1 034	0	1 638	4.9
Deutschland	18 221	3 168	0	674	2	22 053	4.2
Ellada	2 518	0	0	47	0	2 565	6.7
España	24 377	625	0	116	1	25 119	16.0
France	68 698	1 601	0	4	0	70 303	14.9
Ireland	750	0	0	15	0	765	4.7
Italia	44 482	279	3 667	4	12	48 445	21.8
Luxembourg	62	50	0	0	0	112	10.5
Nederland	92	1 315	0	178	2	1 587	2.1
Österreich	38 020	360	0	0	0	38 380	72.9
Portugal	8 737	901	4	11	0	9 653	30.9
Suomi/Finland	13 600	5 990	0	0	0	19 590	32.0
Sverige	75 380	2 140	0	48	0	77 568	53.1
United Kingdom	4 280	1 209	0	213	0	5 702	1.8

(1) Data for Austria, Finland and Sweden are provisional.
(2) GWh: gigawatt hour.
(3) PV: photovoltaic cells.
Source: Eurostat

total. The three new Member States, Austria, Finland and Sweden all have significant hydro-electric production, such that the proportion of electricity generated from renewable sources in the EU-15 is 14.5%, over 50% higher than the EU-12.

With regard to heat, biomass (principally wood) provided almost 98% of renewable energy sourced heat supply in 1993 in the EU-12.

Among the "new" forms of renewable energy, wind power has made the most significant growth over recent years, with significant markets developing in Denmark, and more recently in Germany. In terms of annual installations of wind powered generating capacity, Germany is now the largest market in the EU, and, indeed, in the world. However, in proportion to the total size of the electricity market, wind power still has the highest penetration in Denmark, where it represents over 3% of total power generation.

MARKET FORCES

Supply and competition

Small hydro-electricity generation

In the EU-12, total installed hydroelectric capacity is estimated to have stood at about 92 GW (gigawatt) in 1995. The three new Member States, Austria, Finland and Sweden brought an additional 30.5 GW of hydro capacity into the EU upon accession at the beginning of 1995. The overwhelming majority of this consists of large-scale hydro-electric plants. Small hydroelectric plants (less than 1 MW) contributed 1.4 GW to total hydro capacity in 1993. For new hydro-power development, there is a marked trend towards small scale applications which have a smaller impact on the environment than their larger counterparts. This shift has mainly been due to the limited availability of new large scale sites. The percentage of sites economically exploitable and already in use is 95% for large hydro but only 20% for small hydro-electricity. Al-

Table 2: Renewable energy
Heat production from renewable energy sources, 1993

(thousand toe) (1)	Biomass	Geothermal	Solar	Total
EUR 12	24 159.1	359.2	186.8	24 705.2
Belgique/België	238.5	1.2	0.8	240.6
Danmark	1 068.4	1.1	3.8	1 073.3
Deutschland	2 141.9	8.6	21.0	2 171.5
Ellada	1 399.3	3.1	92.5	1 494.9
España	3 115.7	6.5	21.5	3 143.7
France	11 014.4	121.8	17.4	11 153.6
Ireland	92.2	0.1	0.1	92.4
Italia	2 125.5	216.0	7.2	2 348.7
Luxembourg	15.4	0.0	0.0	15.4
Nederland	450.0	0.0	2.4	452.4
Portugal	2 140.0	0.0	13.9	2 153.9
United Kingdom	357.8	0.8	6.1	364.7

(1) toe: tonnes of oil equivalent.
Source: Eurostat

Table 3: Renewable energy
Electricity generation and installed capacity of mini hydro plants, 1993(1)

	Generation (GWh) (2)	Installed capacity (MW) (3)
EUR 12	4 453.2	1 406.0
Belgique/België	9.6	2.8
Danmark	15.6	5.9
Deutschland	1 215.1	362.0
Ellada	7.6	3.9
España	642.0	189.0
France	1 510.0	404.0
Ireland	18.3	5.6
Italia	790.0	353.0
Luxembourg	59.4	26.8
Nederland	1.0	0.2
Portugal	47.6	24.3
United Kingdom (4)	137.0	28.5

(1) Plants with a capacity lower than 1 MW.
(2) GWh: gigawatt hour.
(3) MW: megawatt.
(4) Plants with a capacity lower than 5 MW.
Source: Eurostat

though most small hydro capacity is installed in Germany, France and Italy, together accounting for 80% of the EU-12 total, it is noteworthy that small hydro capacity in the UK doubled between 1991 and 1993, taking advantage of the arrangements favouring renewable energies under the Non-Fossil Fuel Obligation (NFFO) programme discussed below. The total additional EU exploitable potential for small hydro-electricity is between 4 and 5 GW.

Tidal power

The development of large scale tidal power stations in the EU has been inhibited by the huge investment cost, the very long construction time and concern over the local environmental impact of tidal barrages. The largest tidal power station in the world was built in 1968 at La Rance, in France with an installed capacity of 240 MW. However, no further sites have been developed, or are planned to be developed in the next few years, in the EU, despite their considerable potential.

Wind power

In 1993, Denmark was the largest generator of electricity from wind energy in the EU, accounting for almost 45% of wind-powered electricity generation in the EU-12. The Danish wind power industry was one of the pioneers in Europe, taking advantage of a favourable regulatory environment and guaranteed output prices to take a significant share in the Danish energy market; and of a sound technological advance to obtain a large share of world markets, in particular the US in the 1980s, and more recently, other growing markets in Europe and Asia.

Germany has been witnessing a huge boom in wind farm construction since the early 1990s, and now has the largest installed capacity in the EU, and the highest rate of annual capacity installations. At the end of 1995, Germany had over 1 000 MW of installed wind power capacity. As in Denmark, a system of guaranteed prices for the sale of output from wind generation has encouraged the rapid development of this sector.

Wind power is also being developed quite rapidly in the United Kingdom, under the auspices of the NFFO programme. The UK has many viable sites for wind installations. Installed capacity at the end of 1995 is estimated to be about 300 MW.

Table 4: Renewable energy
Solar energy, 1993

	Total installed surface (thousand square metres)	Share in EUR 12 total (%)
E.U.	4 411.2	100.0
Belgique/België	36.4	0.8
Danmark	103.0	2.3
Deutschland	886.0	20.1
Ellada	1 800.0	40.8
España	302.6	6.9
France	400.0	9.1
Ireland	2.5	0.1
Italia	290.0	6.6
Luxembourg	0.0	0.0
Nederland	128.1	2.9
Portugal	186.0	4.2
United Kingdom	276.6	6.3

Source: Eurostat

Solar photovoltaic systems

Although local electricity generation from photovoltaic (PV) cells, which convert sunlight into electric power, remains a minuscule portion of power generation in the EU, some advances in the cost and efficiency of installations are holding out the prospect of a growing contribution from this technology over the next 15 to 20 years. Research, development and dissemination support is critical to allowing these developments to continue. Governments in Germany, Italy and the Netherlands, in particular, have instituted programmes favouring the installation of PV systems, either in remote sites, or on buildings connected to the electricity grid, allowing the sale of surplus power to the network. There are also several projects in the EU for large-scale PV power plants.

Geothermal energy

In the EU, the greatest amount of geothermal energy production capacity by far lies in Italy where over 50 geothermal units are in operation. Other countries with geothermal sites include France, Germany and Spain. Italy has the largest geothermal power plant in the world, a 60 MW plant, opened in Tuscany in 1991. Plans for three more plants of this size are being considered in line with governments policy to increase the share of geothermal-derived electricity to 3% of total national energy production. Other plans include a 5-10 MW plant which is planned for 2000 in one of three sites in France, Germany and UK, funded by the EU JOULE programme.

In addition to energy for electricity production, hot ground water may be used for space heating on a smaller scale. In the EU-12, it is estimated that in terms of primary energy, geothermal heat provided 360 000 tonnes oil equivalent (toe) of energy in 1993.

Biomass

The theoretical potential for biomass in the EU is very large, at around 100-120 million toe. Within the EU, wood, straw and municipal solid waste are the most commonly used biomass fuels. The primary energy derived from these sources in the EU-12 amounted to 25 million toe in 1993. Most of this total consists of wood. The EU-12 consumes around 20 million toe of wood energy. France is by far the largest consumer of wood, accounting for over 45% of the EU total due to the large proportion of wood burning stoves used in rural areas.

The biggest consumer of straw for energy in the EU is Denmark, where there are over 12 000 straw-burning stoves on farms and over 30 district heating schemes using straw. The combustion of straw currently provides 1.5% of Denmark's primary energy needs. As a means to reduce energy imports,

Table 5: Renewable energy
Forecast electricity production from renewable energy sources

(TWh) (1)	1993	1995 (2)	2000 (2)	2005 (2)	2010 (2)
Hydro	172.5	172.2	181.5	186.0	186.7
Biomass	10.3	40.7	83.0	107.9	126.7
Geothermal	3.6	6.2	9.1	10.6	11.8
Wind	2.3	7.5	19.2	28.4	34.8
Solar (PV) (3)	0.0	0.0	0.1	0.3	0.8
Total renewable energy	188.7	236.3	300.6	346.7	378.2
Energy Demand	N/A	2102.0	2329.0	2648.0	2778.0
Share of renewable energy in demand (%)	N/A	11.2	12.9	13.1	13.6

(1) TWh: terawatt hour.
(2) DG XVII forecasts.
(3) PV: photovoltaic cells.
Source: Eurostat, DG XVII

achieve environmental objectives and provide additional income to farmers, the Danish government has secured agreement from electricity utilities to purchase 1.2 mt/year (million tonnes per year) of straw by the year 2000, almost half of Danish surplus straw production.

Biogas is a fuel consisting mostly of methane, produced from the anaerobic digestion of organic material. Agricultural waste, sewage and a variety of liquid industrial effluents can be treated anaerobically. The technology is widespread at sewage works and it is expected to be used increasingly in treating food industry waste and slurry from intensive livestock farming. Member States currently using biogas are Italy, United Kingdom, Denmark and the Netherlands, with feedstock derived from their livestock farming industries.

The development of energy crops is closely tied to the Common Agricultural Policy (CAP). Set-aside land, which farmers must put to a use other than food production, will total around 15% of EU agricultural land. Energy crops are therefore an attractive option to farmers. Wood could be sustainably harvested or coppiced (where only the outer branches of a tree are stripped away). If 15 million hectares of farmland is in surplus by the end of the century, and if it was all turned over to fuelwood crops then it is estimated that 120-150 million tonnes of wood with an energy content of 55 to 65 million toe could be produced per year.

Active thermal solar collectors

By far the largest user of active thermal solar collectors in the EU-12 is Greece. In 1993, the total installed solar collector surface area was around 1.8 million square metres, contributing around 93 thousand toe to primary energy production. Thus, Greece makes up over 40% of capacity, and almost 50% of output from active solar thermal collectors in the EU-12. Conditions are particularly favourable for this sector in Greece, due to climatic conditions, and the relatively high proportion of the population in remote areas (such as the islands) where solar collectors are an economically viable option relative to mainstream forms of energy.

Germany is the other major market in the EU where solar thermal collectors are important. Installation subsidies from the federal government and from many Lander governments have been available since the beginning of the 1990s, as part of the country's CO_2 emission control strategy. The result has been that the installed capacity of thermal solar installations more than doubled between 1991 and 1993, and is continuing to show strong growth.

Production process

Small hydro-electricity generation

Different countries and institutions have varying definitions for small hydro. While some definitions include plants of up to 10 MW, the statistics included here, in Table 3, refer to plants of up to 1 MW. The technology differs from that of large scale hydro-electricity generation in that turbines are specifically designed for low head conditions.

Tidal power

The simplest systems generate power by capturing water at high tide and running the head of water through turbines (ebb generation). More complicated systems impede the flow of water in both directions, in order to maximise the energy recovered from tidal movements.

Table 6: Renewable energy
Forecast heat production from renewable energy sources

(thousand toe) (1)	1993	1995 (2)	2000 (2)	2005 (2)	2010 (2)
Biomass	24 159	24 874	31 404	35 659	37 502
Geothermal	359	818	1 636	2 094	2 349
Solar, of which:	187	889	2 365	3 364	4 182
Active solar	N/A	713	1 676	2 006	2 119
Passive solar	187	176	689	1 358	2 063
Total renewable energy	24 705	26 704	37 088	45 315	51 969
Energy demand	N/A	670 727	712 141	741 620	776 815
Share of renewable energy in demand (%)	N/A	4	5	6	7
Renewable primary energy	46 053	66 556	96 093	117 696	134 165
Share of renewable energy (%)	3.7	5.6	7.5	8.6	9.2

(1) toe: tonnes of oil equivalent.
(2) DG XVII forecasts.
Source: Eurostat, DG XVII

Wind power

Wind power in Europe, in its present form, can be said to have begun in the mid 1970s in the wake of the oil crisis. The industry went through a slump in the mid 1980's with lower energy prices, which prompted intensified efforts to reduce costs and improve operating efficiency. Costs have come down dramatically and the percentage of capacity used on average has increased steadily.

Modern wind turbines operate on either a horizontal or a vertical axis, though horizontal axis machines are the most common units manufactured. Turbine designs have improved considerably such that the efficiency, measured in energy generated per swept area per year, doubled between the beginning and the end of the 1980s, and is continuing to show constant improvements. The average size of wind turbines installed in the EU has increased steadily since the 1970's. The most common size currently being installed in the EU is 500-600 MW, although R&D work and demonstration projects involve machines of up to 2 MW.

Photovoltaic systems

The basic element is the PV or solar cell. This is comprised of semiconductor materials which have both negative and positive charge carriers. When photons fall on the cell, electrons in the semiconductor are freed, and an electric current is generated.

Three methods of production exist. First, single crystal silicon is a well established technology, with cells that tend to be stable and relatively efficient. The cost of manufacturing, though decreasing, is still relatively high. Second, polycrystalline silicon ingots with grain sizes of several millimetres can be produced by a casting process less expensive than single crystalline process. Larger areas are needed for the same power and module efficiency is slightly lower. Polycrystalline silicon ribbons may be manufactured using edge defined film-fed growth and dendritic web processes. The manufacturing process is complex though it has high potential for high speed production. Third, thin film technology is an area of intense research effort, since the production costs associated with this technology are potentially much lower than for single crystal or polycrystalline cells. Films are deposited directly onto substrates by technologies such as glow discharge, chemical vapour and electro-chemical deposition. Semiconductor materials being investigated include amorphous silicon, copper indium diselenide, gallium arsenide and cadmium telluride.

Geothermal energy

The basic technology involves drilling geological formations to obtain hot water or steam, which is then used in the direct application or to power turbines to produce electricity. Other methods such as magma, geopressured and hot dry rock technologies have been investigated though none are near to commercial viability.

At temperatures below 150° C the most common application of geothermal energy is for direct heat. This has advantages in terms of its simplicity, efficiency and adaptability and is relatively cheap. The hot water cannot economically be transported at distances greater than about 1 km, so the site location is limited by the end use location. Electricity generation at high geothermal steam temperatures is the most attractive application due to the low distribution costs.

Biomass

On a global scale, a large proportion of mankind relies on biomass, such as fuelwood, charcoal, or animal residues, as its primary source of fuel. In the industrialised world, where energy production is more centralised, biomass energy conversion is perhaps the most technically, economically and socially complex renewable energy option. Old, well developed technologies co-exist with completely new, advanced techniques for converting biomass to useful energy.

Electricity generation and heating requirements can be met by direct combustion or gasification of wood, straw or other dry biomass. Household waste may be incinerated, or the landfill gas used to provide heat and/or electricity. Agricultural waste such as slurries from animal husbandry may be used in the anaerobic digestion process to produce biogas. In addition, any organic material may be gasified (or liquefied) by pyrolysis (thermal decomposition in the absence of oxygen).

In recent years, considerable investment has also been made in developing techniques to produce transport fuels, or components thereof, from biomass, as an alternative to fuels refined from petroleum. These fuels may be produced by various methods, three of which are mentioned here.

The first is the production of biodiesel, consisting of complex natural esters from the esterification of oils extracted from plants such as rapeseed, linseed and the sunflower. A second method involves the hydrolysis and subsequent fermentation of plants with a high energy value to produce methanol or ethanol. Thirdly, a diesel or gasoline fuel may be produced by liquefaction, a variant of the pyrolysis technique. An indirect method gasifies the biomass and is followed by the catalytic conversion of the product to a liquid fuel. Direct liquefaction skips the gasification step using lower temperatures to produce partially deoxygenated, complex oils which are then upgraded.

Active solar collectors

Active solar technology can supply heat at moderate temperatures for industrial processes, and heat at ranges that satisfy building energy needs. The essential component is the collector and designs include flat plate collectors (glazed or unglazed), evacuated tube collectors and air collectors.

Unglazed solar water heaters are used in outdoor applications, predominantly for heating swimming pools. Glazed solar water heaters form the bulk of the market, representing approximately 90% of total installed collector surface area in the EU. Evacuated tube collectors form a small but growing part of the market, particularly in northern Europe. In value terms, they account for approximately 10% of total EU sales. Air collectors are generally built into the building structure to produce warm air directly or in connection with a heat pump for space heating.

INDUSTRY STRUCTURE

The renewable energy industry is a heterogeneous mixture of companies in terms of size, specialisation and geographical scope of operations. Small companies, which tend to rely on business generated through EU and national programmes, generally concentrate in niche markets where their core expertise lies. Large multinational companies have historically tended to view renewable energy investments as part of a long term strategy of diversification, and these activities generally form a very small part of their overall business portfolio.

Research into renewable energy technologies is conducted predominantly in universities and government research institutes. However the research budget for renewable energy in large companies has been on the increase. Government incentives have made renewable energy technologies more attractive and companies involved in the market have stepped up investment in order to retain a competitive edge in the field.

REGIONAL DISTRIBUTION

The factors currently governing the regional distribution of renewable energy technologies are the relative size of national

financial incentives promoting renewable energy, the technical and commercial maturity of the technology and the size of the resource base.

For more mature technologies, such as biomass combustion and hydro-electricity generation, the size of the resource is the most important. For other technologies, financial incentives are more significant drivers. For example, although the wind resource in the region around Denmark is relatively small, a long-term government commitment to wind energy has produced a significant and internationally competitive wind energy industry. Germany, more recently, has put in place similar types of incentives as Denmark, and now has the largest wind energy market and industry in Europe. In the United Kingdom, which has theoretically the biggest wind energy resource in Europe, the wind energy industry is less well established, although capacity has increased considerably since the application of the NFFO programme for renewable energy since the early 1990s.

In the long term, as renewable energy technologies mature, the size of the resource base should become the main factor controlling the size of the industry. PV, active solar energy and biomass all rely on sunlight, hence the southern regions have the most potential. The mountainous regions of the EU have the largest potential for small hydro power. The largest tidal potential exists along the western coasts of the United Kingdom and France. Wind energy has the largest potential in the north west region of Europe. Geothermal power will remain essentially confined to Italy.

ENVIRONMENT

In the mid 1970s, interest in renewable energy was stimulated as a result of high crude oil prices. More recent interest has been largely due the relatively benign effects on the environment of fuels from renewable energy sources (particularly with respect to their contribution to reducing carbon dioxide emissions).

With the exception of biomass, renewable energies are almost free of pollution. This clearly differentiates them from conventional methods of energy production, where increasing concerns over pollution from the energy sector is forcing very large investments in emission control equipment. This is not to say that renewable energy has a negligible environmental impact. Ironically, the growth of the renewable energy industry is driven by two opposing factors: on the one hand by world scale environmental factors such as the threat of global warming, while on the other hand, being constrained by environmental factors on a local or regional level such as the visual impact of wind turbines and the environmental impacts of tidal and hydro-electric schemes.

There are two main environmental factors promoting the industry. The first is that renewable energy technologies produce zero or negative net carbon dioxide emissions. Biomass releases carbon dioxide when burnt to produce energy. However, during biomass growth, carbon dioxide is sequestered from the atmosphere. If biomass use is accompanied by afforestation then the net carbon dioxide emissions for biomass could theoretically be zero or even negative in the long run. The second factor is that, with the exception of biomass, energy produced from renewable sources does not produce sulphur dioxide, sulphur trioxide, nitrous oxide or particulates, the principal airborne pollutants derived from mainstream energy sources.

The environmental impacts of renewable energy technologies are generally lower than those of conventional energy sources but are significant since, alongside costs, they can be a significant determinant of the feasibility of implementation.

The environmental impact of wind power is essentially on the human rather than the natural environment. There can be significant visual intrusion, especially since the best sites are often on a skyline. Other environmental impacts are noise and interference with telecommunications.

Active thermal solar collectors and photovoltaic systems can also have a visual impact since their use is predominantly in a widely dispersed fashion and because they must, for maximum efficiency, be placed in prominent positions. However, where these are integrated into new buildings, architects are finding increasingly acceptable ways of ensuring a positive visual impact.

REGULATIONS

Over the last decade, many Member States have successfully encouraged the development of domestic renewable energy industries through policies discussed below.

In Denmark, subsidies for installing wind turbines were phased out in 1989 and replaced by tax credits: shareholders obtain income from the electricity sold tax-free below a set limit. Guaranteed prices for electricity produced from wind turbines and sold to the national grid also contribute to the favourable economics of wind power operation. Government policy also encourages the use of straw as fuel, biogas plants and certain solar projects. The Energy 2000 action plan calls for 1 500 MW of installed wind power capacity by 2005, and is setting up demonstration projects for new renewable energy technologies.

In France, in recent years the government has put particular emphasis on the development of transport fuels from biomass. The French government gives Research, Development & Demonstration grants financed by a tax on petroleum products. Biofuels are exempt from excise taxes applied to mainstream petroleum products. The two principal motivations for this programme are to reduce oil imports and to provide a use for agricultural land which has been set-aside from producing food crops. With regard to electricity generation from renewable sources, France has an established framework for the purchase of electricity by the grid, and, early in 1996, announced a forthcoming programme to promote wind-powered generation.

In Germany, the Electricity Feeding Law of 1991 stimulated renewable energy technologies producing electricity by obliging the electric utilities to pay for electricity generated by these methods at a rate set at 90% of the national average domestic electricity tariff. Subsidies encouraging the installation of wind power, PV systems and thermal solar collectors are also widely available.

In Greece, the government has made particular commitments to the promotion of wind and geothermal installations. Financial incentives take the form of subsidies in the region of 40-55% of the total investment. Tax breaks and low interest loans are also available. Wind power has enjoyed a boom over recent years, mainly on isolated islands.

In Spain, the national energy plan gives a clear objective for the contribution of renewable energy in the year 2000 and provides for government support. A number of large scale solar and wind power demonstration projects have come on line, though the majority of renewable energy use comes from biomass.

In Portugal, the EU Valoren project and a national programme to promote renewable energy (SIURE) have benefited many projects in small hydro-electric generation, active solar collectors, photovoltaics, geothermal energy, wind power, the use of wood residues and the production of biogas. The relaxation of the authorisation procedure for the production of electricity from small installations has benefited renewable energy production. Also, fiscal incentives to promote the penetration of renewable energy technologies exist in the form of reduced VAT on renewable energy equipment.

In Italy, funding is available covering a portion of the capital costs for renewable energy projects. Efforts to remove barriers to the incorporation of electricity from small generators has resulted in very favourable tariffs for wind, photovoltaics, geothermal and biomass energy in particular. Biofuels are exempt from excise taxes and production has increased rapidly over recent years.

In the Netherlands, wind power installation is subsidised on the basis of the swept area and in the area of R&D, funding for 50% of the costs are made available. A second phase of an integrated programme on wind energy provides government funding for research, development and market introduction of wind power technology. Other government programmes exist to promote biofuels and photovoltaics. General subsidies go to solar, biomass and geothermal projects.

In the United Kingdom's privatised electricity sector, regional electricity companies (REC's) are obliged to enter into long-term contracts to purchase a portion of their electricity from non-fossil sources under the Non-Fossil Fuel Obligation (NFFO). This obligation also forces the REC's to purchase the electricity at premium prices, set according to bids submitted by operators of renewable energy schemes. A variety of technologies are accepted within the framework of the NFFO, including small hydro, biogas, wind power, waste-to-energy and energy crops. The objective of this programme is to allow the UK to develop 1 500 MW of renewable energy capacity by the year 2000, while assisting the industry to reduce its costs through experience derived from commercial-scale projects.

The European Commission also has several programmes to support and promote the development of renewable energy.

The Altener programme was launched by the Commission to promote greater penetration of renewable energy. It will run until 1997 on a current budget of 40 million ECU. The plan contains the political EU objectives which are to increase the penetration of renewable energy's contribution to total primary demand from the current 4% to 8% by 2005, to triple the production of electricity from renewable energy sources (excluding larger hydro-electricity power stations) and to secure for biofuels a market share of 5% of total fuel consumption by motor vehicles.

In 1994, the Fourth Framework for R, D & D was agreed by the European Parliament, incorporating funding for existing programmes set up under the Joule programme for research and technological development, and the Thermie programme for energy demonstration projects. Both these programmes originally included support for renewable energy research and pilot projects, covering such areas as wind energy, photovoltaics, biomass and geothermal energy. Continued funding for technological development and demonstration projects will be provided under the umbrella of the non-nuclear energy component of the Fourth Framework.

OUTLOOK

Forecasts developed by the European Commission project that renewable energy production will approximately double between 1993 and 2010, with similar growth rates anticipated for electricity and heat production from renewable sources. This is significantly faster growth than for primary energy demand as a whole in the EU, projected to rise by only about 20% over the same period, implying a steadily rising share for renewables.

With regard to the use of renewables for electric power generation, hydropower is set to remain the single largest component. However, there is likely to be very little development of new large-scale schemes in the EU, because of the lack of acceptable new sites. Such growth as there is will come from a large number of small hydro schemes. The share of hydro in electricity production from renewable energy sources is thus expected to fall from 91% in 1993 to 49% in 2010.

Of the "new" renewable energy technologies, biomass is expected to show the most dramatic growth, as a source of electric power, increasing twelvefold between 1993 and 2010. The development of new combustion and gasification technologies, and the increased dedication of biomass resources to the power sector are expected to provide a strong impetus to development. Electricity generation from wind energy is also expected to grow rapidly as advances in technology and reductions in cost make it increasingly competitive with mainstream power generation technologies. In the generation of electricity from geothermal sources, Italy and Greece are expected to further exploit their high temperature geothermal resources to steadily increase output over the next 15 years. Photovoltaics, although expected to remain a small component of power generation, will see growth in applications for remote locations and grid-connected sites. Significant advances in cost and efficiency remain to be made, however, before PV systems become close to commercial viability without public sector support.

The use of biomass for heat production will continue to from the principal component of renewable energy sources of heat. Use of biomass is forecast to be up by 55% in 2010 relative to 1993 levels. Much of this growth is expected to be associated with the use of biomass in CHP plants, also producing electricity. Geothermal energy for heating will experience strong growth in those Member States where resources are available, principally in Italy.

Thermal solar energy is expected to overtake geothermal energy in its contribution to heat production from renewable energy sources over the forecast period, stimulated by rapidly growing major markets, such as Germany, and continuing penetration in the Mediterranean countries of the EU, particularly Greece, Italy and Spain.

Written by: DRI Europe

Water supply and distribution

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The organisation of the drinking water supply sector varies across Member States. This diversity generates a number of debates on the structure of the water industry in the EU. It is unlikely that universal solutions will be found given the sharp differences in national water resources and water consumption patterns.
The industry will face important changes before the end of the century. In February 1996, the Commission had three water quality (and quantity) proposals before Council and Parliament that are likely to have an impact on the economics of the sector. Also, all the players in this industry face challenges such as small vs. large scale water management systems, separation vs. integration of water management, and fully private vs. mixed or public water management companies.
Whatever changes affect the industry, as human health is strongly impacted by the quality of drinking water, suppliers will need to comply with stricter technical and health standards which will have an increasing impact on the price of water.

INDUSTRY PROFILE

Description of the sector

The drinking water supply sector covers abstraction, treatment, quality control, storage, transport and distribution, infrastructure maintenance, metering (in Member States where metering is generally applied), invoicing and customer information and advice services, both for domestic and industrial users.

In order to ensure compliance with the quality requirements imposed by European legislation, research and development efforts, for the most part carried out by the water suppliers themselves, are gradually increasing.

In the European Union, the supply of drinking water is provided by private companies as well as public companies and municipalities.

Recent trends

Water supply services are facing a number of important developments in connection with operational rationalisation, the requirement to comply with European legislation, and the economic aspects of their functioning.

The main options for change currently being considered by some Member States are whether to:

- take into account the complete water cycle by integrating water supply and sewerage into one entity;
- reinforce co-operation between small isolated operations under the care of a limited number of large regional companies;
- separate the accounting of services or reorganise the services into individual entities; and
- encourage the formation of water supply companies for the smallest communities.

In general, water supply services are under pressure to increase investments and to increase the infrastructure (i.e. the distri-

Table 1: Water supply and distribution
Management types by Member State, 1992 (1)

	B	DK	D	E	F	IRL	I	L	NL	P	UK (2)
Direct public management:											
-Direct management	X	X	X	X	X	X	X	X	X	X	X
-Autonomous board	X		X	X	X		X			X	
Direct supramunicipal management:											
-Direct management	X	X	X	X	X		X	X			
-Autonomous board	X			X			X			X	X
Delegated public management											
-Co-operative companies		X									
-Public trading companies	X		X	X			X		X	X	
Delegated private or mixed management											
-Private companies	X		X	X	X		X			X	
-Mixed capital companies	X		X	X	X		X				
Direct private management											
-Private companies											X

(1) Data for Greece was not available.
(2) England and Wales: direct private management, Scotland: regional direct management, Northern Ireland: direct public management.
Source: EUREAU

Table 2: Water supply and distribution
Percentage of population served by management type and Member State, 1992

(%)	Direct public management	Direct supramunicipal management	Delegated public management	Delegated private or mixed companies	Direct private or mixed management
EUR12 (1)	37	11	16	21	16
Belgique/België	5	0	90	5	0
Danmark	67	0	33	0	0
Deutschland	35	20	30	15	0
España	48	11	12	29	0
France	23	0	2	75	0
Ireland	100	0	0	0	0
Italia	72	23	1	4	0
Luxembourg	100	0	0	0	0
Nederland	15	0	85	0	0
Portugal	92	0	8	0	0
United Kingdom (2)	3	9	0	0	88

(1) Average weighted by population. Excluding Greece.
(2) England and Wales: direct private management, Scotland: regional direct management, Northern Ireland: direct public management.
Source: EUREAU

bution networks). In order to cope with these requirements, some Member States have chosen to delegate the management of all or part of their water supply and waste water treatment services to private or public organisations which take responsibility, on a contractual basis and using methods agreed upon by both parties, for all or part of the infrastructure and the services.

In some Member States water prices tend to evolve so as to incorporate not only the costs of the service, including the protection of resources, or the investment requirements imposed on water services, but also various taxes (such as taxes on water abstraction) and charges for wastewater treatment. In France, for example, taxes accounted for 20% of the average price per cubic meter in 1994.

In certain Member States, however, the water prices do not cover all of the costs of the service provided. There are thus important differences between the prices that consumers pay for drinking water in the European Union. Denmark and Germany appear to have the highest prices in the European Union, whereas prices are generally lower in the southern countries of the European Union (i.e. Portugal, Spain, Italy and Greece).

There is a clear tendency in some of the Member States to give preference to abstraction from surface water sources because groundwater sources are insufficient and their protection is becoming more and more difficult with less certain results. In others, groundwater abstraction is increasing to ensure sufficient resources.

In general, significant efforts will have to be made to protect surface and groundwater from pollution if it is to be used for the production of drinking water in the future.

International comparison

Water is not an "exportable product", and its distribution therefore has an essentially national, regional or even local character. A number of water suppliers nevertheless export their know-how in the framework of international co-operation agreements (e.g. technical assistance or training); water suppliers can also delegate some of their activities to foreign

Table 3: Water supply and distribution
Abstraction for water supply by source and Member State

(million cubic metres)	True ground water 1980	True ground water 1991	Spring water 1980	Spring water 1991	Surface water 1980	Surface water 1991	Total water abstraction 1980	Total water abstraction 1991	Average annual growth rate 1980-91 (%)
Belgique/België	435	465	0	0	217	250	652	715	1
Danmark (1)	362	346	0	0	3	2	365	348	0
Deutschland (2)	4 199	4 142	546	460	1 893	1 934	6 638	6 536	0
España	684	1 234	0	0	2 426	2 895	3 110	4 129	3
France	N/A	3 800	N/A	N/A	N/A	2 280	N/A	6 080	N/A
Italia	3 290	4 025	2 535	3 167	892	1 273	6 717	8 465	2
Luxembourg	2	2	27	30	16	14	45	46	0
Nederland	667	846	0	0	337	381	1 004	1 227	2
Österreich (3)	198	221	221	225	5	4	424	450	1
Suomi/Finland	196	226	0	0	252	220	448	446	0
Sverige	239	222	0	0	716	744	955	966	0
United Kingdom	1 910	2 132	0	0	5 060	5 488	6 970	7 620	1

(1) DVF statistics (75% of population covered).
(2) Estimates (including former East Germany).
(3) OVGW statistics (60% of population covered).
Source: IWSA

partners, and sometimes they purchase foreign materials and products to carry out their services.

Major private European players, namely French, British and Spanish companies, share their knowledge in consortia with large cities in other parts of the world, such as Buenos Aires, Mexico, Caracas or Sydney.

Some public or private entities have been developing operations, service provisions and co-operation and training programmes with other countries (for example, the Netherlands in Indonesia and Germany in East Europe). The French company Lyonnaise des Eaux and the Spanish company Aguas de Barcelona have recently agreed to lead an ECU 750 million consortium aimed at securing water distribution and purification in the Santa Fe Province of Argentina for a period of 30 years.

Recently, as a response to the increased involvement of American players in the European water supply sector, EU water groups developed their investment policies in US water management companies.

MARKET FORCES

Demand

Factors influencing drinking water demand are demographic evolution, consumer habits (varying in the Member States), climate, price structures, the number/types of sanitary installations and industrial development.

In all Member States raw water abstraction for the production of drinking water is a key priority and must be carried out in accordance with conditions ensuring adequate protection of the environment and economic use of water resources. In all Member States measures are taken to encourage water conservation, including leakage control.

General emphasis is placed on quality improvement (European Directives) and on rational use of drinking water.

The requirement for the availability of sufficient drinking water to satisfy customer's needs (e.g. drinking, hygiene and leisure) nevertheless remains an important factor for the water suppliers.

Supply and competition

The function of water supply is carried out either by public, private or mixed entities operating within the framework of geographical monopolies.

The direct management system excludes, except in certain cases, competition for the management of water distribution, while the delegated management system allows a renewal of the service provider's contract at the sovereign discretion of the local community.

Works and supplies contracts relevant to the service and its execution are open to full competition in compliance with the specifications of the European Directives on procurement procedures for public utilities.

Though there are differences between Member States, the general trend is to increase the price of water services, particularly in the wastewater treatment segment. This trend is explained by constant increases in:

- general investments for modernisation of installations and for improvement of processes (involving significant research and development work) to meet the ever increasing quality requirements;
- investments for aquifer protection, water treatment, maintenance of networks and modernisation of distribution (automation, remote metering where applied, leakage detection);
- payments to farmers in some of the Member States to compensate for their efforts to ensure better protection of water resources; and
- water abstraction and treatment taxes in some of the Member States (incorporated in the price of drinking water).

As is the case for environment related industries in general, the water supply sector will make use of more and more refined and diversified skills.

Wages and service operating costs differ from one Member State to the next because of varying requirements due to differences in local conditions: therefore, no reliable estimate is available.

In general, water supply must reflect the regional and local conditions of the raw water resources and the nature of the local customer base.

Table 4: Water supply and distribution
Water deliveries by sector and Member State

(million cubic metres)	Households and small businesses 1980	Households and small businesses 1991	Industry and others 1980	Industry and others 1991	Total deliveries 1980	Total deliveries 1991	Average annual growth rate 1980-91 (%)
Belgique/België	366	416	208	179	574	595	0
Danmark (1)	193	202	112	95	305	297	0
Deutschland (2)	3 869	4 106	2 002	1 581	5 871	5 687	0
España	2 146	1 854	794	871	2 940	2 725	-1
France	2 085	3 300	1 120	1 300	3 205	4 600	3
Italia	3 945	4 552	1 295	1 384	5 240	5 936	1
Luxembourg	24	26	10	13	34	39	1
Nederland	733	949	192	217	925	1 166	2
Österreich (3)	252	359	155	77	407	436	1
Suomi/Finland	218	230	171	197	389	427	1
Sverige	516	531	298	261	814	792	0
United Kingdom	3 160	3 405	2 070	2 051	5 230	5 456	0

(1) DVF statistics (75% of population covered).
(2) Estimates (including former East Germany).
(3) OVGW statistics (60% of population covered).
Source: IWSA

INDUSTRY STRUCTURE

As indicated in the EUREAU 1993 report on EU Management Systems, the structures of drinking water production and distribution services are extremely diverse even within each Member State.

This diversity is due to historical circumstances that governed the creation of these services and to specific institutional and legal practices.

The main characteristics may nevertheless be described as follows:

- in gencral, the provision of drinking water is the ultimate responsibility of a public body (except in England and Wales) whether it is a municipality, another territorial community, a province, a region or the central State;
- the management of the service is guaranteed either by the responsible entity and by its own resources, or by a body distinct from the appointed entity (e.g. delegated management contracts);
- the organisation of the service varies according to whether a distinct legal status is or is not granted to the management entity, the nature of the law that is applicable to its function (administrative law or company law), the structure of the share capital and especially the option to use private capital, exclusively or in association with public capital (mixed companies), the nature, composition and method of appointment of the management bodies, the degree of budgetary independence granted to a management entity compared to the general budget of the responsible entity (e.g. German Regiebetriebe);
- when management is delegated, there can be significant differences in the relationship between the responsible entity and the management entity (participation of the responsible entity in the management entity's capital structure; differing operating, regulatory, statutory or contractual rules);
- delegated contractual management is the formula that gives the management entity the most freedom in negotiations and operations;
- the investments can be financed by either the overall budget of the responsible entity or by the management entity itself; it is also frequent that investments are financed in part by both;
- when responsibility and management are grouped under a single entity, this entity is the owner of the installations and equipment;
- when they are distinct, one or the other can own the installations and equipment, dependent on the particular case;
- clearly, it is not necessarily the case that one entity provides the financing and owns the system;
- as to price-setting, a distinction is made between management systems. Some are based on prices set "at the risk of the management body" (found mainly in contractual forms of management), others have prices set with the aim of balancing income and costs (Cost Recovery), while others have a system in which unreasonable costs will not be refunded. In the first case, once the tariff is set (it is usually accompanied by an adjustment formula or a revision procedure) the management body bears all the consequences of any gap between the costs of service provision and income (except if there is a change in circumstances). In the second case, the price is set so as to equalise income and reasonable costs;
- the activities of the bodies responsible for monitoring the proper execution of public services (generally sanitary authorities and the local community) mainly include control of the tariffs, of the nature and areas or investment, of the management of service and of compliance with health standards.

ENVIRONMENT

In all EU countries, drinking water suppliers have to ensure that the quality of the drinking water supplied by their networks meets the public health standards and the requirements laid down in European legislation.

The public service of water distribution requires ever increasing efforts in the field of R&D, investment and quality assurance, especially in the light of the political and economic climate which tends to limit public financing.

However, the socio-economic and political impact of the price paid by the consumers which increasingly covers, as previously

Table 5: Water supply and distribution
Water consumption per capita by sector and Member State

(litres per capita per day)	Households and small businesses 1980	Households and small businesses 1991	Industry Households and 1980	Industry Households and 1991	Total and others 1980	Total and others 1991	Average annual growth deliveries rate 1980-91 (%)
Belgique/België	104	116	59	50	163	166	0.2
Danmark (1)	175	175	102	82	277	257	-0.7
Deutschland (2)	141	144	73	55	214	199	-0.7
España	157	131	58	61	215	192	-1
France	109	161	58	64	167	225	2.7
Italia	211	214	69	63	280	277	-0.1
Luxembourg	183	183	76	91	259	274	0.5
Nederland	142	173	37	40	179	213	1.6
Österreich (3)	155	215	100	46	255	261	0.2
Suomi/Finland	148	150	117	129	265	279	0.5
Sverige	195	195	120	96	315	291	-0.7
United Kingdom	154	161	100	98	254	259	0.2

(1) DVF statistics (75% of population covered).
(2) Estimates (including former East Germany).
(3) OVGW statistics (60% of population covered).
Source: IWSA

Table 6: Water supply and distribution
Investment in water treatment capacity by Member State, 1990

(million ECU)	Clean water	Waste water
EUR12	7 484	6 705
Belgique/België	140	102
Danmark	11	168
Deutschland	2 046	1 933
Ellada	97	43
España	494	150
France	1 324	1 106
Ireland	64	37
Italia	918	696
Luxembourg	11	28
Nederland	476	469
Portugal	146	151
United Kingdom	1 757	1 822

Source: World Water and Environment Engineer

mentioned, both drinking water supply and wastewater treatment and disposal, cannot be neglected and must remain within socially acceptable limits.

In this context, the industry is combining its efforts with those of other professional sectors in this field, with the national public authorities and European institutions to define a legal framework and a series of development actions that match the needs of public health and environmental protection and anticipate future developments.

The task is made even harder by the diversity of the interests involved (e.g. agriculture, industry and public health) which are often in conflict.

REGULATIONS

The European legislation governing the field of drinking water quality, protection of surface and groundwater resources and the activity of the sectors having a direct or indirect impact on the quality of these resources is at present being revised to ease its implementation and to improve its coherency to produce an integrated approach for the entire water cycle.

More specifically, Directive 80/778/EC of 15 July 1980 on the quality of water intended for human consumption was based on scientific knowledge available in the 1970s and needs to be updated, though there is no doubt that this Directive made a useful contribution to the recognition of the importance of drinking water quality and led to constant improvements in this field.

Since it was adopted, substantial improvements in technical and scientific knowledge of the factors influencing water quality and in the methods of measuring this quality were made. Moreover, the knowledge of the harm to drinking water quality caused by various sources of pollution is constantly increasing.

There appears to be a need, however, for a greater integration in the practical implementation of water legislation. Integration is required between water quantity and quality issues; surface water management and ground water management; water use and environmental protection; control of pollution through emission controls and through quality objectives; and water policy and other policies. The Commission believes that this can be achieved through the adoption of a Framework Directive on Water Resources.

The current initiative to revise and update the Directive is running contemporary to the harmonisation of technical standards (by the European Committee for Standardisation (CEN), and by the national standardisation bodies) for products having a significant impact on the quality of drinking water (construction materials, regulation and control equipment or treatment procedures) and on the cost of its distribution.

This European process of legislation/standardisation takes account of the evolution of international legislation and originates from the work of ISO and the recommendations of the World Health Organisation (WHO).

OUTLOOK

The legitimate expectations of consumers and of health authorities can only be fulfilled if the following conditions are met:

- the raw water resources are protected and the relevant European legislation is revised on the basis of an integrated approach, and
- research & development efforts and costs for improvement of infrastructure (especially networks) are sustainable.

Recent changes in the EU water management industry are often presented as a weakening of the public role. It is in reality a move towards more articulated, integrated and customer-oriented systems, whose outputs are not only good water services, but also new territorial assets and a new approach to environmental engineering.

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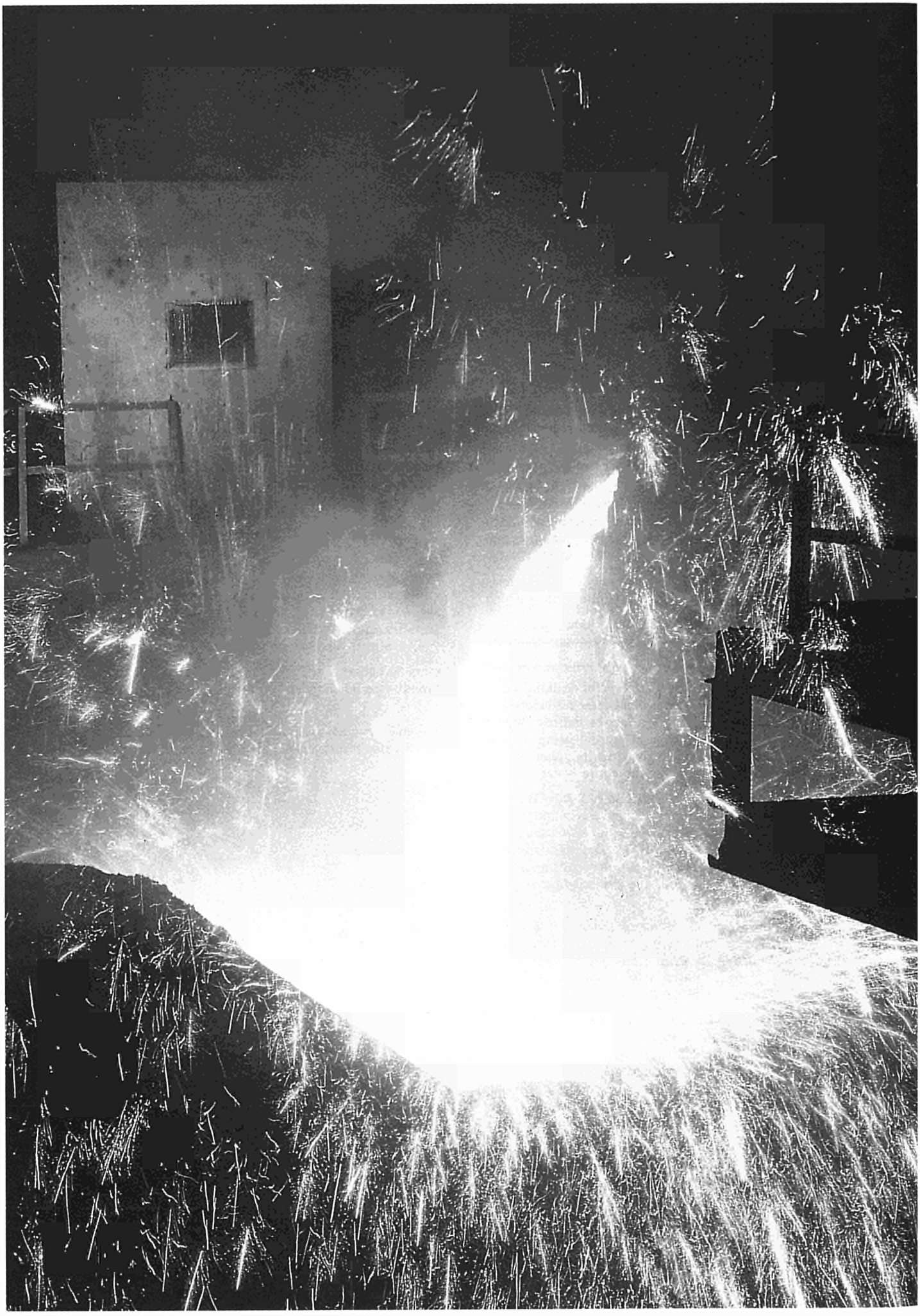

Overview

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The EU accounts for over 2 000 mining and quarrying activities devoted to the production of ores and concentrates for around 50 different commodities. Besides being an important producer of base metals, iron ore, construction raw materials and chemical and physical industrial minerals, the EU is one of the world's largest consuming regions for mineral products and manufacture of these materials significantly reduces import requirements.
After a persistent downturn in the general market fundamentals for mineral products, 1994 showed a substantial turnaround with a marked upturn in the value of many materials. This improvement continued through 1995, boosted by the enlargement of the EU and in particular the contribution supplyed by Sweden and Finland.

INDUSTRY PROFILE

Description of the sector

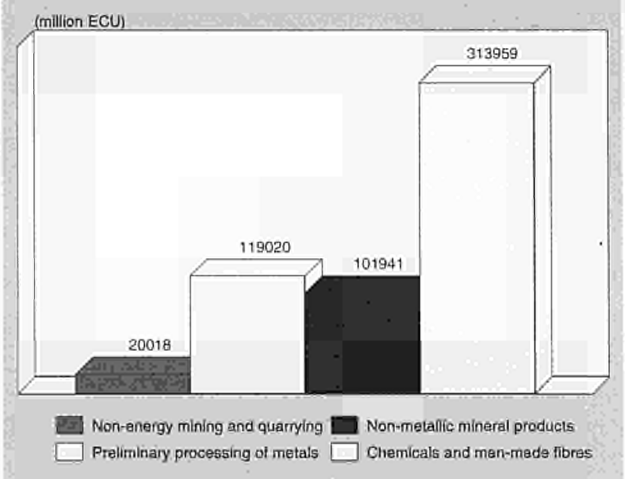
The non-energy mining and quarrying sector comprises the production of all solid minerals except coal and uranium. The minerals are extracted by open-pit or underground materials and are normally subjected to mineral dressing techniques to provide ores and concentrates for further upgrading or use in their own right.

According to the new NACE Revision 1, the non-energy mining and quarrying industry is represented as division 13, mining of metal ores (including groups 13.1 and 13.2, mining or iron ores and mining of non-ferrous metal ores, except uranium and thorium ores) and as division 14, other mining and quarrying (including group 14.1, quarrying of stone, and group 14.2, quarrying of sand and clay).

The industry is divided into two main sub-sectors, metallic (ferrous and non-ferrous ores), and industrial minerals (construction raw materials, chemical industrial minerals and physical industrial minerals). Metallic minerals proceed exclusively to metals production and form the raw material element for chapters 3 and 4. Industrial minerals may either be intermediates (e.g. limestone and chalk for cement and lime production, sulphur for sulphuric acid production) or be used directly as final products after varying degrees of physical processing (e.g. from simple crushing grading in the case of aggregates to complex sequences as in the case of kaolin, potash, and salt). Industrial minerals form the prime raw material element for chapters 5 and 19 and are indispensable to the industries described in chapters 6, 16, and 17.

Mining and quarrying activities in the EU are directed to international markets as well as targeted to local demand. Copper, lead and zinc remain the principal metallic mineral products and the main industrial mineral products include crushed stone, sand and gravel, salt, potash, sulphur (from secondary sources), fluorspar, barite and clays. The total value of mined and quarried minerals in 1994 was around 2 billion ECU and slightly higher in 1995. This figure is low in comparison to other industries, but mineral products are essentially enabling materials which provide the raw materials for industries such as metals, engineering, construction and chemicals which themselves feed value-added industries such as vehicle and aircraft manufacture.

Figure 1: Non-energy mining and quarrying Production in comparison with related industries, 1994



Source: B.M. Coope & Partners, DEBA GEIE

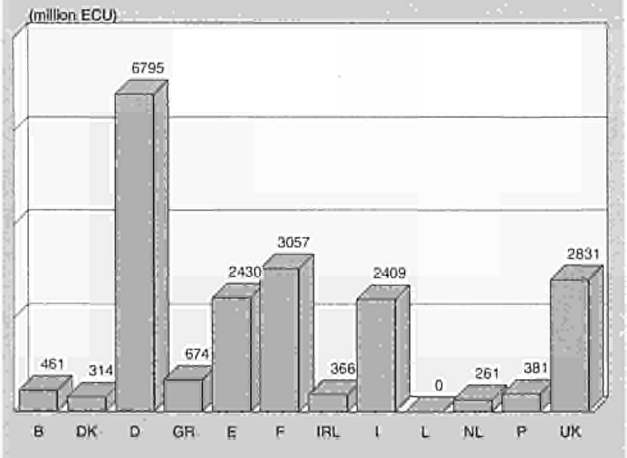
Mining and quarrying activities are carried out in every EU Member State, but Germany, France, Italy, Spain and the UK account for the highest levels of output, around 88% of the total EU production in non-energy mining and quarrying products. Belgium, Denmark, Greece, Ireland, Holland and Portugal are also important producers.

Recent trends

The overall value of production in the sector rose by approximately 10% in 1994 as market conditions improved.

The non-ferrous metals sector experienced in 1994 a long-awaited upturn in prices and demand, notably with regard to copper, aluminium and silver prices. Overall 1995 figures should underline the improvement. Iron ore did not benefit like most of the base metals as prices fell in 1994 by up to 10%. With the entry of the new Member States, production

Figure 2: Non-energy mining and quarrying Production by Member State, 1994



Source: B.M. Coope & Partners, Raw Materials Data 1996

Table 1: Non-energy mining and quarrying
Main indicators in current prices

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (1)	1996 (2)	1997 (2)	1998 (2)
Apparent consumption	25 482	27 210	25 011	24 474	23 800	22 845	25 982	N/A	N/A	N/A	N/A
Production	17 051	19 326	18 202	17 996	17 993	18 084	20 018	N/A	N/A	N/A	N/A
Extra-EU exports	941	1 551	1 420	1 516	1 553	1 527	1 579	1 584	1 365	1 406	1 350
Trade balance	-8 431	-7 884	-6 810	-6 478	-5 807	-4 761	-5 965	-6 597	-3 713	-3 770	-1 320.
Employment (thousands)	207	202	208	210	199	187	179	N/A	N/A	N/A	N/A

(1) Eurostat estimates.
(2) Rounded DRI forecasts.
Source: B.M. Coope & Partners, Eurostat, DEBA GEIE

Table 2: Non-energy mining and quarrying
Average real annual growth rates

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	-2.4	0.5	-1.1	12.2
Production	-2.2	2.7	-0.1	5.3
Extra-EU exports	8.7	2.3	5.8	19.9
Extra-EU imports	-1.4	-4.5	-2.8	41.9

Source: B.M. Coope & Partners, Eurostat, DEBA GEIE

Table 3: Non-energy mining and quarrying
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Extra-EU exports	941	742	753	1 173	1 551	1 420	1 517	1 553	1 527	1 579	1 584
Extra-EU imports	9 372	7 221	6 391	7 919	9 435	8 229	7 995	7 361	6 288	7 544	8 181
Trade balance	-8 430	-6 478	-5 637	-6 746	-7 884	-6 809	-6 478	-5 807	-4 761	-5 965	-6 597
Ratio exports / imports	0.1	0.1	0.12	0.15	0.16	0.17	0.19	0.21	0.24	0.21	0.19
Terms of trade (1)	94.6	100.7	106.2	92	94.8	100	101.4	111.8	90.4	92.2	N/A

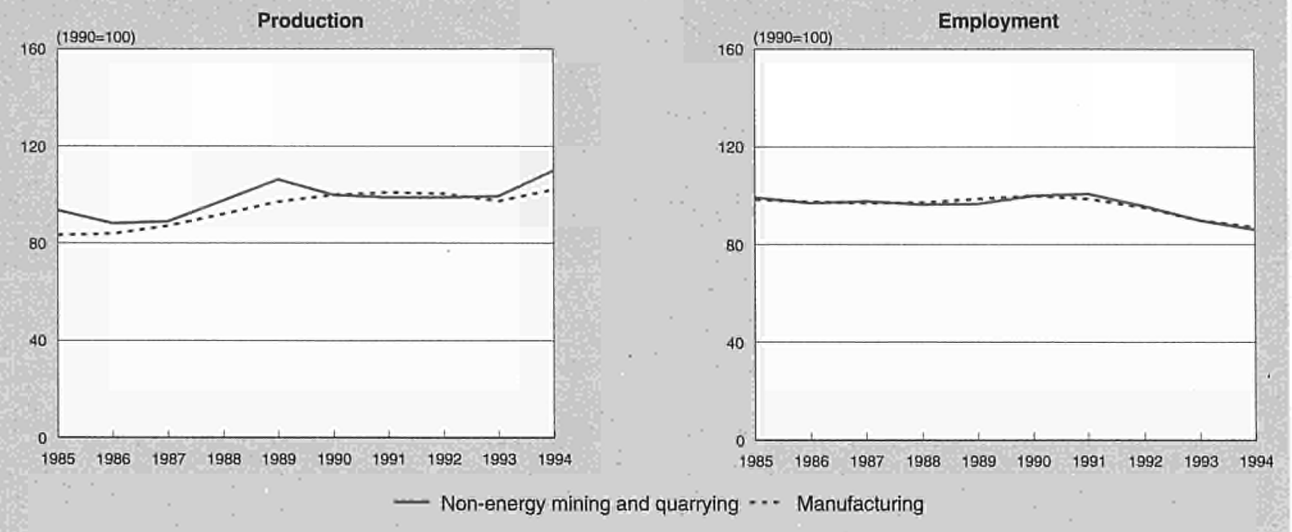
(1) Nace 2300 only.
Source: Eurostat

Table 4: Non-energy mining and quarrying
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	17 280	91	36.8	35.9
20-99 employees	1 501	7.9	27.3	27.4
100 or more employees	216	1.1	35.9	36.7

(1) Estimates for EUR15; Nace 2300.
Source: Eurostat Enterprises in Europe

Figure 3: Non-energy mining and quarrying
Production and employment compared to EU total manufacturing industry



Source: B.M. Coope & Partners, DEBA GEIE

will grow ten-fold, thus sustaining around steelmaking requirements.

Construction raw materials production picked up in 1994 and started to slowdown in 1995, a trend likely to continue in the short term. Physical industrial minerals followed the same pattern with substantial growth 1994 and a further modest improvement also in 1995.

In 1995 the outlook for the chemical industrial minerals improved but a fall in the demand for fertiliser minerals was registered.

International comparison

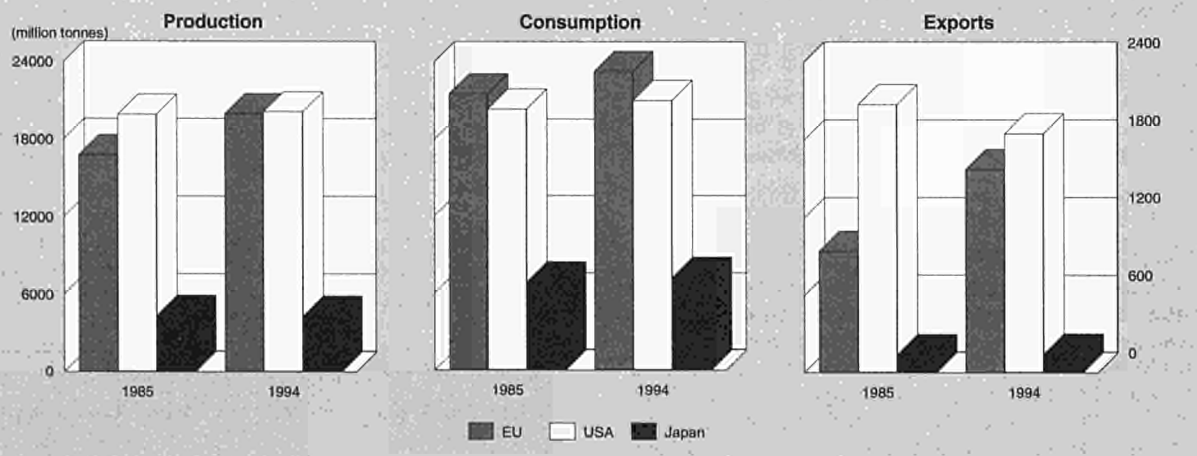
The EU remains a minor international producer of iron ore at between 2-3% of world output, a level which is expected to sustain for the foreseeable future. Currently over 70% of the world's iron ore is supplied from China, CIS, Brazil and Australia. The EU remains a significant consumer with around 12% of world production, currently growing at a rate higher than other developed trade regions. The position is similar for non-ferrous metals where the major international producers are located in South America and South-East Asia.

In the industrial mineral areas, the EU remains the world's leading producer of construction raw materials and physical industrial minerals and in each case production is significantly higher than in other major developed economy regions. In the chemical industrial minerals sector the position is different since EU output is only a third of the USA output, the world's largest producer.

For all minerals, market conditions were similar among the EU and other regions in the world. The higher value minerals, the non-ferrous metals, are subject to international markets, in this case, the local supply and demand is irrelevant. On the other hand lower value minerals rely on the end-using industries in the EU.

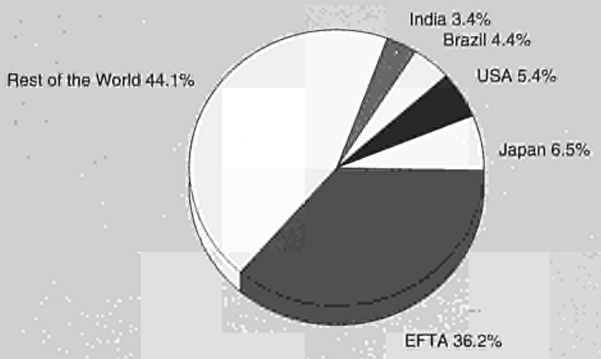
Overall the EU mining and quarrying sector in output terms could be compared with the USA mining and quarrying sector.

Figure 4: Non-energy mining and quarrying
International comparison of main indicators in current prices



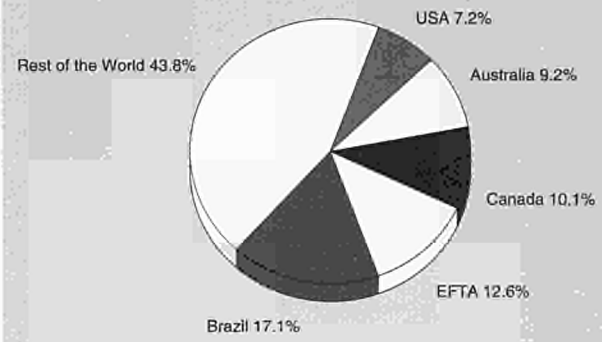
Source: B.M. Coope & Partners, DEBA GEIE

Figure 5: Non-energy mining and quarrying
Destination of EU exports, 1994



Source: Eurostat

Figure 6: Non-energy mining and quarrying
Origin of EU imports, 1994



Source: Eurostat

Foreign trade

The EU does not have strong natural resources for the non-energy and quarrying industry; this is reflected in the negative trade balance.

Extra-EU exports amount to only 8% of production. The biggest share of EU exports, in 36% in 1994, is directed to the EFTA countries. No substantial amount of EU imports originates from a single country; the USA, Brazil, Canada and Australia each account for over 7% of non-energy and quarrying imports in 1994 and around 45% in total. Imports from EFTA countries were below 13% in 1994.

MARKET FORCES

Demand

Steel production reached record levels in the EU in 1994/95, peaking at 143 Mt. Over the 1994/1995 period demand was also strong for non-ferrous metals. In the industrial minerals areas, construction raw materials demand was high in 1994 although falling in 1995 and demand for these materials in other industries such as chemicals, metals, glass and ceramics was also strong. Some improvement in demand was noted for chemical industrial minerals, but adverse market trends in agricultural usage limited the recovery. Physical industrial minerals have enjoyed a boom period and overall demand for non-energy mine and quarry products has had its best period for several years.

Supply and competition

The downward trend in iron ore production in the EU 12 countries continues. Considering the EU 15, the prospects for Austrian production appear limited and thus Sweden in the short run will probably be the sole iron ore producer, despite the predicted increases in iron ore trade.

For non-ferrous metal minerals competition from large-scale, high-grade overseas operations remains intense, but overall international EU activities remain competitive.

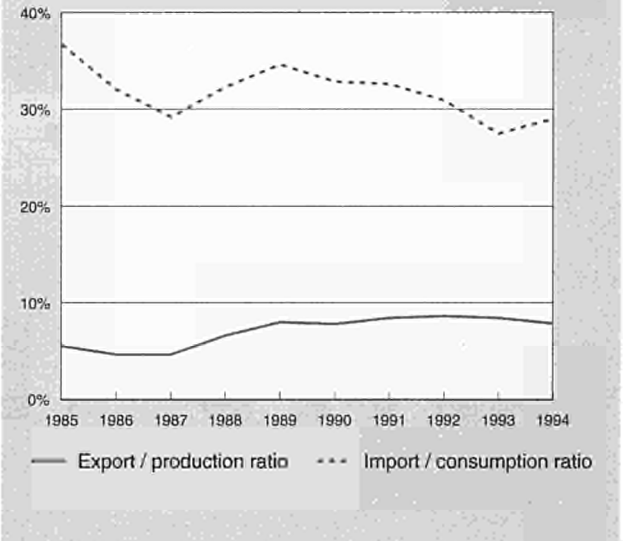
The low value of the mineral products ensures that construction raw materials stay resilient to overseas competition and supplies remain adequate. For chemical industrial minerals, however, world-wide oversupply is a problem and industries such as potash are being strongly attacked by cheaply-produced minerals from the CIS, Canada and Israel. A similar position in fluorspar with respect to supplies from China has been alleviated by this mineral being included in China's export licensing scheme. Indeed the same holds true for magnesite and magnesia in the physical industrial minerals sector. For the physical industrial minerals as a whole supply position is generally good.

Production processes

Technical developments in the mining and mineral processing areas are aimed at continuing improvements in economies of scale and energy efficiency at the high-volume end of the processes whereas controllability and enhanced quality provide the focus at the product end. In this highly international business the EU remains at the forefront in the utilisation of advanced technologies which have allowed reserves to be extended for many commodities and new product lines to be added in particular for physical industrial minerals.

The entry of Sweden and Finland into the EU will considerably strengthen technology and equipment assets.

Figure 7: Non-energy mining and quarrying
Trade intensities



Source: B.M. Coope & Partners, Eurostat

Table 5: Non-energy mining and quarrying
The largest companies in the EU, 1995

(million ECU)	Country	Turnover	Profit	Employment (thousands)
Chemical industrial minerals				
Elf Aquitaine	F	31 553	658	89.5
Azko Nobel	NL	10 381	770	70.4
Solvay	B	6 678	281	41.3
EMC (1)	F	2 249	-134	13.3
Physical industrial minerals (1)				
Redland	UK	3 234	489	21.5
English China Clays	UK	1 363	122	8.8
Hepworth	UK	897	97	9.1
Sud Chemie	D	445	N/A	4
Construction groups with construction mineral interests				
Lafarge Coppee	F	4 989	560	33.2
RMC Group	UK	4 383	338	27.4
Heidelberger Zement	D	3 279	289	24.2
Tarmac	UK	2 991	128	20.6
Non-ferrous metal ores (1)				
Somincor	P	N/A	N/A	1.1
Tara	IRL	N/A	N/A	0.8
Parnasse	GR	N/A	N/A	0.6
Esturiana	E	N/A	N/A	0.6
Iron ore				
LKAB	S	N/A	N/A	3.2
ARBED Group	L	N/A	N/A	0.2
Voest-Alpine	A	N/A	N/A	0.1
Cia Andaluza de Minas	E	N/A	N/A	N/A

(1) 1994 data.
Source: B.M. Coope & Partners

INDUSTRY STRUCTURE

Companies

The EU 15 iron ore industry is dominated by the state-owned Swedish LKAB company, the 6th largest iron ore producer in the Western world. The Somincor copper mine at Neves Corvo, Portugal and the lead/zinc operations of Tara (Ireland) and Asturiana de Zinc (Spain) are also major international operations. The EU is also home to many major international companies in the sector including RTZ (UK), Minorco (Luxembourg), Trelleborg (Sweden), Union Miniere (Belgium) and Outokumpu Oy (Finland).

In the construction minerals area, there are a number of large cement and aggregate companies including Lafarge Coppee of France; RMC, Redland, Tarmac, Tilcon (formerly BTR now Minorco), Blue Circle, Hanson, and Bardon of the UK; Heidelberger Zement, Dyckerhoff, and Basalt AG of Germany; Holderbank of Switzerland; Italcementi of Italy; CBR of Belgium and CRH of Ireland. There are also the limestone/dolomite/lime specialists such as Lhoist and Carmeuse (B), Rheinische Kalkstein-Werke (Wulfrath) (D), and Buxton Lime (Minorco) (L) and calcium carbonate producers such as Pluess-Staufer (CH), English China Clays (UK), Provencale (F), Faxe Kalk (DK), and Reverte (E). In the gypsum and plaster sector the major enterprises are BPB Industries (UK), Lafarge Coppee (F) and Gebr. Knauf (D). Major companies in the industrial sands industry are Sibelco (B), Quarzwerke (D), and Hepworth (UK).

In chemical industrial minerals, the major companies involved with salt include Akzo Nobel (NL), Solvay (B), BASF (D), SKW (D), CSME-Salins du Midi (F), Salt Union (UK), Staveley Industries(UK) and Union Salinera (E). Five companies dominate the potash industry, the BASF subsidiary, Kali und Salz (D); the Entreprise Miniere et Chimiques subsidiary, MDPA (F); the two INI subsidiaries, Suria K and Potasas de Subiza (E); and the Minorco subsidiary, Cleveland Potash (UK). Sulphur is recovered from sour gas by the two oil companies, Elf-Aquitaine (F) and BEB (D). Major EU fluorspar producers include Sogerem of the Pechiney group (F); Laporte (UK); Nuova Mineraria Silius (I); Minersa (E); and Sachtleben of the Metallgesellschaft group (D). The leading barite producers are M-I (UK), Barytine de Chaillac (F), and Sachtleben (D).

Major companies in the physical industrial minerals sector include the clay producers English China Clays and Watts Blake Bearne (UK), Amberger Kaolinwerke (D), AGS and Imetal (F), and Group Minerale Harwanne (CH). Major companies in the bentonite and special clays sector are Süd Chemie (D), Laporte and Redland (UK), Tolsa (E), Eliopoulos (GR), and Laviosa (I). Other leading companies for other minerals are: CECA (F) for diatomite: Grecian Magnesite (GR) for magnesia from natural magnesite; Redland (UK), Sardamag (I), NedMag Industries (NL but now part of the Lhoist group of Belgium), and Premier Periclase (part of CRH) (IRL) for magnesia from seawater and brines; and Talc de Luzenac (F and part of the RTZ group) and Finnminerals (SF but now

Table 6: Non-energy mining and quarrying
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.8	0.7
Danmark	1	0.9
Deutschland	1	1.1
Ellada	4.7	4.7
España	1.7	1.7
France	1	0.8
Ireland	1.6	1.6
Italia	1	0.8
Luxembourg	0	0
Nederland	0.3	0.3
Portugal	1.6	1.5
United Kingdom	0.9	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: B.M.Coope & Partners, DEBA GEIE

owned by a joint venture involving Pluess-Staufer of Switzerland and WMC of Australia).

Strategies

In the ferrous and non-ferrous areas, company strategies revolve exclusively around the development of internationally competitive orebodies from which minerals can be profitably sold into international markets.

In the industrial minerals sector strategies are more varied and include integration with the added value downstream activities, rationalisation and acquisition as well as reserve and new product development. The construction minerals industry is also active in the development of coastal superquarries.

REGIONAL DISTRIBUTION

Existing iron ore mines are in the Lorraine, Andalusia, Steiermark in Austria and northern Sweden. Greece, Iberia, Ireland and Sweden are the foremost non-ferrous metals mining regions.

Construction industrial minerals are spread across the EU and include certain specialist areas such as Carrara for marble. With respect to chemical minerals, potash and salt are mined underground in Northern Europe but salt is produced by evaporation around the Mediterranean. The physical industrial minerals are generally widespread but certain areas contain more specialised minerals such as the South-west of England for Kaolin.

ENVIRONMENT

Iron ore mining has a low environmental impact in terms of harmful substances and the major challenges are those associated with the movement of large tonnages of ore and waste. Similarly with the production of non-ferrous metals concentrates, mineral processing does not involve any chemical transformation of the minerals and the major challenge is the impoundment of tailings material. All non-energy mining and quarrying sector operations are prone to environmental pressures because of their disturbance of the countryside as well as noise and dust implications and thus planning permission can only be obtained by high quality impact assessment, operational and pit closure plans.

Environmental considerations favour the development of superquarries but impose strict regulations on the discharge of soluble salts such as phosphates into water courses. Specific minerals such as fluorspar have also been affected by environmental legislation with respect to CFCs, once a major market for the mineral. Conversely, the applications of other industrial minerals such as lime in environmental applications is growing.

Although the sector is rather less under the microscope in the EU than in other parts of the world, environmental attention is increasing and environmental costs are growing accordingly. All major mineral producers and most medium-sized enterprises now have environmental policies and management systems.

REGULATIONS

Developing regulations affecting the sector include those relating to hazardous waste which threaten to disadvantage parts of the secondary metals sector in favour of the primary, mining, area. The harmonisation of building codes and standards is also a feature in construction industrial minerals.

OUTLOOK

The outlook for iron ore mining in the EU 12 appears bleak, but the development of Swedish operations should allow EU 15 production to keep growing, with production prices probably higher in the short run. The outlook for the EU non-ferrous sector is stable. Both markets are exclusively international and performance will thus be related to general world economic performance.

Construction industrial minerals will inevitably be a major industry within the EU, with performance being closely tied to trends in the building industry. In the chemical industrial minerals industry, the fundamental weakness in oversupply of certain materials threatens the modest improvements recently made. Physical industrial minerals are expected to continue as a major industry within the EU.

Overall the sector is growing steadily and, as a mature but vital set of industries, without radical change. It is possible that 1994/95 will represent the peak of the economic cycle, and that the following years will see lower revenues, but developments could be enhanced by investments in new technologies and positive trends in the major industries, whose raw material requirements fuel the non-energy mining and quarrying industry.

Generally speaking, the EU Council conclusions of 18 November 1993 on "a Community approach to the development of the non-energy mining industry", which is aimed at reinforcing the competitivity of this sector, have given proof of the fact that this sector is increasingly being considered as an important matter by the EU; in the framework of these Council conclusions, the Commission has been invited to focus particularly on four different aspects:

- access to information (transparency);
- environmental considerations commensurate with economic requirements;
- adaptation of training to the industrial needs;
- deepening of the co-operation with non-EU countries.

Written by B M Coope & Partners
The industry is represented at the EU level by: International Association of European Mining Industries (EUROMINES). Address: Avenue de Broqueville 12, B-1150 Brussels; tel (32 2) 755 6311; fax (32 2) 779 0523.

Iron Ore
NACE (Revision 1) 13.1

The EU is the most important consumer of iron ore in the world Production within the EU is falling but the entry of Sweden into the EU has increased its self sufficiency considerably from 2% to over 10% of apparent consumption. The closing down of iron ore mines in the EU continues. Towards the end of the century, there will probably only be one or two iron ore extracting companies left.

INDUSTRY PROFILE

Description of the sector

Iron ore among the EU-12 countries is low grade with an iron content of 30-35%. The Austrian ore is also low grade while Swedish ores are high grade with an iron content of 60%. More than 50% of the Swedish production is agglomerated into pellets and volumes of this refined product will continue to grow. Production of high phosphorous ore was discontinued in Sweden in 1995.

Recent trends

The iron ore production within the EU fell sharply in the early 1990s. Between 1990 and 1994 production was reduced by more than 60 per cent to 4.5 Mt. Among the EU-12 production continued to fall to below 3 Mt in 1995. Including the new member countries Sweden and Austria, production however rose again in 1995 to reach a total of 26 Mt. Future EU production is expected to stay on this level. Production increases in Sweden will balance planned close downs in other EU countries.

World iron ore trade reached an all time record of 433 Mt exports and 415 Mt imports in 1994. The global market has continued to expand also in 1995. However, in spite of the tight market conditions that this has created, iron ore prices continued to fall by 6-10% in 1994. Iron ore was the only major commodity that did not benefit from the recent rise in commodity prices. In 1995 there was only a modest increase in prices by 6-8%. One of the reasons for this weak increase was the weak dollar in comparison to the DM and Japanese yen which are the currencies of the major markets.

EU consumption of iron ore increased in 1994 by 6% to 145.0 Mt. All EU member countries except Italy increased consumption. The EU-15 consumption is forecasted to stay at this level or decline slowly in the long term.

Extra EU exports by the EU-12 are negligible but are considerable among EU-15 due to Swedish exports. Of total EU production in 1995, 16% are extra EU exports. Sales are made worldwide. East Asia, China and the Middle East are growing markets.

The employment in the sector has been decreasing over the last five years due to the close down of French and Spanish mines. Total employment in 1995 is estimated to be less than 4 000, of which 3 200 in Sweden. During the next few years the level of employment is forecasted to decrease to 3 500 in spite of an almost constant total EU production level.

International comparison

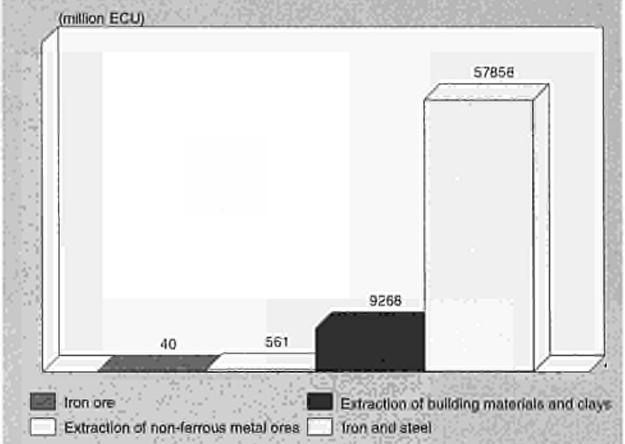
EU production of iron ore was 0.5% of total world production in 1994. In 1995 the figure will grow to 2-3%. US production is 6% of total world. There is no iron ore production in Japan. The major iron ore producing countries are China, Brazil, CIS and Australia, together accounting for 70% of total world output. The importance of China and partially also CIS is however slightly overstated since they produce ore with low iron content. The Chinese average ore grade is estimated to be 30%, while in the CIS the spread in grades is much wider.

Consumption of iron ore in EU was 12% of total world consumption of 955 Mt in 1994 compared to a Japanese consumption of 12% and a US figure of 7%. Growth in 1994 was highest in the EU while Japan showed only 1% growth and 10% in the US.

Foreign trade

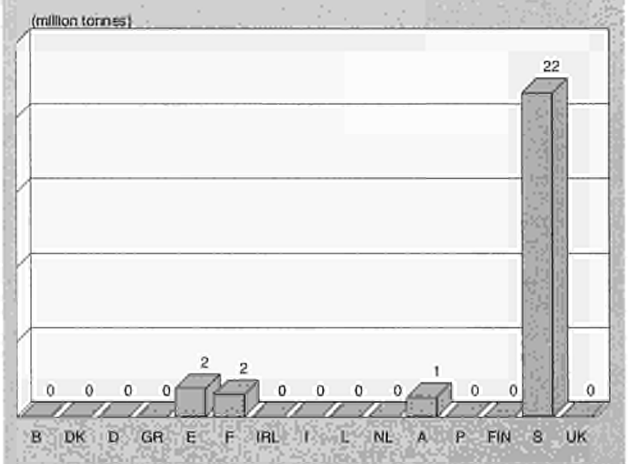
Total imports (excluding intra EU trade) of iron ore into the EU were 129 Mt in 1994 accounting for over 98% of apparent consumption. In 1995 this figure will decrease to 89-90%. The EU share of world imports was 31% in 1994, of which Germany accounted for 10.3% world's second biggest importer, France 4.9% (5), UK 4.7% (6), Italy 4.0% (8) and Belgium/Luxembourg 3.6% (9). EU exports will account for app. 1% of total world exports in 1995.

Figure 1: Iron ore
Production in comparison with related industries, 1994



Source: B.M.Coope and Partners, DEBA GEIE

Figure 2: Iron ore
Production in volume by Member State, 1995



Source: Raw Materials Data 1996, Eurostat

Table 1: Iron ore
Main Indicators in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1995 (2)	1996 (3)
Apparent consumption	3 997.3	2 944.8	3 202.8	2 804.3	2 152.9	2 708.9	2 618.9	2 965.0	2 896.0
Production	277.0	108.0	138.0	79.0	56.0	40.0	36.0	312.0	306.0
Extra-EU exports	0.6	4.8	3.3	4.3	2.3	7.3	3.1	84.6	96.0
Trade balance	-3 720.3	-2 836.8	-3 064.8	-2 725.3	-2 096.9	-2 668.9	-2 582.9	-2 653.0	-2 590.0
Employment (thousands)	3.8	1.9	1.8	1.6	1.3	1.2	1.0	3.9	4.0

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
(3) Rounded Raw Materials Group and DRI forecasts for EUR15.
Source: B.M.Coope & Partners, Raw Materials Data 1996, Eurostat

Table 2: Iron ore
Production breakdown by sector, 1995

(million tonnes)	EUR12	EUR15
Unagglomerated ore	3.0	12.0
Agglomerated ore	0.0	14.1
Pyrites	0.2	0.2

Source: Raw Materials Data 1996

Table 3: Iron ore
Average real annual growth rates

(%)	1990-94	1993-1994
Apparent consumption	1.9	7.9
Production	-23.4	-29.5
Extra-EU exports	13.7	168.3
Extra-EU imports	2.6	8.7

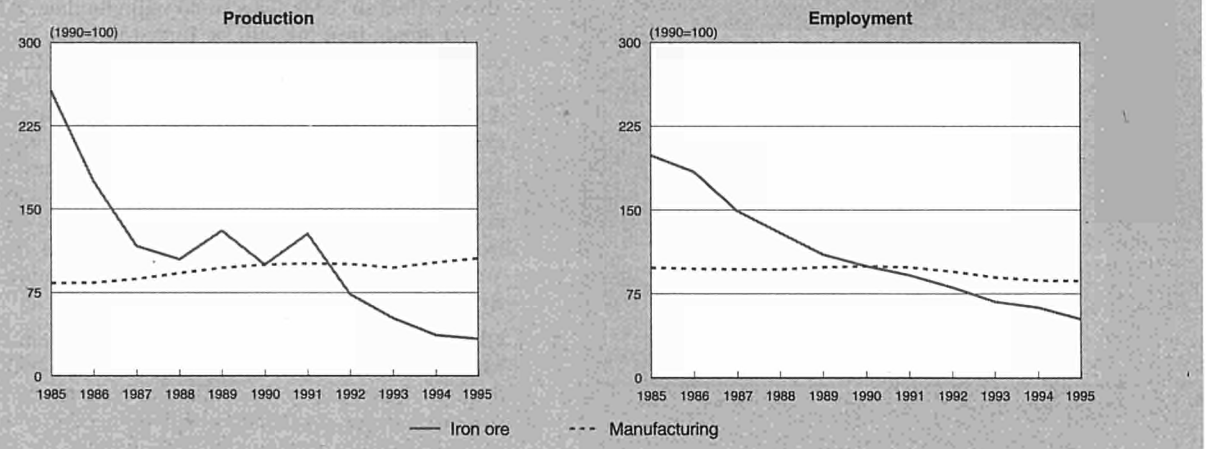
Source: B.M.Coope & Partners, Eurostet

Table 4: Iron ore
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	0.6	0.8	0.6	4.9	1.8	4.8	3.3	4.3	2.3	7.3	3.1	84.6
Extra-EU imports	3 720.9	2 879.5	2 442.5	2 890.6	3 002.3	2 841.6	3 068.1	2 729.5	2 099.2	2 676.2	2 586.0	2 737.6
Trade balance	-3 720.3	-2 878.7	-2 441.9	-2 885.7	-3 000.5	-2 836.8	-3 064.8	-2 725.3	-2 096.9	-2 668.9	-2 582.9	-2 653.0
Ratio exports / imports	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Terms of trade index	84.5	92.6	100.6	114.7	115.5	100.0	89.6	91.9	91.9	103.6	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Iron ore
Production and employment compared to EU total manufacturing industry



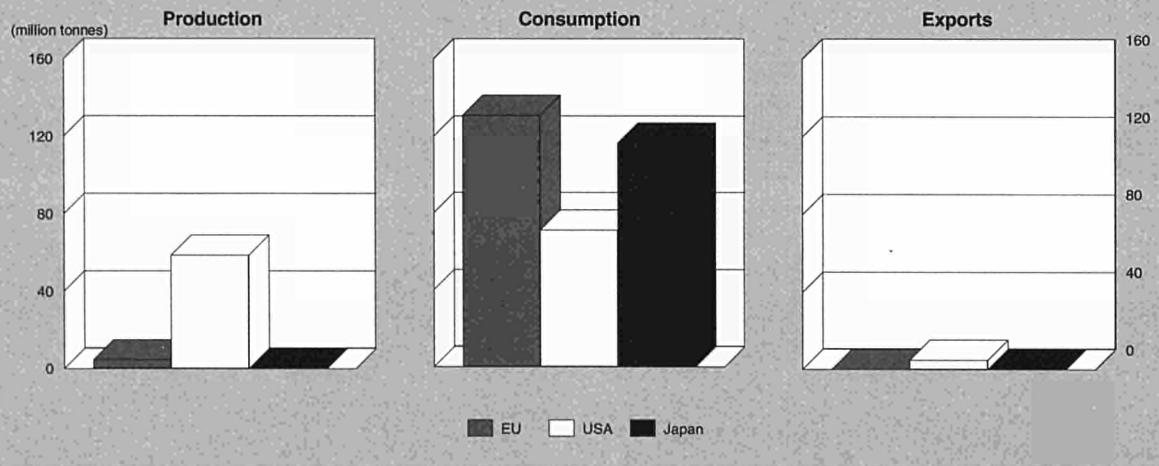
Source: B.M.Coope & Partners, Raw Materials Data 1996, Eurostat

Table 5: Iron ore
Extra-EU imports by Member State, 1994

(million tonnes)	Unagglomerated iron ores	Agglomerated iron ores
Belgique/België, Luxembourg	13.6	1.3
Danmark	0.0	0.0
Deutschland	9.7	7.4
Ellada	0.0	0.0
España	5.4	2.2
France	19.7	0.3
Ireland	0.0	0.0
Italia	13.9	2.5
Nederland	23.6	4.9
Portugal	0.4	0.2
United Kingdom	16.4	2.2

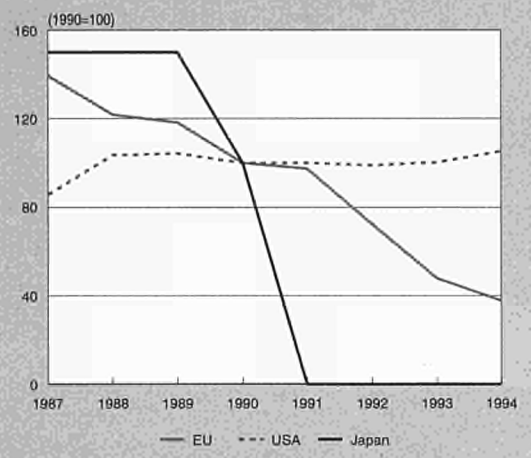
Source: Eurostat

Figure 4: Iron ore
International comparison of main indicators in volume, 1994



Source: UNCTAD

Figure 5: Iron ore
International comparison of production in volume



Source: UNCTAD

MARKET FORCES

Demand

Crude steel production (CSP) in the EU has increased steadily since its low in 1993. 1994 EU CSP production was 139 Mt (5 % increase) and continued to rise in 1995 reaching 143 Mt exceeding the record level set during the previous cyclical upswing in 1989. The high steel production has been driven by the general economic recovery. There was also a considerable build up of inventories contributing to steel demand. Most of the European steel producers were operating at or near capacity in 1995. EU steel producers started to cut down production in late 1995 to counter lowered steel prices.

Steel production in the EU is not expected to continue to grow above the level reached in 1994/5. The level of production will continue to vary with the economic cycles. The competitiveness of the EU steel producers is generally high and in the long term they will be able to offset variations in domestic demand by exports particularly to Eastern Europe and the CIS.

Supply and competition

In 1995 world production of iron ore increased to almost 1 000 Mt. In contrast among the EU 12 iron ore mining declined also in 1995 to 3 Mt. This trend will continue. All producers of low grade iron ore will be forced to close down. The last operating mine in France, owned by the ARBED group of Luxembourg, will cease operation at the end of 1997. Production in the Spanish mines in Andalusia has also been decreasing over the last years. Cia Andaluza de Minas has been facing serious financial problems and its future is uncertain. Within EU 15 the Austrian Voest-Alpine will close its mines according to plan in 2002. This will leave only one important iron ore producer in the EU Swedish LKAB. In the rest of West Europe there is only one more iron ore mine, Norwegian Sydvaranger producing 3.5 Mt ore yearly.

Global iron ore trade is expected to shift from the 350-400 Mt level of the early 1990s to a level of 450-500 Mt towards the end of the century. In addition to incremental productivity increases major investments will be necessary to meet this increase in iron ore demand. The outlook for EU suppliers except Sweden is gloomy in this context.

Production process

Investment activity in the two Swedish underground mines continues to be on a high level. A new main haulage level in Kiruna will be operational in 1997. Total investment in this highly automated unit is 2 300 MSEK. The capacity of LKAB will increase gradually to 26 Mt in the year 2000. LKAB is also investing 1 700 MSEK in new 4 Mt pelletising capacity which was partly operational during 1995. The third investment area is a new harbour in Luleå. The technology used in the Swedish iron ore mines is internationally highly competitive. LKAB spends 2 % of its turnover yearly on R&D.

INDUSTRY STRUCTURE

Companies

In 1995 there were only 4 companies producing iron ore in the EU. In EU 12 there is ARBED French Mining Division and Cia Andaluza des Minas in Spain. In EU 15 there is also Loussavaara Kirunavaara AB (LKAB) and Voest-Alpine Erzberg GmbH.

LKAB is the 6th largest iron ore producer in the Western world. The ARBED group is the 10th largest iron ore producer, including approximately 10 Mt. production form its Brazilian affiliates Samitri and Samarco.

Table 6: Iron ore
Breakdown by size of enterprise, 1995 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
100 or more employees	4	100.0	100.0	100.0

(1) Estimates for EUR15.
Source: Raw Materials Data 1996

Table 7: Iron ore
The four largest companies in Europe, 1995

(million ECU)	Country	Operating Revenue	Employment
LKAB	S	488.2	3 241.0
ARBED Group	L	N/A	180.0
Voest-Alpine	A	N/A	100.0
Cia Andaluza de Minas	E	N/A	N/A

Source: Raw Materials Data 1996

Figure 6: Iron ore
Destination of EU exports

Source: Eurostat

The iron ore sector is unique in the sense that the level of global concentration is higher than in most other economically important metal mining branches. The ten largest iron producers control approximately 50 % of total Western world production.

The iron ore sector in the EU is largely influenced by the member states' governments. LKAB is fully state-owned. The Luxembourg state is the largest single shareholder in the ARBED group with 25 % of total voting shares. Voest-Alpine was recently introduced on the stock market but the Austrian state is still the largest shareholder with 43% of the capital through its holding company ÖIAG. The Spanish CAM is privately owned by its management.

REGIONAL DISTRIBUTION

The four iron ore mining regions are Lorraine in France, Andalusia in Spain, Steiermark in Austria and Norrbotten in Sweden. The iron ore mines in Kiruna and Malmberget in northern Sweden form the basis for almost all economic activities in the region.

ENVIRONMENT

The environmental problems caused by mining of oxidised iron ores are relatively small compared to that of sulphide ores which are common as sources of other metals. Environmental impact caused by iron ore mining is mainly related to the physical handling of large quantities of ores and waste. The production of agglomerated pellets causes limited emission of sulphur dioxide.

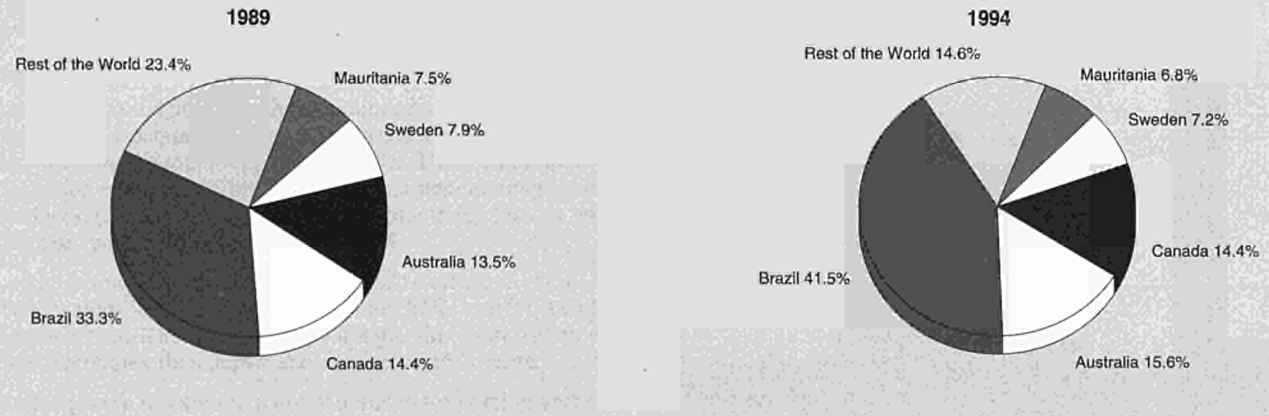
REGULATIONS

Existing mining and environment regulations permit expansion of the sector and do not disturb the competitiveness of the EU producers.

OUTLOOK

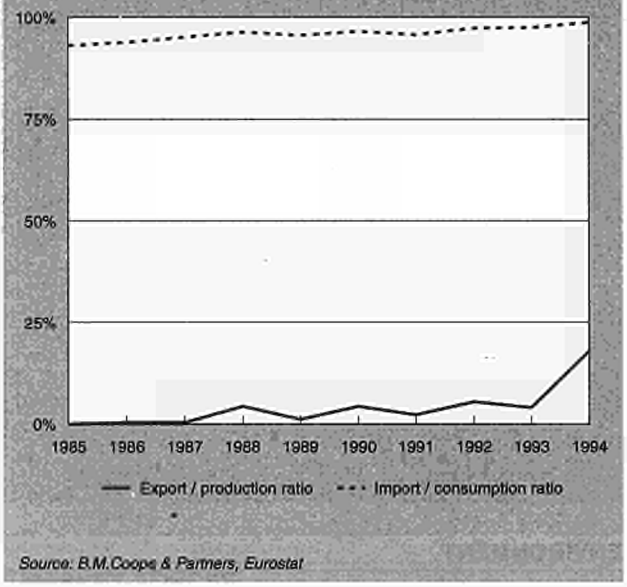
Iron ore mining will probably cease in all EU member countries except Sweden within 5 years. The only question mark is the capability of the Spanish producer to survive. The long term competitiveness of the Swedish producer looks good. Demand for iron ore will probably stay on the present level during the period.

Figure 7: Iron ore
Origin of EU imports



Source: Eurostat

Figure 8: Iron ore Trade Intensities



Source: B.M.Coope & Partners, Eurostat

Written by: Raw Material Group

The Industry is represented at the EU level by: European Confederation of Iron and Steel Industries (EUROFER). Address: Rue du Noyer 211, B-1040 Brussels; tel: (32 2) 736 0100; fax: (32 2) 736 3001; and European Association of Mining Industries (EUROMINES). Address: Avenue de Broqueville 12, B-1150 Brussels; tel: (32 2) 775 6311; fax: (32 2) 779 0523

Non-ferrous metal ores
NACE (Revision 1) 13.2

1994 marked a turning point for the world's non-ferrous metal mining industry and after a recession more persistent than that experienced by other industries, stronger demand and prices were enjoyed. Copper mines in particular saw the benefit of a rise in copper price of over 20% during the year. The EU non-ferrous metal mining sector benefited accordingly with copper accounting for nearly 30% of revenues, although overall EU sector output was little changed over the year due to lower output. Copper and zinc continue to make major contributions to mining revenues, with significant returns also from lead, nickel, tin and gold. The improved fortunes of the sector continued throughout 1995 and indications for 1996 are fair, although a significant reduction is forecast in the copper price. The sector will be further strengthened by the entry into the EU of new member states and especially Sweden which will become the largest contributor to the sector, being responsible in 1995 for 28% of total non-ferrous metal mining revenue in the expanded Community.

INDUSTRY PROFILE

Description of the sector

NACE Rev.1 13.2 covers the mining and physical processing of all non-ferrous metal ores, with the exception of uranium and thorium ores. Major operations in the EU include base and precious metals, nickel and tin and there are small mines producing bauxite and chromite, chiefly in Greece. The EU is a major producer of non-ferrous metals, however, and despite the operation of some world-class mines and a total value of non-ferrous metal ores and concentrates of just over 750 million ECU, the EU remains 80% dependent on imported materials.

In 1994, the major producing countries in the sector were in descending order Portugal, Spain, Greece and Ireland who are together responsible for 90% of output by value. France produced a further 6%, with the balance being shared between Italy and the UK. The remaining EU countries did not have any operating non-ferrous metals mines in 1994.

In 1995 Sweden became the largest EU producer of non-ferrous metal ores with Finland joining France as a more modest producer. Austria has a small production of tungsten.

Recent trends

1994 was a good year for the non-ferrous metals mining industry sector in general with large rises in the prices of some commodities, notably copper, aluminium and silver, and steady progress seen in most other metal prices, in many cases with demand and prices increasing further in 1995.

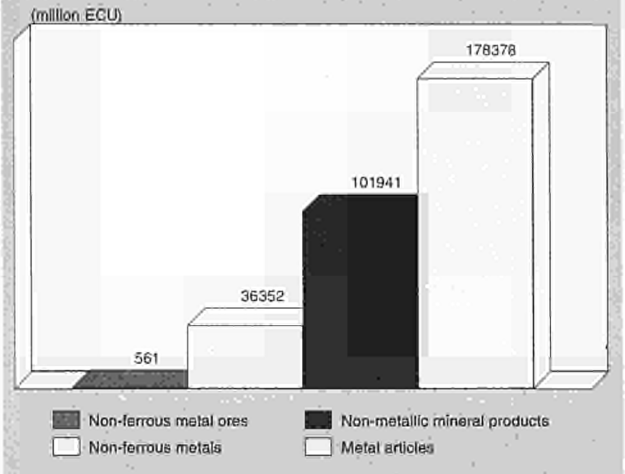
International comparison

South America and Southeast Asia continued their rapid growth in non-ferrous metals mining and Africa and the Former Soviet Union remained popular exploration areas. The EU continues as a minor producer of ores and concentrates, although the introduction of the three new member countries, Sweden in particular, will raise output by over 40%.

In comparison with the USA, which is self-sufficient, the EU produces 90% less while consuming only 55% less for metal manufacturing. The EU produces double the value of ores and concentrates than Japan and consumes 55% more.

No changes are foreseen to these patterns in the coming years.

Figure 1: Non-ferrous metal ores
Production in comparison with related industries, 1994



Source: B.M. Coope & Partners, DEBA GEIE

Foreign trade

Although substantially deficient in non-ferrous metal ores and concentrates, the EU exports some 21% of its output, this being a reflection of the international nature of the markets for these commodities. The EU is the largest purchaser in the market, importing more than the USA and Japan combined.

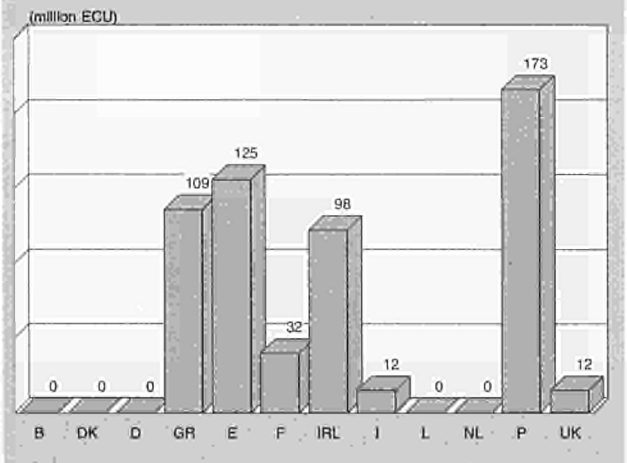
MARKET FORCES

Demand

Consumption growth was a feature of most of the major non-ferrous metals markets in 1994 as exampled by world copper consumption jumping by 7-8% and aluminium by around 9%. Growth rates in the USA were particularly high and parts of Southeast Asia also performed well. An element of re-stocking was also manifest.

Demand was reasonable also in 1995, but signs of a decline in North America and patchy growth in Europe and Japan restrained demand.

Figure 2: Non-ferrous metal ores
Production by Member State, 1994



Source: B.M. Coope & Partners

Table 1: Non-ferrous metal ores
Main indicators in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Apparent consumption	3 579.9	2 877.1	2 620.9	3 268.9	4 448.4	3 667.8	3 082.0	2 970.6	2 527.7	3 002.8	N/A
Production	449.2	597.0	479.0	632.0	987.0	855.0	665.0	701.0	574.7	560.8	N/A
Extra-EU exports	244.5	157.2	153.0	169.2	426.8	349.2	292.6	297.4	280.6	284.3	341.7
Trade balance	-3 130.7	-2 280.1	-2 141.9	-2 636.9	-3 461.4	-2 812.8	-2 417.0	-2 269.6	-1 953.0	-2 442.0	-3 060.7
Employment (thousands)	17.4	15.1	15.5	14.5	14.4	14.3	14.2	13.5	11.0	10.0	N/A

(1) B.M. Coope & Partners and Eurostat estimates.
Source: B.M. Coope & Partners, Eurostat

Table 2: Non-ferrous metal ores
Breakdown by sector, 1994

(million ECU)	Apparent consumption	Production	Extra-EU exports
Zinc	738.0	160.4	26.2
Copper	618.8	157.2	91.9
Lead	158.3	31.6	2.8
Bauxite	343.6	44.0	17.4
Nickel	52.5	51.8	0.2
Tin	10.1	32.2	22.7
Tungsten	1.1	0.8	0.6
Gold	10.0	80.8	100.1
Silver	4.3	2.0	0.2
Chromite	27.5	0.0	3.5

Source: B.M. Coope & Partners, Eurostat

Table 3: Non-ferrous metal ores
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	2.0	-0.8	0.8	16.7
Production	12.4	-9.4	2.1	-9.3
Extra-EU exports	12.3	-2.2	5.6	-13.9
Extra-EU imports	0.8	1.0	0.9	18.5

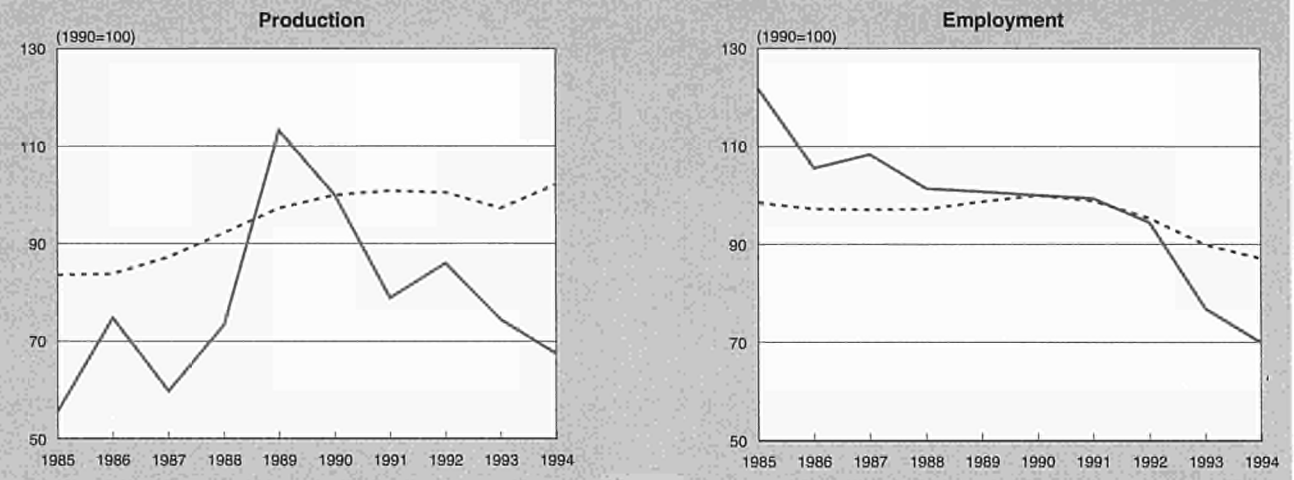
(1) Some country data for apparent consumption and production have been estimated.
Source: B.M. Coope & Partners, Eurostat

Table 4: Non-ferrous metal ores
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Extra-EU exports	244.5	157.2	153.0	169.2	426.8	349.2	292.6	297.4	280.6	284.3	341.7
Extra-EU imports	3 375.2	2 437.3	2 294.9	2 806.1	3 888.2	3 162.0	2 709.6	2 567.0	2 233.5	2 726.3	3 402.3
Trade balance	-3 130.7	-2 280.1	-2 141.9	-2 636.9	-3 461.4	-2 812.8	-2 417.0	-2 269.6	-1 953.0	-2 442.0	-3 060.7
Ratio exports / imports	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Terms of trade index	122.1	121.8	119.0	111.3	106.2	100.0	96.9	97.4	94.1	107.6	N/A

(1) Eurostat estimates.
Source: Eurostat

Figure 3: Non-ferrous metal ores
Production and employment compared to EU total manufacturing industry



Source: DEBA GEIE, Eurostat

Supply and competition

Across the world, supply and demand are fairly well balanced for most non-ferrous metal ores, with the ability to expand capacity rapidly available in many cases, in the event of temporary shortages.

Competition remains intense between mining regions for development funds, and only prospects which offer genuine cost competitiveness are favoured for investment, there being little premium for location. EU mining prospects must thus stand on their own merits and only a selected, small number are likely to be supported.

Production process

There have been few major changes in the techniques used in mining and mineral processing of late, and the leading EU operations compare favourably with overseas mines in the application of technology and in production efficiency.

Nickel processing saw the development of hydrometallurgical techniques, pioneered in particular in Australia, which may have application to EU nickel ores in due course in combination with advances in leach solution separation and purification technology being developed in part in Europe.

Opportunities may also arise from the development of bacterial leaching processes for complex sulphide orebodies.

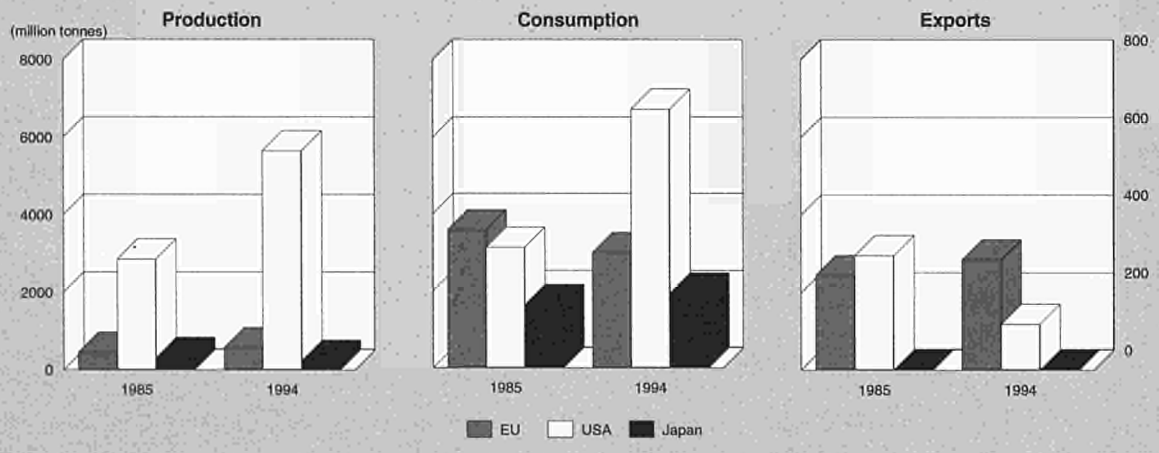
INDUSTRY STRUCTURE

Companies

At the end of 1994 approximately 36 non-ferrous metals mines were operating with significant production under the ownership of around 20 mining companies directly employing over 10 000 people. In addition approximately 100 exploration and development licences were being pursued with these activities employing an estimated further 1 000 staff.

Changes during the year included the re-opening of the Salsigne gold mine in France and the Panasqueira tungsten/tin mine in Portugal, with the Mittersill tungsten mine in Austria also planning to re-open and new mines planned for 1996 at

Figure 4: Non-ferrous metal ores
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Non-ferrous metal ores
Destination of EU exports

Source: Eurostat

Galmoy, Ireland (Zinc) and Pahtavaara, Sweden (Au). Development of the Lisheen, Ireland zinc prospect is also continuing.

The EU also remained a home for a number of major international non-ferrous metals mining companies with operations world-wide, the companies including RTZ and Lonhro (UK), Minorco (Luxembourg), Trelleborg (Sweden), Union Miniere (Belgium) and Outokumpu Oy (Finland). A large number of medium-sized and junior mining companies also are based in the EU.

Strategies

The vast majority of mine exploration and development undertaken by EU mining companies continues to be overseas, with South America and Southeast Asia being strategic targets.

REGIONAL DISTRIBUTION

The major non-ferrous mining areas within the EU will continue to be Scandinavia, Iberia, Ireland and Greece. Exploration in the first two mentioned areas is particularly bullish at present.

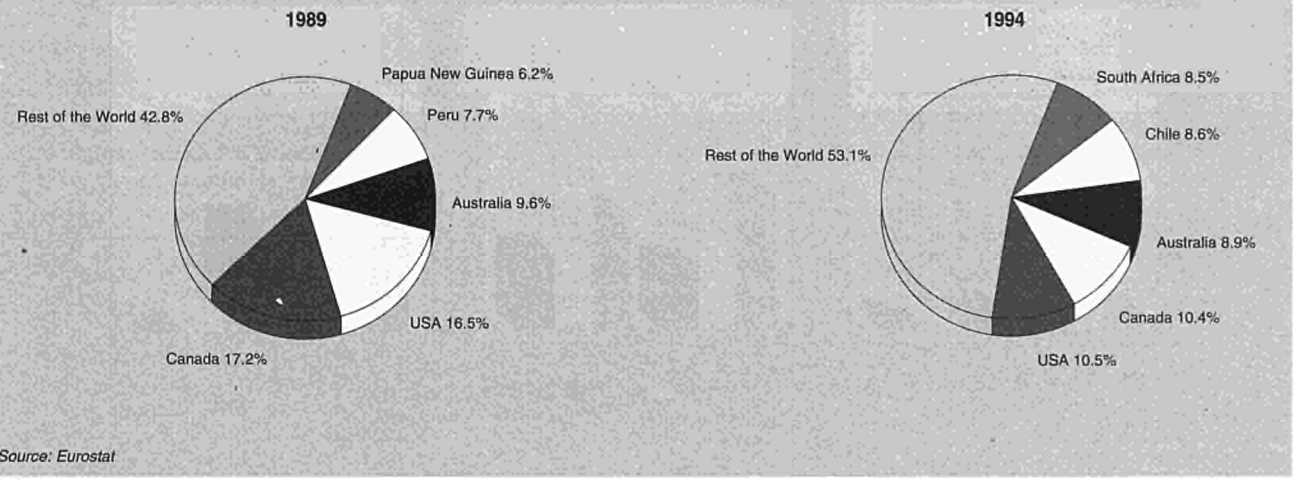
It is likely that Ireland will be a major producer of zinc concentrates for several years as the new mines enter production and the resource at Neves Corvo (Portugal) should sustain copper mining on a large scale for the indefinite future. Outside these and the main Swedish mines, however, there is little immediate prospect of substantial new deposits being exploited.

ENVIRONMENT

The small number of non-ferrous metal mines within the EU and their high level of environmental performance has resulted in environmental issues in this area having a relatively low profile, certainly in comparison to North America and Australia, for example, where a stronger focus is seen. There should be no reason why good relations should not continue to exist between environmentalists and miners in the EU where environmental management systems are largely in place and working well.

A developing threat to the mining industry is the intensifying attacks on the usage of metals by means of tightening standards, for instance copper in drinking water. Producers, commodity associations, environmentalists and government authorities are likely to be vigorously debating this issue in the coming years.

Figure 6: Non-ferrous metal ores
Origin of EU imports



Source: Eurostat

Table 5: Non-ferrous metal ores
Breakdown by size of enterprise, 1994

(units)	Number of enterprises	Share of number of enterprises (%)
Less than 20 employees	6	16.7
20-99 employees	18	50.0
100 or more employees	12	33.3

Source: B.M. Coope & Partners

Table 6: Non-ferrous metal ores
The five largest companies in the EU, 1994

(units)	Country	Employment
Somincor	P	1 100
Tara	IRL	750
Parnasse	GR	550
Esturiana	E	550
Eximinesa	GR	400

Source: B.M. Coope & Partners

REGULATIONS

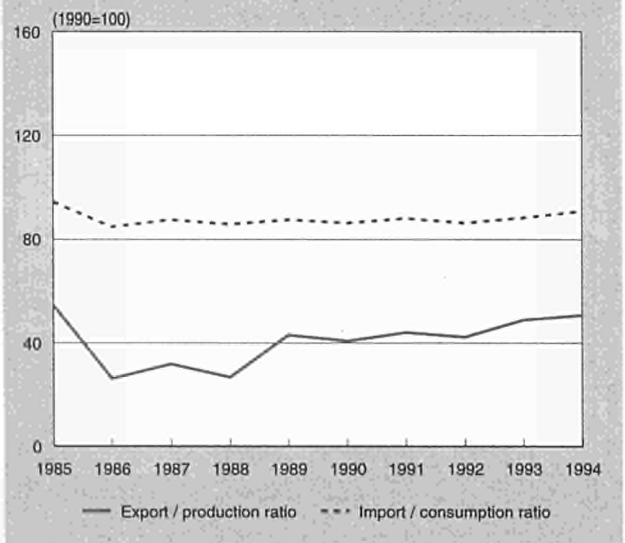
New regulations relating to the transportation of hazardous wastes will threaten the metal industries if they are extended to include some of the forms of waste normally considered as secondary raw materials. If some of these cases are not resolved to the satisfaction of the industries they will result in a small boost for primary materials and thus mining, but the added expenses incurred by consumers for waste disposal will put pressure on prices

OUTLOOK

The outlook for non-ferrous metals mining internationally remains little changed. The industry is very well established and the scope for radical movement in business fundamentals is small and confined to cyclical movement reflecting the general world economy. At present prices and demand are close to the top of the cycle which has a lower amplitude than in previous, highly-volatile times.

The EU non-ferrous metals mining sector seems set to continue on its path of recent years, with a small number of major mines complemented by several minor producers producing around 20% of the EU's metal's requirements.

Figure 7: Non-ferrous metal ores
Trade intensities



Source: Eurostat, DEBA GEIE

Table 7: Non-ferrous metal ores
Production specialisation

(ratio)	1985	1994
Belgique/België	0.0	0.0
Danmark	0.0	0.0
Deutschland	0.0	0.0
Ellada	7.5	27.2
España	8.1	3.1
France	0.3	0.3
Ireland	22.0	15.1
Italia	0.4	0.1
Luxembourg	0.0	0.0
Nederland	0.0	0.0
Portugal	4.0	24.3
United Kingdom	0.2	0.1

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: B.M. Coope & Partners

Written by: B.M. Coope & Partners
The industry is represented at the EU level by: International Association of European Mining Industries (EUROMINES). Address: Avenue Broqueville 12, B-1150 Brussels; tel (32 2) 775 6311; fax: (32 2) 779 0523.

Construction raw materials

NACE (Revision 1) 14.20

The EU is one of the world's major producing and consuming regions for construction raw materials. In the construction raw materials sector the EU is theoretically self-sufficient for virtually all mainstream products and external trade tends to be in material chosen on aesthetic grounds. The economic performance of this industry is tied directly to the level of building and construction activity in the EU, which appeared to be slowing down in 1995.
Some of these predominantly construction minerals -- notably limestone, dolomite and silica sand -- are also widely used by industry; for instance, in glass and ceramics, metallurgy, paper, paints, plastics, etc. The proportion is generally less than 10%.

INDUSTRY PROFILE

Description of the sector

The main products of this group are crushed stone, sand and gravel for construction and road aggregate; limestone and chalk for cement and lime; gypsum for plaster and cement; and dimension stone (including marble and granite, sandstone, and slate). Clay for construction uses is covered under the physical industrial minerals chapter.

Construction aggregates and cement are the bulk raw materials used in the building of roads, railways and buildings, and value added data tend to be in line with overall economic activity. Thus Germany displays the largest value followed by France, the UK, Italy, and Spain.

Many larger operations are owned by large construction and civil engineering groups. However, the abundance of deposits and the localised nature of their markets (most operations serve markets within a 50km radius) also allows the existence of a very large number of small enterprises.

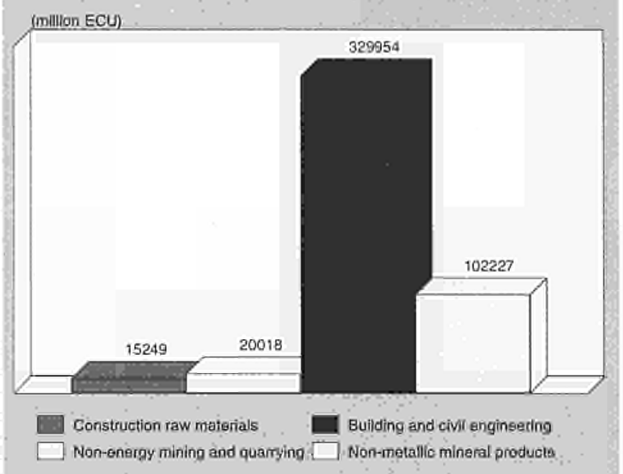
Limestone and chalk are the main raw materials used in cement but other important ingredients include clays and shales (as a source of alumina and silica) and gypsum or anhydrite. Limestone and chalk are also the main starting point for lime manufacture and a whole range of crushed and ground calcium carbonates used in agricolture, metallurgy (eg. steel fluxes), and industrial fillers. Gypsum is used not only in cement but also as the main ingredient of plaster and plasterboard. Quarries for these end-uses are invariably captively owned by the large cement, lime, and plaster manufacturing groups featured in Chapter 5.

Limestone and dolomite are also among the most important rocks used to produce crushed stone aggregate along with igneous and metamorphic rocks such as granite, porphyry, diorite, basalt, diabase, sandstone, and gritstone. Granite and the metamorphosed limestone - marble - are the two most important rocks used for dimension stone (primarily for the beauty of their appearance when polished), closely followed by slate for roofing and sandstone for building blocks.

Recent trends

Production and consumption levels increased gradually throughout the 1980s to reach a peak in 1989 followed by decline in 1990 and slow growth in 1991-1993. 1994 proved not only to be a boom year but also a new peak year as both production and consumption fell in 1995. Some regions such as the former East Germany continue to display comparatively high levels of activity. It is now generally accepted that the next two years are likely to be "quiet years" before renewed growth in 1998.

Figure 1: Construction raw materials Production in comparison with related industries, 1994



Source: B.M. Coope & Partners, DEBA GEIE

International comparison

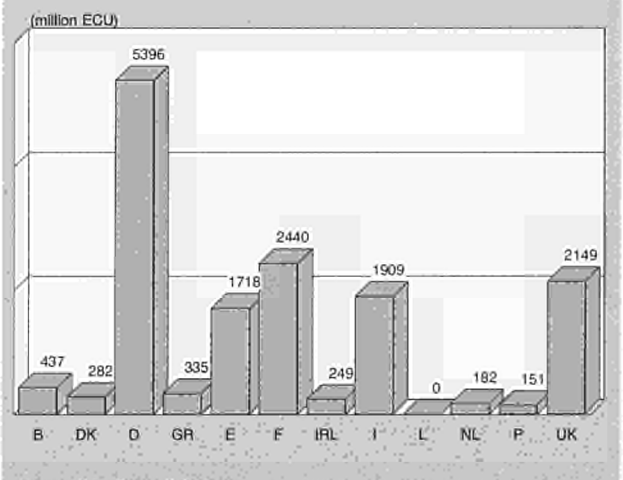
The EU is the world's leading producer of construction raw materials with an output 50% higher than the USA and 3 times the size of Japan in 1994. Both the USA and Japan display a similar pattern of production and consumption over the past ten years with growth in 1983-89 period followed by decreases in the 1989-1993 period.

Foreign trade

Foreign trade represents only a small part of the total commercial activity in construction minerals, with imports accounting for about 6% of total consumption and exports 3% of total production. Nevertheless the sheer size of the sector means that tonnage measured in tens of million of tonnes are involved.

Thus, the EU is highly active in both the importing and exporting of these materials, but in recent years has become a

Figure 2: Construction raw materials Production by Member State, 1994



Source: B.M. Coope & Partners

Table 1: Construction raw materials
Main indicators in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1996 (2)	1997 (2)	1998 (2)
Apparent consumption	11 166	13 357	13 497	13 783	14 042	15 613	14 965	16 160	17 470	18 950
Production	11 093	13 174	13 273	13 502	13 715	15 249	14 621	15 770	17 030	18 450
Extra-EU exports	260.5	347.5	372.3	362.8	370.6	403.9	402.7	430.0	460.0	480.0
Trade balance	-73.0	-182.9	-223.8	-281.4	-327.3	-363.5	-344.0	-390.0	-440.0	-500.0
Employment (thousands)	135.4	148.1	150.2	144.2	139.0	133.9	140.0	140.0	140.0	140.0

(1) Eurostat estimates.
(2) Rounded DRI forecasts.
Source: B.M. Coope & Partners, Eurostat

Table 2: Construction raw materials
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Limestone	4 542	4 567	36.2
Dolomite	373	375	12.1
Other stone	3 460	3 332	45.1
Gypsum	243	255	13.8
Slate	157	153	3.5
Sand and gravel	6 121	6 107	57.0
Silica sand	459	462	33.5

(1) Trade may occur in products not produced within the EU, hence figures are not additive with respect to Table 1.
Source: B.M. Coope & Partners, Eurostat

Table 3: Construction raw materials
Average real annual growth rates

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	0.3	1.3	0.8	10.5
Production	0.1	1.2	0.6	10.8
Extra-EU exports	2.9	3.5	3.2	9.7
Extra-EU imports	9.3	6.3	7.9	7.0

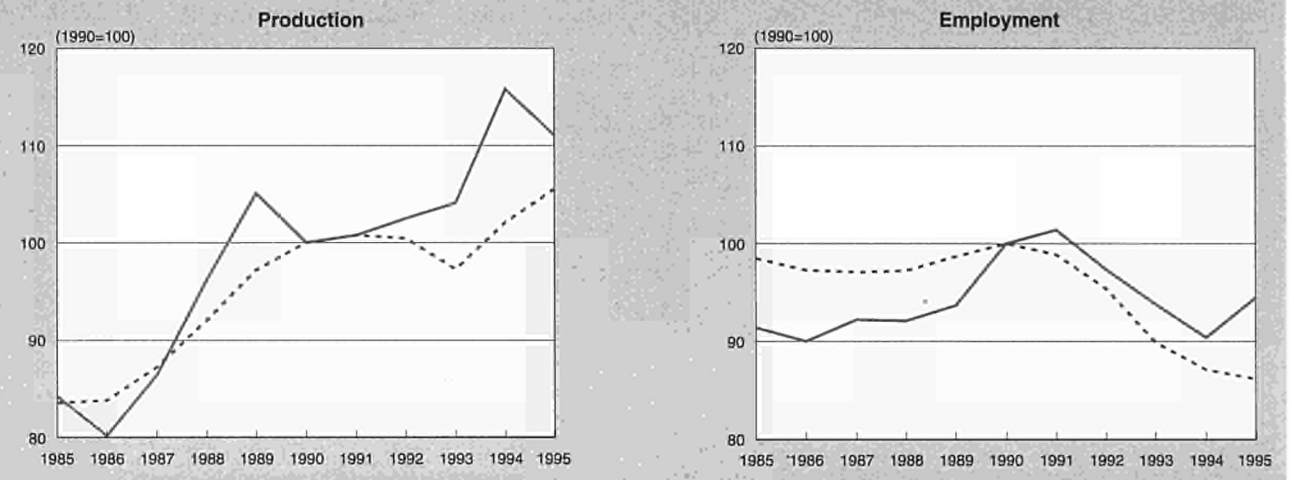
Source: B.M. Coope & Partners, Eurostat

Table 4: Construction raw materials
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Extra-EU exports	260.5	242.5	262.4	305.7	378.4	347.5	372.3	362.8	370.6	403.9	402.7
Extra-EU imports	333.5	282.8	299.3	424.2	511.5	530.3	596.1	644.3	698.0	767.4	746.7
Trade balance	-73.0	-40.4	-36.9	-118.5	-133.1	-182.9	-223.8	-281.4	-327.3	-363.5	-344.0
Ratio exports / imports	0.8	0.9	0.9	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5

(1) Eurostat estimates.
Source: Eurostat

Figure 3: Construction raw materials
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: B.M. Coope & Partners, DEBA GEIE

net importer. This is primarily due to a surge in the imports of dimension stone granite from countries such as Norway, South Africa, Brazil, and India. At the same time these imports have tended to be in raw form and have provided a boost in value added activity by the EU's domestic stone processing industry (particularly in Italy).

Exports are dominated by shipments to EFTA countries, particularly of construction aggregates to Switzerland. Highlights in export trade to non-EFTA countries are the shipments of dimension stone marble and granite to Japan, the USA, and the Middle East.

So far as sources of 1994 imports are concerned, the EFTA countries accounted for about two-thirds of total and the main highlights were dimension stone granite and crushed stone aggregate from Norway, Sweden, and Finland. The Swedish and Finnish element of this trade became intra-EU trade in 1995.

At present Intra-EU trade is dominated by cross border movement of aggregates and industrial limestone/dolomite products between Germany, the Netherlands, Belgium, and France. And also by trade in dimension stone products in which Italy, Spain, Portugal, and Greece are prominent.

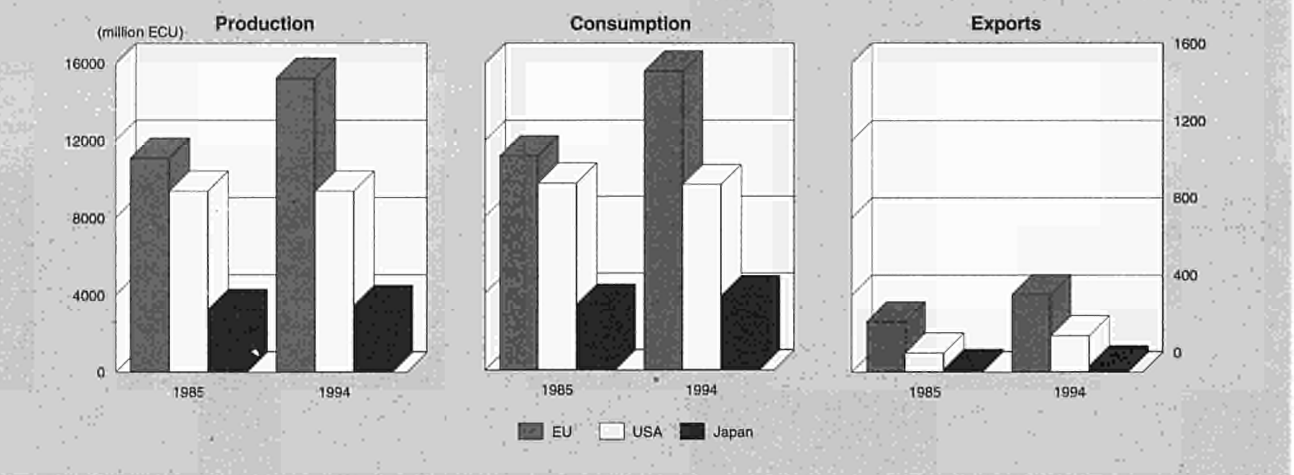
MARKET FORCES

Demand

The construction industry is clearly the dominant factor in any discussion of markets for this group of raw materials. As the fundamental ingredients involved in the construction of roads and buildings demand for the major product lines are directly dependent on overall construction activity. However, it should not be forgotten that the industrial grades of limestone, dolomite, and sand are consumed primarily in chemicals, metallurgical, and the glass and ceramics industries.

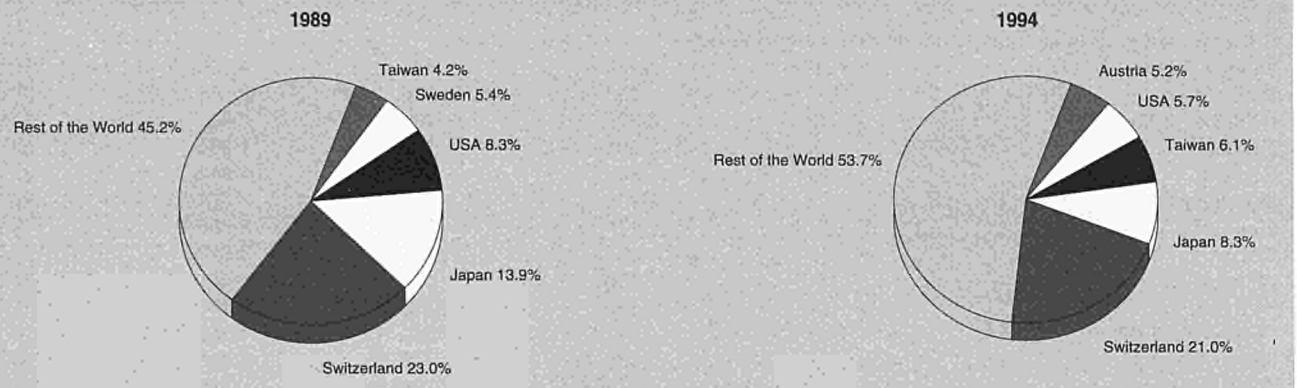
No major technological changes have taken place recently in construction materials although on aesthetic grounds the increasing use of natural stone (as represented by dimension stone granite and marble) for the exterior and interior surfaces of buildings has already been noted.

Figure 4: Construction raw materials
International comparison of production in current prices



Source: B.M. Coope & Partners, DEBA GEIE

Figure 5: Construction raw materials
Destination of EU exports



Source: Eurostat

Supply and competition

The EU is a major world producer and is theoretically self-sufficient for virtually all the minerals and rocks in this group. Thus prices tend to be an intra-EU affair based on contracts negotiated between producer and consumer. Indeed because of the high degree of captive ownership in the construction minerals area many prices tend to be an intra-company affair.

Transportation is a major consideration in bulk raw material markets and thus producers often operate their own trucks and sell on a delivered basis and in many cases sell semi-finished or finished products such as ready-mixed concrete, coated roadstone, and plasterboard. Sales of these value-added products plus the strong element of service offered to the customer often combine to give attractive operative margins for companies operating in the sector.

Transportation is also the factor which normally rules out foreign competition in bulk construction raw materials on cost grounds. The exceptions to this rule include foreign producers of high value items such as dimension stone granite (for instance, in South Africa, Brazil, and India) and very large scale operators based on the "coastal superquarry" principal. Norway in particular will continue to grow as major exporter of stone products (both crushed and dimension stone) to the rest of northern Europe.

Production process

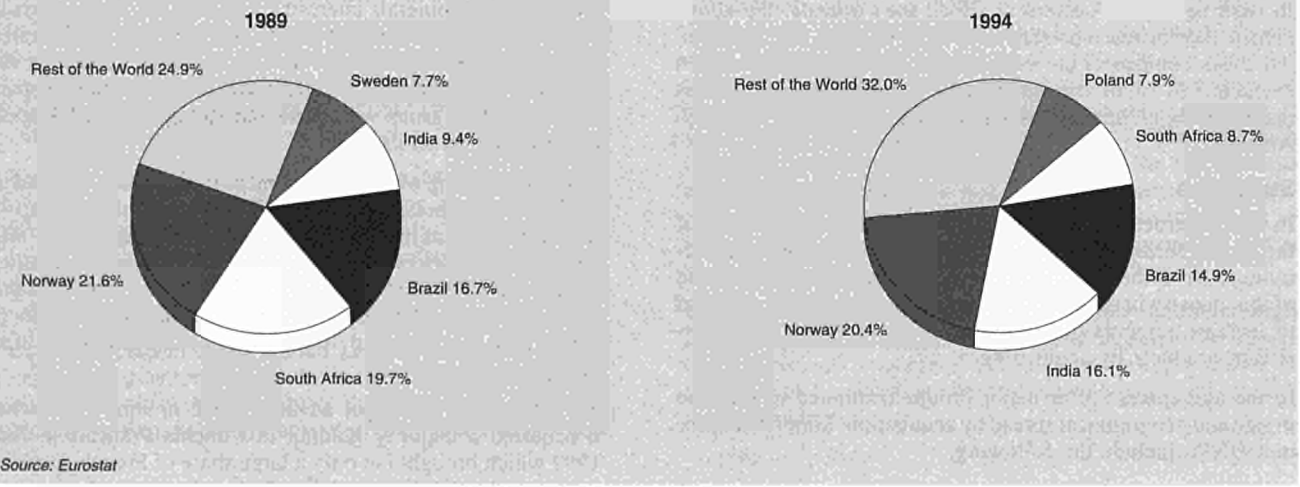
Construction raw materials extraction is often in the hands of large construction groups whose activities may range from cement and plaster products manufacture to civil engineering. The quarrying divisions of such groups tend to be large scale, highly mechanised operations with quality control well in evidence to cover what is in essence a crushing and grading exercise. Much attention has been focused on improving the efficiency of the crushing process and new or improved technologies are being used to cut costs and maximise the output of high grade products.

INDUSTRY STRUCTURE

Companies

The largest enterprises operating in construction raw materials sector are the major cement and aggregates groups such as Lafarge Coppee of France; RMC, Redland, Tarmac (including Wimpey), Tilcon (Minorco), Blue Circle, Hanson, and Bardon of the UK; Heidelberger Zement, Dyckerhoff, and Basalt AG of Germany; Holderbank of Switzerland; Italcementi of Italy;

Figure 6: Construction raw materials
Origin of EU imports



Source: Eurostat

Table 5: Construction raw materials
The largest companies in the EU, 1995

(million ECU)	Country	Turnover	Profit	Mkt Capital	Employment (thousands)
Construction groups with construction mineral interests					
Lafarge Coppee	F	4 989	560	4 526	33.2
RMC Group	UK	4 383	338	2 566	27.4
Heidelberger Zement	D	3 279	289	1 893	24.2
Tarmac	UK	2 991	128	1 034	20.6
Redland	UK	2 942	445	2 344	21.5
Italcementi	I	2 718	-52	N/A	18.8
Blue Circle	UK	2 121	220	2 686	19.7
CRH	IRL	1 964	141	1 819	13.7
Wimpey	UK	2 036	54	470	11.3
BPB Industries	UK	1 583	195	1 908	11.0
Cimenteries CBR	B	1 347	140	1 358	11.7
Rugby Group	UK	1 185	89	785	9.5
Euroc	S	1 075	38	438	7.0
Other cement companies (1)					
Calcestruzzi	I	225	-55	146	0.8
Dyckerhoff	D	913	44	256	4.6
Unicem	I	169	-9	273	1.0
Aalborg Portland	DK	336	26	382	2.5
Heracles General	GR	247	25	197	2.0
Titan Cement	GR	190	24	131	1.5
Diversified companies with construction mineral interests					
Hanson	UK	14 668	1 763	13 808	74.0
Minorco	L	2 887	348	4 887	17.8
Aggregate specialists					
Camas	UK	580	25	280	4.7
Bardon	UK	428	25	204	2.7
Fels-Werke	D	234	2	70	1.0

(1) 1994 data.
Source: B.M. Coope & Partners

CBR of Belgium; and CRH of Ireland. All of which measure their employees in thousands or tens of thousands.

Other major enterprises extracting limestone include the lime specialists such as Lhoist (B), Carmeuse (B), Rheinische Kalkstein-Werke owned by Wulfrath (D), and Buxton Lime owned by Minorco (UK) and calcium carbonate specialists such as Pluess-Staufer (CH), English China Clays (UK), Provencale (F), Faxe Kalk (DK), and Reverte (E). In the gypsum and plaster sector the major enterprises are BPB Industries (UK), Lafarge (F) and Knauf (D). Major players in the industrial sands industry are Sibelco (B), Quarzwerke (D), and Hepworth (UK).

In each of the sub-sectors in which they operate, the above named enterprises represent over 60% of total EU turnover. All these companies are either European or international in character. Most of the large cement and aggregate groups maintain major international interests, particularly in North America.

Strategies

In the construction raw materials sector, market strategies of the larger enterprises are bound up in their downstream activities. Nevertheless there has been a marked consolidation of the industry in the EU itself as major groups have continued to increase reserves of raw material and influence in downstream products by acquisition.

In the aggregates sector major groups continued to increase in size and geographical spread by acquisition. Major examples in 1995/96 include the following:

Inlate 1995 Tarmac bought Wimpey Minerals (only recently enlarged through the acquisition of the Alfred McAlpine group's aggregate interests) from the George Wimpey group (UK) and paid in an "asset swap" which involved transferring its housing division to Wimpey, thus leaving Tarmac to concentrate on aggregates and Wimpey on housebuilding.

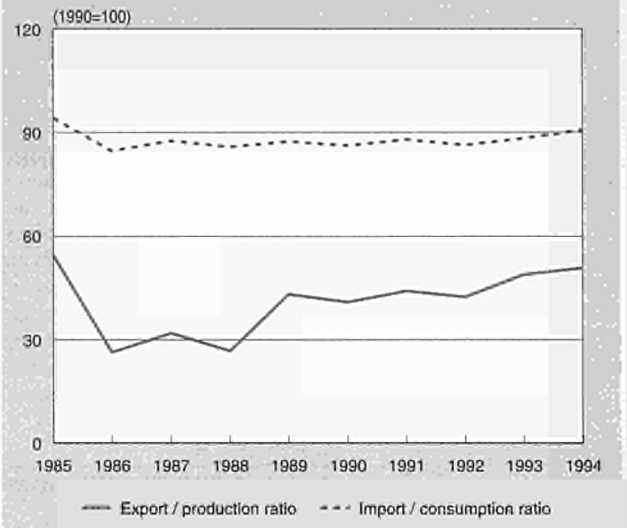
In April 1995, RMC bought a major share of Kies-Union, one of Austria's largest aggregate companies and in July 1995 acquired Hargreaves, a UK aggregates and lime producer, from Charter plc (UK).

In late 1995 Minorco (based in Luxembourg, but related to Anglo-American Corp of South Africa) added to its aggregate and industrial minerals interests by buying the Tilcon division (UK) of conglomerate BTR and by buying Kies und Naturstein Leipzig (D). This is apart of an ongoing strategy turning this company from a natural resource investment holding company to an operating group with particular strength in the European construction minerals sector.

The restructuring of Europe's cement industry is a continuous process and although the prime objective of major groups is to acquire cement manufacturing capacity and associated markets the secondary effect is to concentrate limestone operations (and reserves) within the major groups. Three groups in particular - Holderbank (CH), Lafarge (F), and Italcementi (I) - now hold a copmbined 70% of European cement manufacturing capacity.

For Italcementi its major advance came in June 1992 when it acquired a majority holding in Ciments Francais in June 1992 which brought not only a large share of French domestic

Figure 7: Construction raw materials
Trade intensities



Source: B.M. Coope & Partners, Eurostat

capacity but also ownership of companies in Spain (SFM, Cementos Rezola, and Cementos Molins), Greece (Halyps Cement), the Czech Republic (Hranice and Ostrava).

Hoderbank increased its Western European presence further by acquiring Cedest (F) in May 1994 and gaining full control of Societe Suisse de Ciment Portland (SSCP) in late 1995. The company has also made important acquisitions in Eastern Europe, most notably in the Czech Republic, Slovakia, Hungary, and Bulgaria and now owns 44 cement plants in Europe.

Lafarge Coppee (F) took control of Perlmooser Zement (A) in late 1993 but otherwise seems to have been concentrating its expansion efforts in the Far East and North America. In early 1995 Lafarge began a staged takeover of China Cement Corp., a major producer of cement in north-east China, and in late 1995 announced that it is building ne w cement plants in Canada (Richmond, BC) and the USA (Sugar Creek, Missouri). It also made further cement acquisitions in Marocco, Brazil, and Venezuela and bought into the US plasterboard producer, National Gypsum.

Another merger of note begun in October 1993 when Heidelberger Zement (D) acquired 42.2% of Cimenteries CBR (B) and has since increased its share to a controlling interest. Between them the two companies now own important cement manufacturing assets in the Czech Republic, Hungary, Poland, and most recently (December 1995) Turkey (Canakkale Cimento).

The cement industry in Scandinavia is also in the process of further consolidation as a result of the merger between Aker of Norway and Euroc of Sweden (which also controls Finnish cement production), announced in October 1995 and approved in March/April 1996.

Meanwhile CRH (IRL) made a major investment in Poland in late 1995 by acquiring a 75% holding in Cementownia Ozarow and in Greece Calcestruzzi (I) finally took over Halkis Cement in January 1996, which had been expected ever since it acquired Greece's largest cement producer, Heracles Cement in March 1992.

Outside the cement sector March 1995 saw Europe's largest gypsum and plasterboard producer, BPB Industries, acquire a major new plasterboard plant in Zaragoza, Spain (formerly operated by Expanola de Placas del yeso) and a major new

Table 6: Construction raw materials
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.0	0.8
Danmark	1.4	1.1
Deutschland	1.0	1.1
Ellada	4.4	3.0
España	1.2	1.5
France	1.0	0.8
Ireland	1.1	1.4
Italia	1.1	0.9
Luxembourg	0.0	0.0
Nederland	0.2	0.2
Portugal	1.5	0.8
United Kingdom	0.9	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: B.M. Coope & Partners, DEBA GEIE

BPB plasterboard plant is under construction in Berlin with completion expected in the second half of 1996.

In the lime and calcium carbonates sector the most interesting development of the 1995/96 year concerned the acquisition in May 1996 of Faxe Kalk (DK) by the Lhoist Group (B).

REGIONAL DISTRIBUTION

Aggregates and cement are produced throughout the EU with all 15 countries (including Luxembourg) recording production. With regard to aggregates, sand and gravel is more prevalent in low lying regions and crushed stone is more common in highland areas. Dimension stone workings tend to be highly concentrated, for instance in the Carrara marble district of Italy and the Pontevedra/Badajoz granite district of Spain. Gypsum is not nearly as widespread as limestone, but large deposits exist in Germany, France, Spain, and the UK and mining (both open cast and underground) and processing (including plaster and plasterboard) tend to be carried out at single sites. Sand deposits are fairly widespread, although the better quality industrial grades are obtained from deposits located in Belgium and in the north of Germany and France.

ENVIRONMENT

Most of the minerals and rocks in this group are mined by open cast methods and operations therefore consist of a quarry (or sand and gravel pit) with associated processing plant. Many such operations are thus highly visible and continue to be very undesireable to local residents.

The modern quarrying industry has an excellent record for dealing with potential problems such as dust emissions and noise pollution during the life of an operation and for restoration of the land once the extractive process has finished. Nevertheless the restrictions imposed on new workings in some member states will lead to some areas of the community importing materials at high cost. Although the use of waste materials as aggregates is growing it will only be in applications where less stringent performance requirements are allowed. Recycling of aggregates shows promise and is becoming a common part of road maintenance.

Meanwhile the coastal superquarry will play an increasingly important role in supplying aggregate deficient areas. Although, projects in some of the more promising areas in the EU (such as Scotland) are being delayed or curtailed by planning procedures.

This sector also supplies major products for use in environmental processes, most notably limestone and lime in water and air treatment and silica sands for water filtration. Paradoxically many limestone and lime based processes to remove sulphur from gases or waste streams yield chemical gypsum as by-product. The use of this by-product gypsum will, for the foreseeable future, reduce demand for natural gypsum; nevertheless, this variety is not well adapted to all uses, as the natural type is.

REGULATIONS

Increased harmonisation of building codes and standards in Europe is being achieved through the EURONORMS programme of CEN (European Committee for Standardisation) in which producers of construction minerals the EU, EFTA, and the former Comecon members of Eastern Europe are all actively engaged.

OUTLOOK

The EU will continue to be a major centre for the production of construction raw materials and EU enterprises operating in this sector will continue to be major players on the world scene. Many of the major European groups are already active in areas of high construction activity such as the Far East and see future expansion in those regions. These companies are also set to gain from the oft-predicted boom in construction activity in Eastern Europe which is at last beginning to happen in countries such as Poland, the Czech Republic, and Hungary.

Meanwhile future development of EU production and consumption will be closely tied to the overall level of building activity which in turn will be affected by expenditure in both public and private sectors as well as environmental concerns. In the public sector spending on infrastructure is always weighed against socio-economic costs (such as long-term structural unemployment and the needs of an ageing population) and indeed extra constraints on public expenditure are currently being applied by Member States aiming to meet the convergence criteria for the EMU. Environmental concerns also having an effect on public sector spending as, for instance, road-building programmes are re-assessed in the light of increasing concerns over air caused by vehicle emissions.

Nevertheless in the construciton industry most clouds seem to have silver linings. Thus social and economic changes and an upgrading of environmental standards are seen as a stimulus to future growth in construction activity. Major expenditure on transportation infrastructure will still involve roads in certain regions (eg. in central Europe to improve East-West links) but will need to be aimed at high speed railways and other public transport systems in other regions. Thus the EU and the national governments will continue to play a significant role in stimulating economic growth in construction activity throughout the union.

Written by: B.M. Coope
The industry is represented at the EU level by:
European Aggregates Association (UEPG). Address:156 Buckingham Palace Road, London SW1 W9TR; tel: (44 1)71 730 8194; fax: (44 1)71 730 4355; and,
European International Federation of Natural Stone Industries (EURO-ROC). Address: Avenue Henry Dunant 2, Bte. 15, B-1140 Brussels; tel: (32 2) 736 0245; fax: (32 2) 736 0245.;and,
Association of European Gypsum Industries (EUROGYPSUM). Address: 98, Rue Guliedelle, B-1200 Brussels; tel: (32 2) 775 84 90; fax: (32 2) 771 30 56; and
EuLA. Address: Annastrasse 67-71, D-5000 Köln; tel: (49 221)934 67 417.
Liaison Office of the European Ceramic Industry (CERAME-UNIE). Address: Rue des Colonies 18-24, Bte. 17, B-1000 Brussels; tel: (32 2) 511 3012; fax: (32 2) 511 5174.

Chemical industrial minerals

NACE (Revision 1) 14.30 and 14.40

The EU is a major producer of salt, potash, and sulphur (the latter mainly from secondary sources) and is a significant producer of fluorspar and barite. Although the entry of Finland into the union adds a domestic phosphate mining and processing operation, the new contribution is modest compared to the overall requirement. Thus the EU remains deficient in phosphate rock and borate resources and continues to be a major importer of these minerals and their derivatives. The markets for several of these items are severely depressed at present, particularly those such as sulphur, phosphates, and potash which are heavily influenced by fertiliser demand.

INDUSTRY PROFILE

Description of the sector

The chemical industrial minerals are major raw materials for the chemicals and fertiliser manufacturing industries covered in Chapter 6 of Panorama. The principal bulk items are salt, potash, phosphates, and sulphur. Other significant products include fluorspar, barite, and borates.

The EU is a leading world producer of salt and potash and is a significant player in world markets for sulphur, fluorspar, and barite. However, it has only a small phosphate mining industry (in Finland) and no borate mineral production of its own.

Germany, France, the UK, Italy, and Spain are the principal EU producers of chemical industrial minerals and are all active to some degree in potash, salt, sulphur, fluorspar, and barite production. The Netherlands is also notable for its major contribution to EU salt production. Of the new entrants, Austria is a significant salt producer and Finland an important producer of sulphur and phosphate (apatite).

Recent trends

The production and consumption values for this group of minerals show a major decline during the 1985-93 period due to a combination of falling tonnage and falling or stagnant prices. The years 1994 and 1995 showed something of a revival due to increased tonnage and higher prices for most of these products. Sulphur has shown the most extreme decline of any product in the minerals sector with prices declining by a factor of 10 (taking account of inflation) between 1985 and 1995.

The fall in consumption has been more marked in the fertiliser sector than the industrial chemicals sector. The decline in fertiliser consumption in the EU has reduced the demand for all fertiliser minerals but especially for phosphate rock. It should further be noted that much of EU phosphate imports now consist of phosphoric acid rather than phosphate rock and this has been one major factor in reducing the trade deficit apparent in the figures presented in Table A. A sharp reduction in sulphur imports has been another major factor. In fact the EU's increasing output of by-product sulphur will turn it into a significant sulphur exporter in the later 1990s.

International comparison

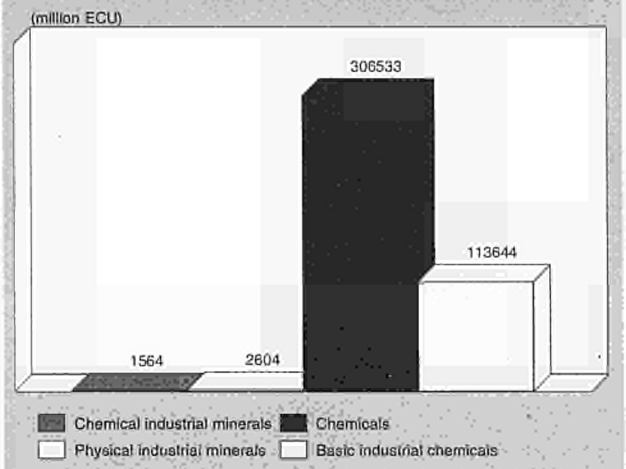
The USA is the world's leading producer of salt, sulphur, phosphate rock, and boron minerals and is an important producer of potash and barite. Thus, its production of chemical industrial minerals exceeds that of the EU by a factor of three. Total production values have been maintained over the period with declines in some commodities such as sulphur and barite balanced by increases in the production of potash, soda ash, bromine, etc. Meanwhile Japan's only significant contribution as a producer is for sulphur (and the small volume, high value product, iodine) and it is a major importer of all the other commodities, including salt.

Consumption trends in Japan have been similar to the EU as reflected in overall value decline and falling tonnage's in the fertiliser sector (seen most strongly in reduced phosphate consumption). In the USA demand for fertiliser minerals has held up better and thus overall consumption shows a somewhat smaller decline in value terms.

Foreign trade

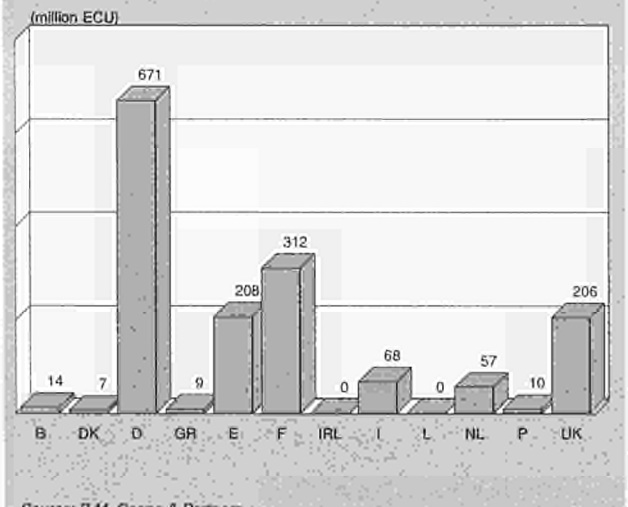
The EU is active in both import and export trade of the chemical industrial minerals. Major export items are potash, salt, and sulphur and major import items are phosphate rock, potash, borates, and sulphur. Although the EU continued to show a negative trade balance in 1994 the deficit is now quite small compared to those of the mid-1980s. This is due to both

Figure 1: Chemical industrial minerals Production in comparison with related industries, 1994



Source: B.M. Coope & Partners, DEBA GEIE

Figure 2: Chemical industrial minerals Production by Member State, 1994



Source: B.M. Coope & Partners

Table 1: Chemical industrial minerals
Main indicators in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1996 (2)	1997 (2)	1998 (2)
Apparent consumption	4 449	2 553	2 262	1 950	1 512	1 697	1 770	1 910	2 070	2 240
Production	3 239	1 870	1 811	1 746	1 383	1 564	1 566	1 700	1 850	2 010
Extra-EU exports	219.2	382.4	516.3	561.0	476.0	482.9	425.9	410.0	390.0	380.0
Trade balance	-1 210.4	-682.8	-451.0	-204.4	-129.0	-133.2	-204.4	-210.0	-220.0	-230.0
Employment (thousands)	25.8	22.0	21.8	20.0	18.1	17.0	N/A	N/A	N/A	N/A

(1) Eurostat estimates.
(2) Rounded DRI forecasts.
Source: B.M. Coope & Partners, Eurostat

Table 2: Chemical industrial minerals
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Sulphur	196	205	40
Barite	43	33	5
Fluorospar	84	56	5
Kieserite	72	72	1
Potash	662	776	297
Salt	340	422	103

(1) Trade may occur in products not produced within the EU, hence figures are not additive with respect to Table 1.
Source: B.M. Coope & Partners, Eurostat

Table 3: Chemical industrial minerals
Average real annual growth rates

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	-15.9	-12.5	-14.4	7.8
Production	-17.9	-6.4	-13.0	13.1
Extra-EU exports	10.0	-0.9	5.0	4.4
Extra-EU imports	-3.9	-20.3	-11.6	-8.9

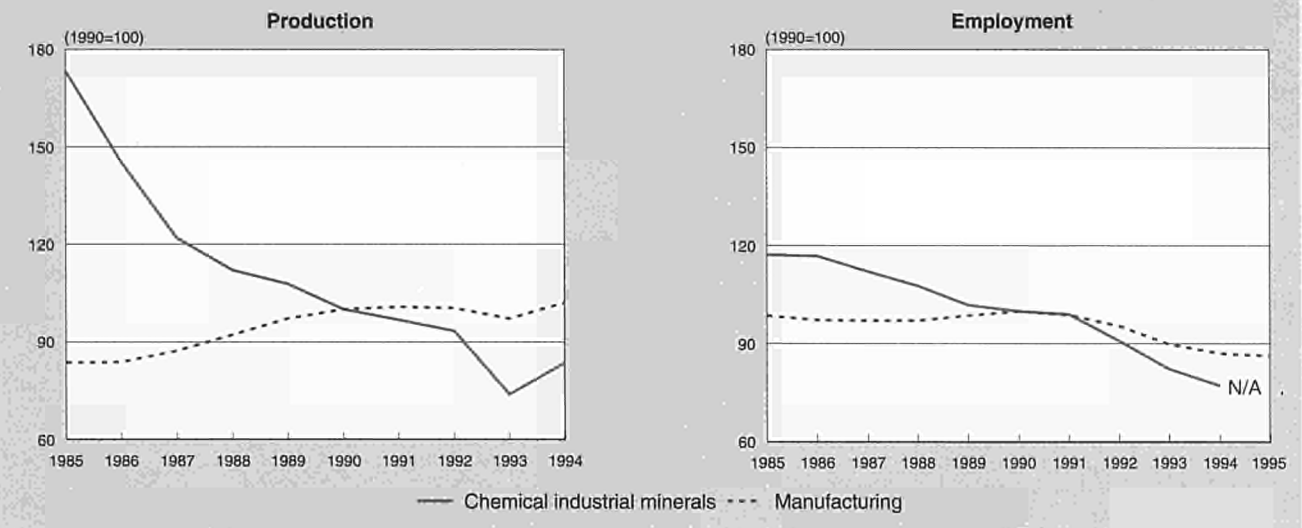
Source: B.M. Coope & Partners, Eurostat

Table 4: Chemical industrial minerals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Extra-EU exports	219.2	166.3	178.2	347.8	384.6	382.4	516.3	561.0	476.0	482.9	425.9
Extra-EU imports	1 429.6	1 173.1	930.1	1 218.9	1 355.4	1 065.2	967.3	765.4	605.0	616.1	630.3
Trade balance	-1 210.4	-1 006.8	-751.9	-871.1	-970.8	-682.8	-451.0	-204.4	-129.0	-133.2	-204.4
Ratio exports / imports	0.2	0.1	0.2	0.3	0.3	0.4	0.5	0.7	0.8	0.8	0.7

(1) Eurostat estimates.
Source: Eurostat

Figure 3: Chemical industrial minerals
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: B.M. Coope & Partners, DEBA GEIE

reduced imports (particularly of phosphate rock and sulphur), and increased exports of potash and salt and in the future, sulphur.

The most important supply countries to the EU are Morocco (phosphates), the USA (phosphates), Israel (phosphates and potash), the former Soviet Union (potash), Poland and Russia (sulphur), Egypt, Tunisia, Marocco and Poland (salt), Turkey (borates), South Africa (phosphates), and Canada (potash), South Africa, Kenya, Mexico and China (fluorspar).

MARKET FORCES

Demand

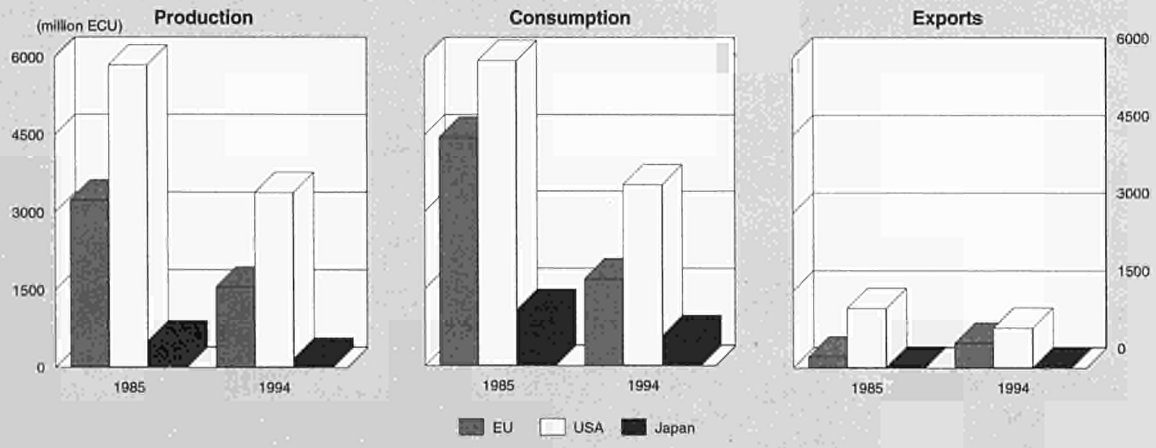
The main consuming industries for these minerals are the bulk inorganic chemical and the fertiliser industries. Salt is the main raw material of the chloralkali chemical sector whose products include chlorine, caustic soda, and soda ash. Such products and their derivatives are used not only within the inorganic chemicals sector, but also in plastics (PVC), soaps and detergents, glass, paper manufacturing, and in a wide range of general industrial processing.

Sulphur is the source of sulphuric acid, probably the most versatile chemical used in chemical and other industrial processes. Nevertheless it should be pointed out that about 60% of sulphuric acid is consumed by the fertiliser industry. Thus EU fertiliser manufacturing, which in turn is highly dependent on demand from EU agriculture, is a major influence on the EU markets for sulphur, phosphates, and potash. Thus these three minerals have all been adversely affected by EU agricultural reforms and environmental legislation concerning fertiliser usage.

Supply and competition

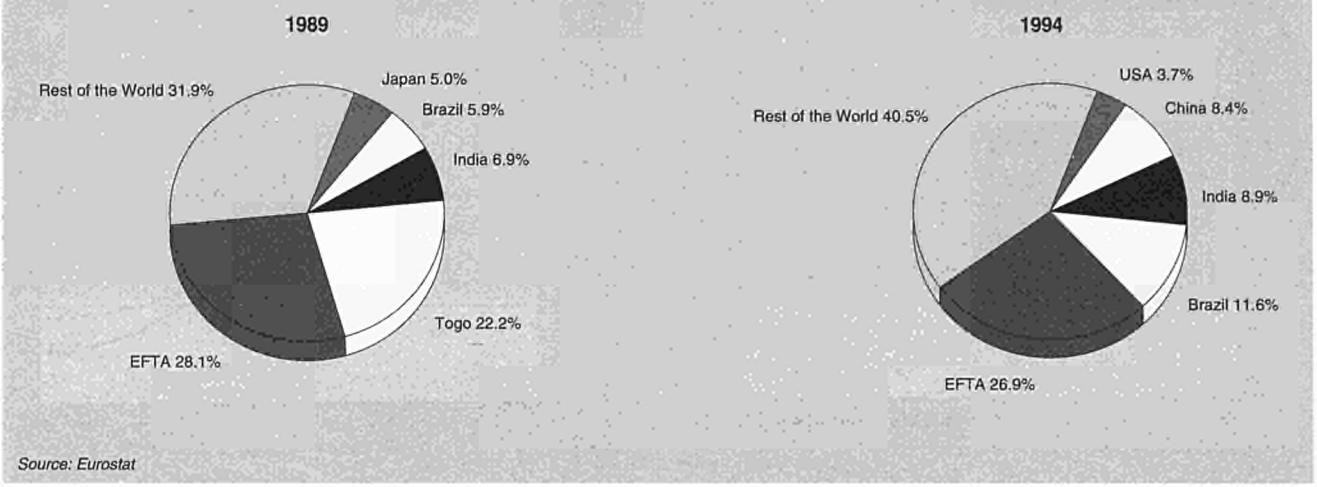
It is probably fair to say that there is a major world oversupply in all the major products of this grouping, although perhaps less extreme for salt than for potash, phosphate rock, and sulphur. The downward pressure on prices that this situation has created is certainly hurting some of the more vulnerable producers of these minerals, the smaller, higher cost producers.

Figure 4: Chemical industrial minerals
International comparison of main indicators in current prices



Source: B.M. Coope & Partners, Eurostat

Figure 5: Chemical industrial minerals
Destination of EU exports



Source: Eurostat

The sulphur supply situation is further complicated by the high proportion of co-product and by-product output in world production. The bulk of EU sulphur production is from secondary sources ranging from elemental sulphur recovered from sour natural gas and oil (particularly in Germany and France) to sulphur recovered as sulphuric acid from metal smelters. Production from primary resources is limited to the now modest output of sulphuric acid produced from natural pyrite in Spain, Portugal, and Greece.

The EU potash industry has faced major challenges in recent years from low price competition from the former Soviet Union and the integration of the former East German potash industry into unified Germany. The EU imposed anti-dumping duties on potash from the former Soviet Union during 1992. The industry also has to compete with low cost producers in Canada (with its economies of scale) and Israel (with its low cost brine operations).

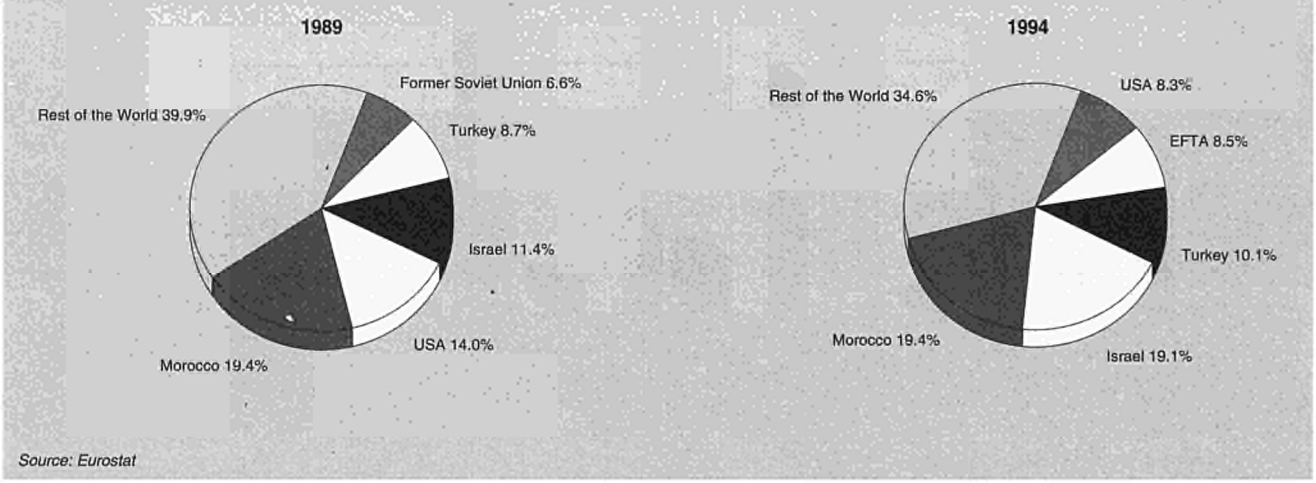
As a high volume, low value commodity, salt tends to be less vulnerable to foreign competition and most bulk grades of salt, i.e. for chemicals and road de-icing, are consumed close to the point of production. Much of this production is captive or subject to long term contract agreements. However, salt consumption has been adversely affected by the move away from chlorine based products, particularly paper pulp bleaching agents, for environmental reasons.

The EU's domestic fluorspar industry has been cut back drastically in recent years as result of exposure to low priced competition from foreign countries and because of the phasing out of chlorofluorocarbons (CFCs), as provided for by the Montreal Protocol (1992). In fact the main source of these imports, China, was subject to anti-dumping duties by the EU in 1993/94. Fluorspar is one of the main industrial minerals included in China's export licensing scheme which was introduced in 1994 and has effectively boosted minimum prices for exported products. This in turn has provided a boost for EU fluorspar producers who are now able to work with more acceptable operating margins.

Production process

No major new technological developments have taken place in the processing of chemical industrial minerals, although the trend towards larger sized equipment and the treatment of finer material has continued together with efforts at energy saving and improved environmental compliance.

Figure 6: Chemical industrial minerals
Origin of EU imports



Source: Eurostat

Table 5: Chemical industrial minerals
The largest companies in the EU, 1994

(million ECU)	Country	Turnover	Profit	Mkt capital	Employment (thousands)
Elf Aquitaine (1)	F	31 553	658	13 661	89.5
Azko Nobel (1)	NL	10 381	770	6 382	70.4
Solvay (1)	B	6 678	281	3 314	41.3
EMC	F	2 249	-134	641	13.3
MDPA	F	150	-45	517	2.7
Kali + Salz	D	476	-155	1 203	11.0
Cleveland Potash	UK	108	9	N/A	1.0
Suria K	E	32	-11	N/A	0.5
Potasas de Subiza	E	25	N/A	N/A	0.4
Potasas de Liobregat	E	37	N/A	N/A	0.5
Kemira	FIN	718	-126	N/A	7.6
BEB	D	553	N/A	N/A	1.9
Rio Tinto Minera	E	295	-26	16	1.1
Sudwestsalze	D	98	5	97	0.6
Staveley Industries	UK	441	26	318	5.1
Salt Union	UK	66	10	N/A	0.2

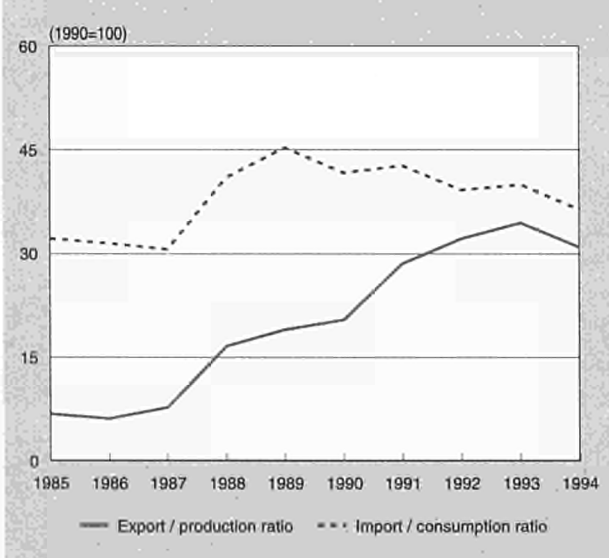
(1) 1995 data.
Source: B.M. Coope & Partners

INDUSTRY STRUCTURE

Companies

EU production of chemical industrial minerals is highly concentrated in the hands of few large organisations. The salt industry involves major chemical groups such as Akzo Nobel (NL), Solvay (B), BASF (D), and SKW Trostberg (D) as well as salt specialists such as CSME-Salins du Midi (F), Salt Union (UK), Staveley Industries (UK), and Union Salinera (Spain). The EU potash industry consists of five operating companies: the BASF subsidiary, Kali und Salz (D); the Entreprise Miniere et Chimiques subsidiary, MDPA (F); the two INI subsidiaries, Suria K and Potasas de Subiza (E); and the Minorco subsidiary, Cleveland Potash (UK). The operations of the IRI subsidiary, Italkali (I), remained closed during 1994/95. Most potash producers are also significant producers of by-product salt and Kali und Salz produces another important by-product, the magnesium sulphate mineral, kieserite.

Figure 7: Chemical industrial minerals
Trade intensities



Source: B.M. Coope & Partners, Eurostat

Meanwhile sulphur is recovered from sour gas by the two energy companies, Elf-Aquitaine (F) and BEB (D). Phosphate in the form of apatite concentrates is obtained by Kemira Oy (FI) at Siilinjarvi for immediate consumption in an adjacent phosphoric acid and fertiliser plant.

Major EU fluorspar producers include Sogerem of the Pechiney group (F); Laporte (UK); Nuova Mineraria Silius (I); Minersa (E); and Sachtleben of the Metallgesellschaft group (D). The most important barite producers are M-I (UK), Barytine de Chaillac (F), and Sachtleben (D).

With regard to borates it should be noted that the world's largest producer, RTZ (UK), is a EU-based company and thus significant boron compounds capacity (and indeed technology) resides in Europe. Furthermore the second largest borate producer is based in Turkey, a neighbouring country with close associate status to the EU.

Strategies

The restructuring of the former West and East German potash industries has continued under the single ownership of Kali und Salz AG. Mine closures and rationalisation reduced total output to less than 3 million tonnes (K_2O) in 1993 but in 1994 and 1995 the level has been rising again to the 3.5 million tpa level. Meanwhile Kali Export GmbH, the sales joint venture between MDPA of France and Kali und Salz, has been dismantled at the request of the European Commission.

The French industry continues to wind down producing operations (in a phased exploitation of remaining reserves) and EMC is increasingly involved in the distribution in the EU of imported potash through commercial arrangements with producers in Israel and Jordan.

In the salt/soda ash sector both Akzo Nobel and the Harris Chemical Group of the USA are notably acquisitive. Akzo Nobel took over Dansk Salt and Icelandic Salt in 1993 and is investigating further salt/soda ash acquisitions in Poland. Harris Chemical already owns Salt Union (UK) and the former Henkel plant in Duisburg (D), but through the forthcoming acquisition of Penrice Soda Products of Australia may also acquire Brunner Mond (UK) and compete for ownership of the Polish operations.

Table 6: Chemical Industrial minerals Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.5	0.2
Danmark	0.2	0.2
Deutschland	1.2	1.3
Ellada	1.5	0.7
España	2.4	1.7
France	1.4	1.0
Ireland	0.5	0.0
Italia	0.6	0.3
Luxembourg	0.0	0.0
Nederland	0.6	0.7
Portugal	1.2	0.5
United Kingdom	0.4	0.8

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: B.M. Coope & Partners, DEBA GEIE

REGIONAL DISTRIBUTION

The underground potash and salt operations are associated with the Zechstein geological formation in northern Europe. Salt operations based on the solar evaporation of sea water are located in the more arid climes of the Mediterranean coast of EU countries.

ENVIRONMENT

In the recent past the principal environmental issue facing the EU potash industry has concerned the disposal of waste salt from processing operations, particularly into water courses or rivers such as the Rhine and the Werra. Legislation has forced producers to adopt alternative means of disposal, to increase production of saleable salt, or to close down offending operations.

The introduction of phosphates to water courses through fertiliser and detergent products also became a major issue in the 1980s and has been a contributing factor towards the reduced levels of fertiliser application in recent years.

The by-product nature of most of EU sulphur production has already been commented on and it is worth noting that sulphur recovery units are required by legislation to prevent emissions. Some sulphur control processes yield gypsum rather than sulphuric acid as by-product.

Environmental constraints have made a major impact on the EU fluorspar industry through drastic cuts in the production of chlorofluorocarbons (CFCs) in response to the requirements of the Montreal Protocol. The ozone-depleting CFCs once provided the major market for fluorspar and although certain hydro-fluorocarbons (HFCs) are already providing ozone friendly replacements in some applications, fluorspar purchases are unlikely to reach former levels.

The concern over chlorine has focused on the release of carcinogenic dioxins by chlorine based bleaching processes, including paper pulping and water treatment.

OUTLOOK

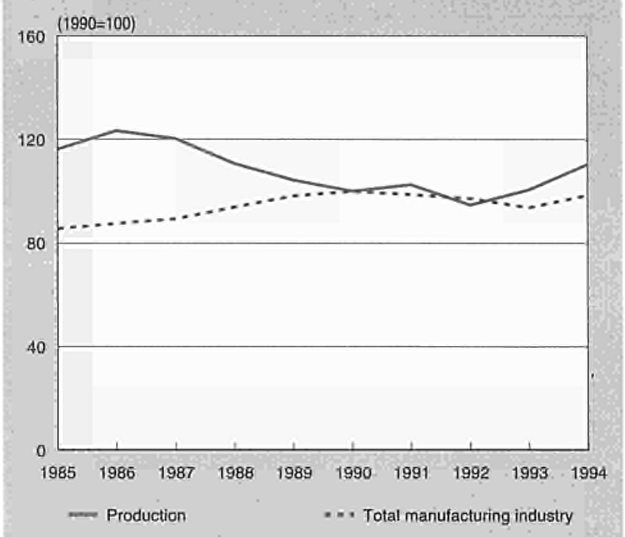
The outlook for chemical industrial minerals is somewhat brighter in the second half of the 1990s than in the first half. Prices for most products are expected to remain at higher levels and even sulphur prices may improve eventually. However, a significant overcapacity on an international scale persists for most of the main products which will only be resolved by further mergers, rationalisation, and closures on the supply side renewed demand in the former Eastern Bloc and in the agriculturally less mature areas of world.

Written by: B.M. Coope
The industry is represented at the EU level by: European Association of Mining Industries (EUROMINES). Address: Avenue de Broqueville 12, B-1150 Brussels; tel: (32 2) 775 6311; fax: (32 2) 779 0523; and Industrial Minerals Association (IMA). Address: Avenue de l'Indépendence Belge 75, B-1080 Brussels; tel: (32 2) 414 2060; fax: (32 2) 414 1188. European Lime Association (EuLA). Address: Annastrasse 67-71, D-5000 Köln; tel: (49 221) 934 67 417.

Crystallised Salt
NACE (Revision 1) 14.4

Studies and papers produced by various market observers of the crystallised salt industry confirm the concern expressed by European salt manufacturers. Salt consumption in the EU is intricate and complex, but in general, demand appears to be declining. The chlor-alkali industry is the largest end-use sector for the salt industry, and the structural changes occurring in it determine to a large extent the future prospects for the salt industry, with much of the salt being produced captively by chemical companies for their own use. Over-capacity remains the most salient feature of the European salt industry, and the increases in highway de-icing are insufficient to boost the declining demand over time in this industry.

Figure 1: Crystallised salt
Production in volume compared to EU total manufacturing industry



Source: European Committee for the Study of Salt, Eurostat

INDUSTRY PROFILE

Description of the sector

The activities of the salt industry are based on solar evaporation (sea salt), rock salt mining, solution mining (electrolytic decomposition of brine to produce chlorine and caustic soda, or production of crystallised salt by removal of the water through heat processing). Industrial evaporation is carried out either under vacuum or by a multiple effect series of evaporators or using mechanical vapour recompression - both are highly energy efficient. The description 'crystallised salt' also includes salt recovered as a by-product of potash mining. The types of crystallised salt are interchangeable in most of the major end-use sectors. Quantities of rock salt and sea salt are being used as a raw material for chlorine production while vacuum salt, like the other types of salt, is spread on the roads as de-icing agent.

Total production capacity for crystallised salt is about 40 million tonnes. Based on the 1992-94 period, production averaged 19 million tonnes. In 1994 there was a slight improvement due to an increase in demand for road salt.

Recent trends

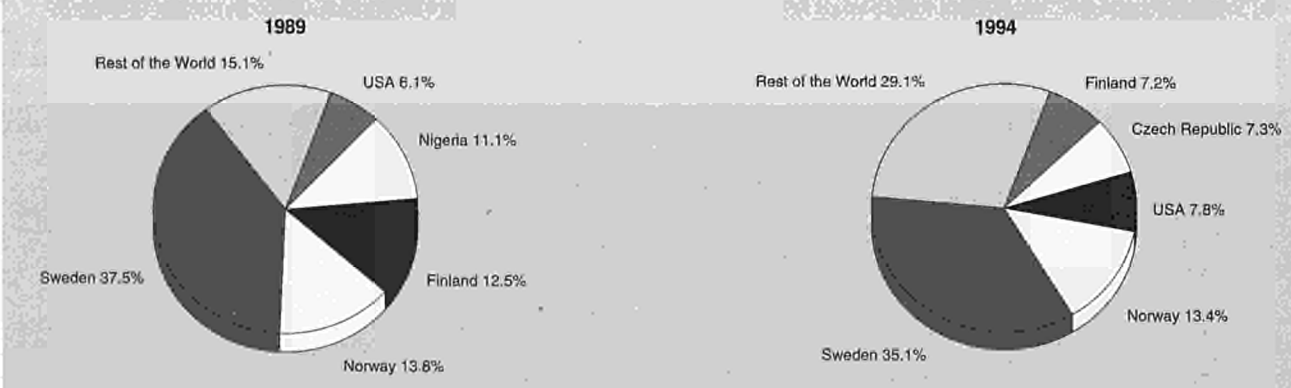
Forecasting for the 1995-97 period remains difficult because climate affects directly (sea salt harvesting) and indirectly (impact of winter clearance) output levels. It is assumed that sea salt production in 1995 exceeded the average, at least in France and Spain.

A breakdown by the main methods of production shows that, in 1994, rock salt (including by-products from potash mines) amounted to 39% of crystallised salt, sea salt 18% and vacuum salt 43%. The move from rock to vacuum salt for chlorine production has ceased, leaving a further gap in capacity. Mines and solar evaporation installations, which hitherto had not produced salt of relatively high purity, have now installed facilities to improve their quality. As no significant change in methods of producing chlorine are envisaged, the demand will presumably remain steady in the chemical industry and slightly decrease in other sectors. The future for road salt is unpredictable.

International comparison

Annual sales of salt by American manufacturers set a new record in 1994: 31.6 million tonnes, up 9% from the 1993 record output. The largest growth was again recorded in sales of de-icing salt (18.9 million tonnes). Tonnage for water con-

Figure 2: Crystallised salt
Destination of EU exports



Source: Eurostat

Table 1: Crystallised salt
Main indicators in volume

(million tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	21.4	22.4	22.1	20.4	19.4	18.3	19.6	16.4	16.9	19.0
Production	22.4	23.8	23.2	21.4	20.1	19.3	19.8	18.3	19.4	21.3
Extra-EU exports	1.5	2.0	1.7	1.4	1.3	1.5	2.0	3.2	2.8	2.8

Source: European Committee for the Study of Salt, Eurostat

Table 2: Salt
Production breakdown by sector in volume

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Rock salt and by-products	11 194	11 806	11 176	8 456	7 707	7 851	8 889	7 321	8 123	8 298
Solar salt	2 456	3 728	3 725	4 068	3 714	3 300	3 665	3 279	3 693	3 864
Vacuum salt	8 780	8 284	8 332	8 869	8 721	8 151	8 777	8 830	8 867	9 150
Brine (1)	12 976	15 290	16 080	15 814	16 256	15 653	15 169	15 338	15 183	15 762

(1) Excluding Spain and Portugal in 1985.
Source: European Committee for the Study of Salt

Table 3: Crystallised salt
Average annual growth rates in volume

(%)	1985-1990	1990-1994	1985-1994	1993-1994
Apparent consumption	-3.1	1.0	-1.3	12.7
Production	-3.0	2.5	-0.6	9.9
Extra-EU exports	-0.2	16.8	7.0	1.1
Extra-EU imports	-1.7	3.0	0.4	-2.7

Source: European Committee for the Study of Salt, Eurostat

Table 4: Crystallised salt
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	72.1	53.9	65.8	49.6	53.4	51.0	66.3	98.8	97.8	102.9
Extra-EU imports	10.9	12.5	13.4	11.1	14.0	13.0	10.5	13.7	19.0	21.2
Trade balance	61.2	41.4	52.4	38.5	39.3	38.0	55.7	85.1	78.8	81.7
Ratio exports / imports	6.63	4.31	4.92	4.48	3.80	3.92	6.29	7.21	5.14	4.8
Terms of trade index	83.8	95.7	104.0	100.8	102.9	100.0	99.3	114.1	105.1	91.4

Source: Eurostat

Figure 3: Crystallised salt
Origin of EU imports

Source: Eurostat

ditioning increased by 7.1% to 2.6 million tonnes and use in animal feed jumped to 2 million tonnes. But in the first six months of 1995, road salt sales plummeted by more than 40%. In Canada, salt sales were 11.7 million tonnes in 1994 (including salt in brine), and in Mexico, the major solar salt operation yielded almost 6 million tonnes. NAFTA manufactures huge quantities of salt.

Foreign trade

Salt is a low value, bulk commodity. A great number of countries produce salt. The comparatively high transportation cost/tonne in relation to the value/tonne of the product has an inhibiting effect on export/import business; nevertheless it does play a part in the intra-EU trade. In terms of imports, intra-EU trade represented 3.8 million tonnes in 1994. Imports from third countries amounted for 0.5 million tonnes and exports from the EU 2.8 million tonnes, showing no change in comparison with 1993.

The Nordic countries constitute the main export outlet for the European salt manufacturers but they are facing a shrinking demand, especially in Finland and Sweden.

As far as the enlargement of the EU is concerned, Austria is the only producing country. The following table summarises the situation.

MARKET FORCES

Demand

Consumption of crystallised salt within the EU-12 amounted to 17.1 million tonnes in 1994. A breakdown of consumption by end-use sectors emphasises the dependence on the chlor-alkali chemicals industry and, to a lesser extent but with greater variations, on highway clearance in winter.

The possibility of substituting one type of salt for another does not make any difference to the overall market: the one exception is where salt in brine (cutting out the crystallisation phase) is used in diaphragm cells.

Including salt in brine form, the chlor-alkalis are the basic end-use sector for the salt producing industry. One ton of salt produces 0.58 ton of chlorine and 0.63 ton of caustic soda when an electric current is passed through a saline solution. Irrespective of the ratio of chlorine to caustic soda produced, the imbalance in demand for both materials has a detrimental effect on supply. Reflecting the general upswing in the European economy, chlorine production rose to 9.1 million tonnes in 1994, nevertheless remaining lower than the 1990 level (9.4 million tonnes). The production methods of chlorine in Europe are:

- diaphragm technology 25%
- mercury cells 64%
- membrane process 11%

They require crystallised salt for 75% of the chlorine production. The sales of crystallised salt in the EU amounted to 8.4 million tonnes for this end-use sector.

'Miscellaneous industries' include animal feed industries and water softening. As regards the latter, 0.9 to 1.0 million tonnes seems to be a reliable estimate. A recent literature study on domestic water softening carried out by TNO has thrown some light on the advantages of ion exchangers for water softening:

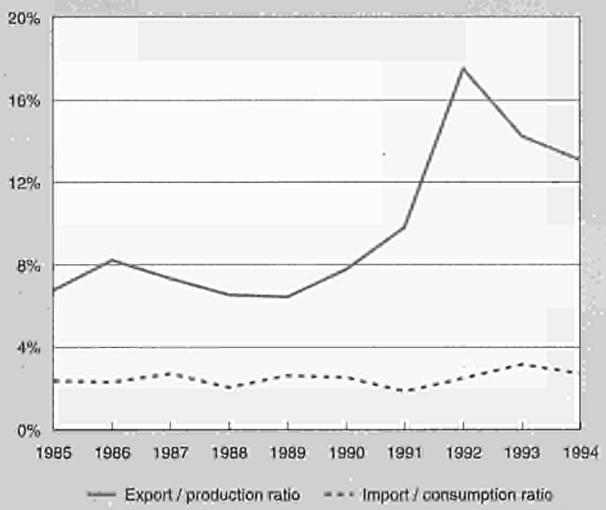
- they prevent scaling in the pipes and heating appliances,
- dish and fabric washing needs less energy and detergent.

Further comments on environmental aspects are made in the environment-related section. High quality water is also essential for certain industries and for successful animal production systems.

For thousands of years it has been known that domestic and wild animals need salt just as man does. Salt is unique in that animals have a much greater appetite for the sodium and chloride in salt than for other minerals. Salt supplementation is a critical part of any nutritionally balanced diet for animals. In addition, salt can be used to ensure adequate intake of less palatable nutrients. Salt can be provided to animals in many ways: loose salt or salt blocks. The latter can be obtained with or without additives. Manufacturers add the following trace minerals: iron, copper, zinc, manganese, selenium and iodine.

Eliminating iodine deficiency disorders (IDD) remains an issue. They continue to be a significant public health problem in many European countries. Universal salt iodisation (fortification of all salt for human and animal consumption) has been endorsed in numerous international bodies (WHO, UNICEF, ICCIDD, World Bank, etc.). Germany is the unique Member State where the food industries are allowed to use iodised salt. In most of the Member States, only discretionary salt is supplemented with iodine (and fluorine) and the corresponding penetration rate varies widely (99% in Austria, 60% in Germany, 50% in France, 10% in Belgium). Food grade salt sold in the EU amounted to 2.1 million tonnes in 1994. It is assumed that less than 0.3 million tonnes is supplemented with iodine.

Figure 4: Crystallised salt
Trade intensities



Source: European Committee for the Study of Salt, Eurostat

Road salt is considered everywhere as an efficient de-icer because it is readily available, easy to store, handle and spread, and is less expensive than abrasives and chemicals which are sometimes used as substitutes. Preventive de-icing with wet salt or salt slurries (dry salt and brine) is developing. This trend explains how it is possible to minimise salt usage without negatively affecting driving conditions. The consumption of road salt depends on climate conditions, the amount of precipitation, and the length of the winter period. Figures available for the recent past showing an increase in demand are in line with the weather conditions, and the resulting operational requirements.

The detailed pattern of salt consumption is complex but the distribution by main applications for the European market is a good indication of the respective part played by various end-uses including the petroleum, textile, tanning, metal (aluminium), and pharmaceutical industries.

Supply and competition

Capacities of plants producing crystallised salt far exceed declining market requirements. Quite apart from ups and downs in the market curves, there are some fundamental changes occurring. It is possible that the environmental 'dangers' of chlorine in pulp bleaching have been overplayed in Northern Europe, but the tide will not be turned. Once a pulp mill switches bleaching technologies, the decline in chlorine demand is certain in this important end use industry for salt. The use of brine and/or wet salt for highways de-icing reduces overall salt consumption in winter maintenance. This brine and wet salt is well suited for preventive action against ice, frost and freezing rain, and immediately effective. Under such circumstances the endemic over-capacity remains the most salient feature of the salt industry. It is likely that the 'fortunes' of the salt producing companies will become more closely linked with those of the chlor-alkali manufacturing industry.

Generally speaking, salt is sold in bulk when marketed for non-food uses. Market conditions differ according to end-use sectors. For the chemical sector, the supply is based on short and simple channels, especially where salt production is a captive process. Conversely, the distribution of special salts for dish washing and water softening (pressed or pelletised, packaged products) is rather sophisticated, as is the production of cooking salt supplemented with iodine and fluorine. This type of white, high-quality salt is facing the competition from low price and low grade salt from abroad, and the so-called Traditional Bay salt. The point is that some of these products are not precisely meeting the requirements of the Codex Alimentarius Standard for food grade salt.

INDUSTRY STRUCTURE

Companies

Producers involved in the salt business can be split into three categories:

- salt business units within large chemical groups, or their subsidiaries producing salt and other minerals (like potash);
- companies specialising in salt and salt specialities;
- small firms.

Irrespective of their size, some of them are still state-owned companies but the prevailing trend is to privatise them, provided that their assets make the deal attractive for investors.

Strategies

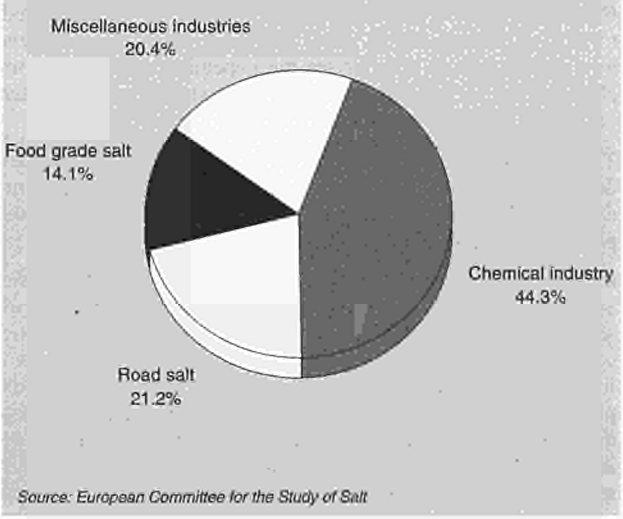
Solvay S.A. is one of the largest salt producing groups in Europe. In Germany, investment measures have been decided for the modernisation of the infrastructure. They relate to:

- surface processing of rock salt,
- modernisation of the packaging and palletising units,
- extension of the stockpiling facilities,
- optimisation of logistics for the whole range of products.

The German companies Kali und Salz A.G. and Mitteldeutsche Kali A.G. decided in 1992 that it would be advisable to merge their assets in a joint venture with the objective to cut down uneconomical potash and rock salt capacities. This drastic reduction in salt mining will be compensated in 1996 by an evaporated salt facility with a limited capacity (250 000 tonnes/year).

Another example of rationalisation in line with a continuously shrinking demand and increasing competition has been the establishment of Südsalz GmbH by Bayerische Berg- Hütten- u Salzwerke and Südwestdeutsche Salzwerke to constitute a joint venture from 1 January 1995.

Figure 5: Crystallised salt
EU sales to end markets, 1994



Source: European Committee for the Study of Salt

ENVIRONMENT

'The private salt industry is the main actor in salt iodisation ', the World Bank explains in a new white paper, 'Shifting the bell curve with a grain of salt'. Among the four resource organisations listed under 'Help is on the way' is the Salt Institute. 'What you should know about iodised salt ' was issued in 1995. In this leaflet, co-sponsored with the European Salt Producers' Association, UNICEF supports the WHO recommendation to eliminate iodine deficiency disorders (IDD) safely through universal salt iodisation. As with all preventive public health measures, the decision to ensure universal salt iodisation will be made by weighing the potential risk of excess intake for the few (in certain susceptible individuals, Hashimoto thyroiditis has been observed after very high iodine intake) against the well-documented risk of mental and physiological impairment for the many (1572 million people at risk of IDD in the world, including 141 million in Europe). As an iodine and fluorine carrier, salt participates in the management of deficiencies with high social cost.

Another significant role for salt is in the softening of hard water via ion exchange. A risk assessment made within the framework of a recent study on the effect of an increase in market penetration of this type of equipment shows that the increased concentration of NaCl in sewers will have no detrimental effect on aquatic life and drinking water production. In fact the benefits of ion exchange-treated water are well established. They include reduced discharge of detergents into the environment, and slightly reduced energy consumption.

Despite the continuing efforts developed by the chemical industry to reduce the environmental impact of chlorine, there is an ever increasing need for accurate information. Euro Chlor has invited an independent research institution to continue the analysis of "Chlorine flow in Europe". The environmental pressures are beginning to abate. A chlorine phase-out seems no longer to be a top priority. And, further to several scientific studies, the PVC issue is also addressed in a rather positive way. The PVC industry has successfully weathered several attacks thanks to the rapid expansion of major recycling schemes and waste disposal programmes.

OUTLOOK

It is very difficult to forecast the future for the salt industry because the evolution of certain end-use sectors is unpredictable. Some consultants assume that salt has no future in Europe, given its sluggish demand, and its dependence on weather. If demand restores the industry to health, it is probable that installed capacity could be better operated. Even in the case of growth, which is currently unforseeable in Western Europe, over-capacity will remain a matter of concern.

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Physical industrial minerals

NACE (Revision 1) 14.5

The EU is the world's major consuming region for physical industrial minerals and currently produces around 85% of its own requirements. Major EU producers of these minerals are recognised as world leaders in their fields and are actively involved in operating in other countries. This leadership has been gained through technical expertise and a close understanding of its consuming industries' requirements.

INDUSTRY PROFILE

Description of the sector

The physical industrial minerals are defined as those industrial minerals used predominantly for their physical characteristics rather than for their chemistry. They are used in such fields as ceramics, refractors, and abrasives; as filler/ extender pigments for incorporation into paper, paints and plastics; and as filters, absorbents, and insulating materials. The range of products includes clays such as kaolin, kaolinitic clays, bentonite, and sepiolite as well as a variety of minerals such as diatomite, feldspar, magnesite & magnesia, perlite, pumice, and talc. The EU is a leading producer and exporter of these products.

Recent trends

EU production and consumption of the physical industrial minerals displayed excellent growth during the 1980s followed by a fall in 1990, 1991, and 1992. A strong growth occurred in 1993 and 1994, and to a lesser extent in 1995. Extra-EU exports have increased during the period under review, although the trade balance has remained consistently negative during this time.

International comparison

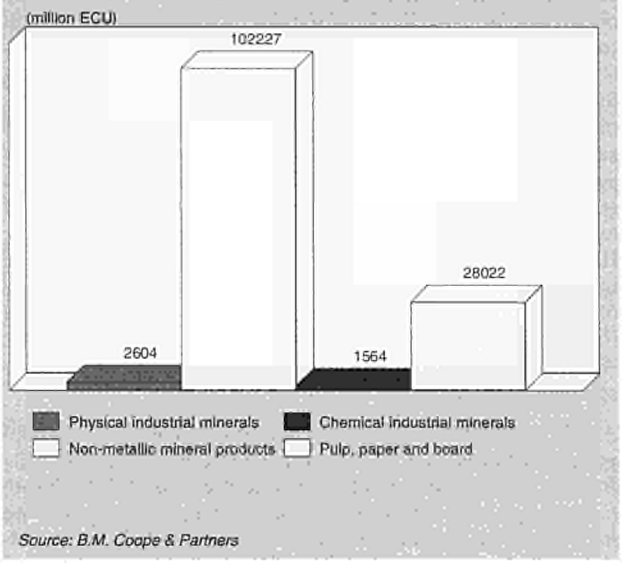
The EU production of physical industrial minerals was 54% higher than the USA, and consumption was 2.7 times greater in 1994 but the USA is a much larger exporter of these minerals than the EU. Japan is only a minor producer of physical minerals and thus its consumption (which was less than 29% of that for the EU in 1994, is heavily based on imported raw materials). The EU displayed stronger growth in consumption than either the USA or Japan over the ten-year period. Indeed the USA appeared to show a clear decline in value terms between 1983 and 1992, although this has more to do with exchange rate movements than any decline in volume terms.

Foreign trade

The EU is net importer of physical industrial minerals. Nevertheless, during the 1983-1992 period exports grew by nearly 90% compared to a growth in imports of 35%, thus lowering import dependence. The major EU export items are the industrial clays -- kaolin, ball clay, bentonite, etc. -- which made up over 60% of total exports of these minerals in 1993. Ironically, industrial clays are also the major imported items in this group and indeed the value of imports almost exactly balances exports in most years. It should be noted, however, that for a number of other important EU export items such as magnesia and talc, imports actually exceed exports by a considerable margin.

Major sources of EU imports of physical industrial minerals are the USA (kaolin, other clays, diatomite, bentonite and talc), Brazil (kaolin), China (magnesia and graphite), Canada (asbestos), Turkey (bentonite, perlite, pumice), Cyprus (bentonite), Switzerland (quartz(ite)) and Norway (feldspathic minerals, quartz(ite)). The major destinations for EU exports were the EFTA countries.

Figure 1: Physical industrial minerals Production in comparison with related industries, 1994



Source: B.M. Coope & Partners

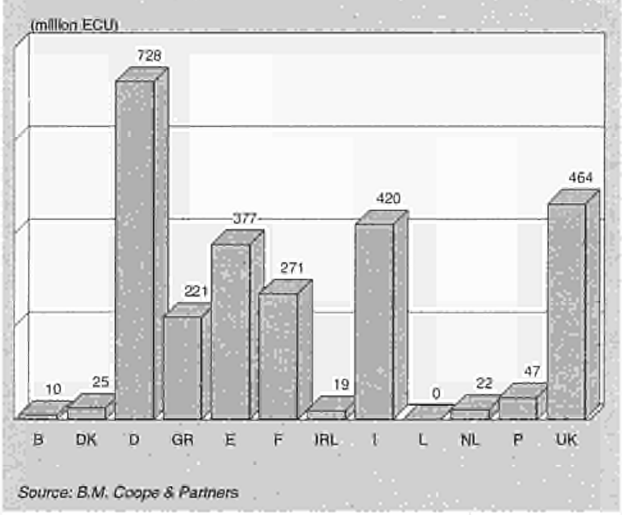
MARKET FORCES

Demand

The physical industrial minerals are consumed by a very wide range of industries, but prominent among the products using them are ceramics, refractors, glass, and abrasives; paper, paints, and polymers (plastics, rubber, sealants/adhesives, etc.); and filters, absorbents, and insulating products. Since the ceramics industry also includes building products such as bricks, tiles and pipes based on common clays the construction industry also looms large as a direct consumer, as well as an indirect consumer of these other products.

The technical requirements of the manufacturers of many of these products have become more stringent with time, but the raw material producers have tended to upgrade their products accordingly. Many producers of physical industrial minerals maintain close technical relationships with major

Figure 2: Physical industrial minerals Production by Member State, 1994



Source: B.M. Coope & Partners

Table 1: Physical industrial minerals
Main indicators in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1996 (2)	1997 (2)	1998 (2)
Apparent consumption	2 289	2 489	2 430	2 291	2 610	2 961	3 086	3 350	3 640	3 970
Production	1 993	2 195	2 109	1 965	2 355	2 604	2 681	2 890	3 120	3 380
Extra-EU exports	216.4	335.8	332.0	327.9	397.1	400.7	410.7	440.0	460.0	490.0
Trade balance	-296.1	-294.2	-321.4	-326.5	-255.0	-357.3	-404.9	-460.0	-520.0	-590.0
Employment (thousands)	24.4	22.0	21.8	20.0	18.1	17.1	N/A	N/A	N/A	N/A

(1) Eurostat estimates.
(2) Rounded DRI forecasts.
Source: B.M. Coope & Partners, Eurostat

Table 2: Physical industrial minerals
Breakdown by sector, 1994

(million ECU)	Apparent consumption	Production	Extra-EU exports
Clay and shale	291	276	10
Kaolin	448	482	170
Ceramic clays	599	599	27
Bentonite, etc	387	385	27
Asbestos	33	20	37
Diatomite	122	113	8
Feldspar, etc	347	310	3
Graphite	30	6	7
Magnesia	265	145	39
Perlite	153	23	5
Pumice	47	39	7
Quartz(ite)	79	79	19
Talc	173	108	3

Source: B.M. Coope & Partners, Eurostat

Table 3: Physical industrial minerals
Average real annual growth rates

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	-2.5	3.1	0.0	5.1
Production	-2.9	3.7	0.0	2.6
Extra-EU exports	6.0	4.2	5.2	1.5
Extra-EU imports	3.8	1.5	2.8	13.2

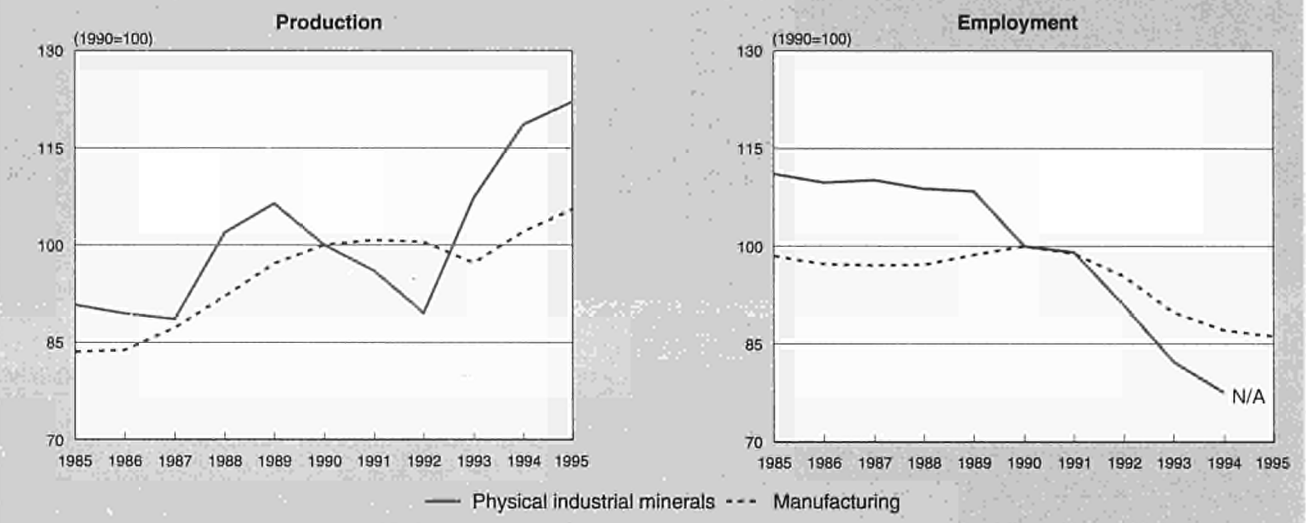
Source: B.M. Coope & Partners, Eurostat

Table 4: Physical industrial minerals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Extra-EU exports	216.4	175.5	159.1	345.4	359.1	335.8	332.0	327.9	397.1	400.7	410.7
Extra-EU imports	512.5	447.9	424.0	579.1	677.6	630.0	653.4	654.3	652.1	758.0	815.6
Trade balance	-296.1	-272.5	-264.9	-233.7	-318.4	-294.2	-321.4	-326.5	-255.0	-357.3	-404.9
Ratio exports / imports	0.4	0.4	0.4	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5

(1) Eurostat estimates.
Source: Eurostat

Figure 3: Physical industrial minerals
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: B.M. Coope & Partners, DEBA GEIE

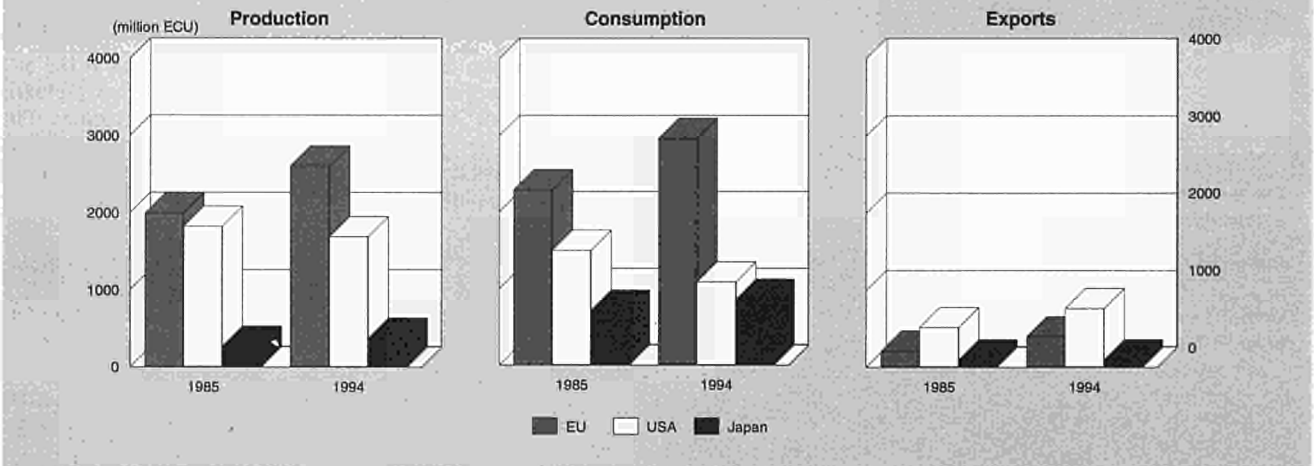
consuming companies in order to meet future requirements. Thus, many products are "speciality" rather than "commodity" minerals and long-term contracts between major producers and major consumers are common.

Supply and competition

The EU is theoretically self-sufficient for the bulk of the minerals in this group, but the level of extra-EU imports is due partly to the multiplicity of grades available and the suitability of certain grades for specific end uses, for which imported products are more suited. EU producers compare well with the foreign competition as result of either the quality of deposits or the processing expertise or a combination of both. The high technical input into many of these products is undoubtedly reflected in the USA, Canada, and the EFTA countries being major outside suppliers. It should also be noted that certain products such as graphite, mica, and clays are bought in raw form for further processing in the EU before reaching the eventual consumer. Nevertheless, the EU is clearly deficient in certain minerals such as asbestos, vermiculite and graphite, and imports the bulk of its requirements. Asbestos is no longer as vital as it used to be as a range of replacements have been developed (many of them based on indigenous EU raw materials) to overcome the health hazards associated with this mineral.

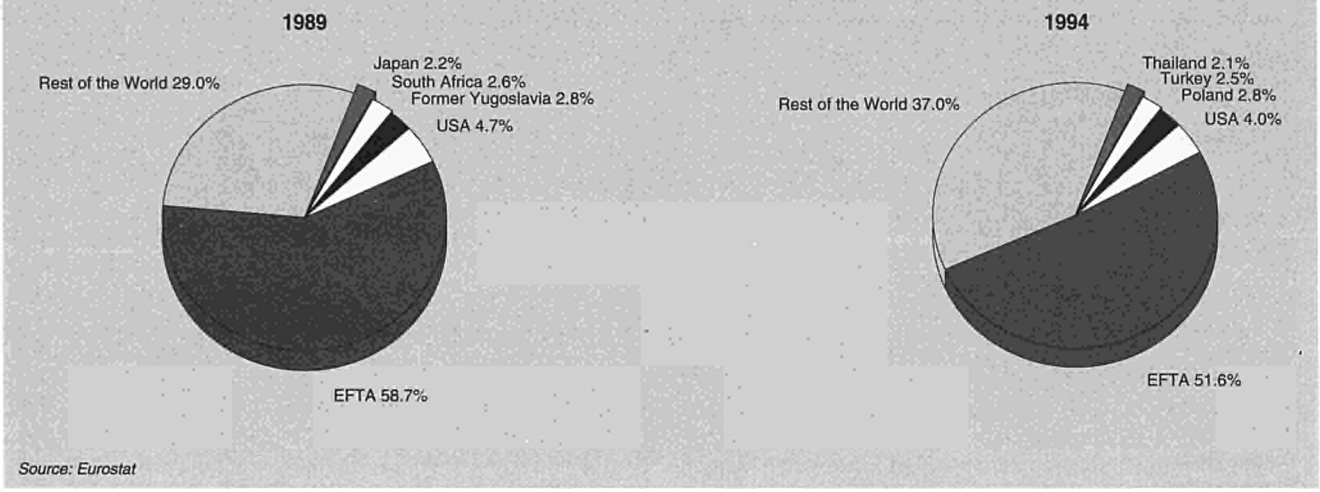
One area where EU industry is suffering from foreign competition concerns magnesite and magnesia. The EU produces a wide range of grades of magnesia from natural magnesite, or from sea water or brines for applications in refractors, construction, general chemicals, and agriculture. For most of the past decade EU magnesia producers have had to meet strong competition in the lower grade sections of the market from low-priced products from China. More recently, further competition has become evident in the higher grade sectors of the market from new low-cost production in Australia (as well as from China itself which has improved the quality of

Figure 4: Physical industrial minerals
International comparison of main indicators in current prices



Source: B.M. Coope & Partners, Eurostat

Figure 5: Physical industrial minerals
Destination of EU exports



Source: Eurostat

certain grades). During 1992 anti-dumping action was taken against China and a duty imposed on certain products. Even so, the EU magnesia industry is undergoing a process of rationalisation with producers tending to focus on more specialised grades and value-added products.

Production process

Many of the minerals in this group are improved, or their properties are enhanced, by highly sophisticated processing techniques. Kaolin, bentonite, talc, magnesia, and diatomite are all subjected to a wide range of treatments involving such processes as high intensity magnetic separation, acid or alkali treatment, high temperature processing, laser sorting, jet milling, attrition grinding, classification at micron sizes, and surface modification. Such techniques have not only improved product quality in traditional uses, but have introduced new grades to new markets and have expanded viable reserves.

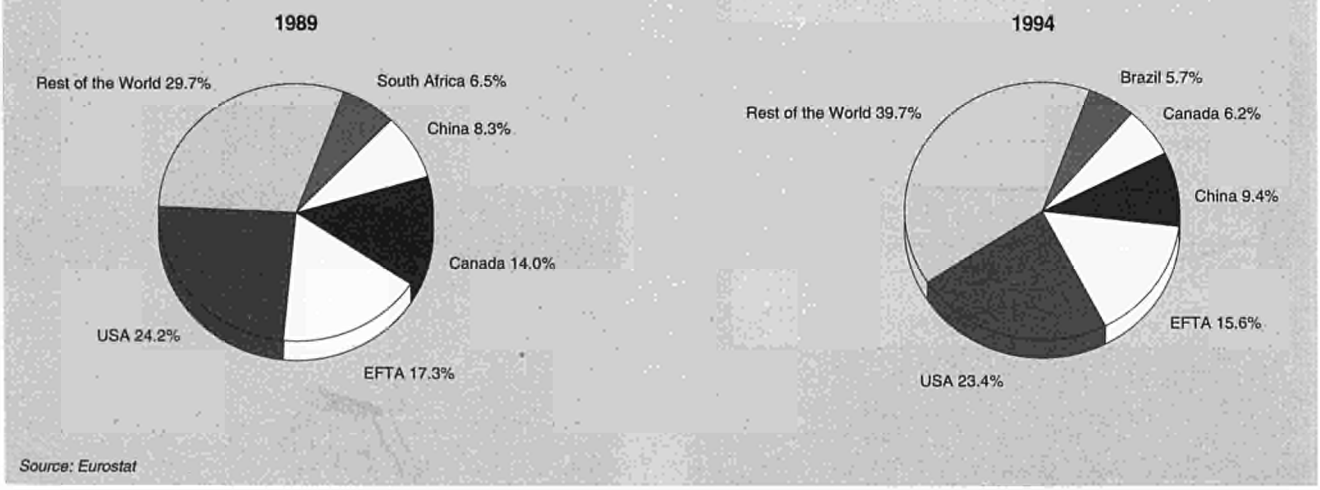
INDUSTRY STRUCTURE

Companies

Most of the companies operating in this sector tend to be specialists of industrial minerals, although some companies from the construction (e.g. Redland and CRH), petroleum (e.g. Elf-Aquitaine), and metals (e.g. RTZ) sectors are involved. In the kaolin and ceramic clays sector major enterprises include English China Clays and Watts Blake Bearne (UK), Amberger Kaolinwerke (D), AGS and Imetal (F), and Group Minerale Harwanne (CH).

Major enterprises in the bentonite and special clays sector are Süd Chemie (D), Laporte and Redland (UK), Tolsa (E), Eliopoulos (GR), and Laviosa (I). Leading companies in other minerals are CECA (F) for diatomite; Grecian Magnesite (GR) for magnesia from natural magnesite; Redland (UK), Sardamag (I), NedMag Industries (formerly Billiton Refractors -- NL), and Premier Periclase (part of CRH -- IRL) for magnesia from sea water and brines; and the RTZ subsidiary, Talc de Luzenac (F).

Figure 6: Physical industrial minerals
Origin of EU imports



Source: Eurostat

Table 5: Physical industrial minerals
The largest companies in the EU, 1994

(million ECU)	Country	Turnover	Profit	Mkt Capital	Employment (thousands)
Redland	UK	3 234	489	2 576	22
English China Clays	UK	1 363	122	1 455	9
Hepworth	UK	897	97	875	9.1
Sud Chemie	D	445	N/A	N/A	4.0
Ibstock	UK	270	18	242	3.2
CECA	F	292	9	814	0.1
London Brick / Butterly	UK	177	9	N/A	2.4
AKW	D	95	N/A	N/A	0.9
WBB	UK	111	13	N/A	1.1
Argiles et Minéraux	F	36	1	107	0.4
Talcs de Luzenac	F	220	N/A	N/A	1.2
Tolsa	E	40	N/A	N/A	0.4
Grecian Magnesite (1)	GR	30	0	19	0.6
Silver & Baryte (1)	GR	47	11	10	0.3
Radex-Heraklith	A	586	N/A	N/A	3.6
Veitsch-Radex	A	276	N/A	N/A	2.4
Finnminerals	FIN	42	5	N/A	0.2

(1) 1995 data.
Source: B.M. Coope & Partners

Strategies

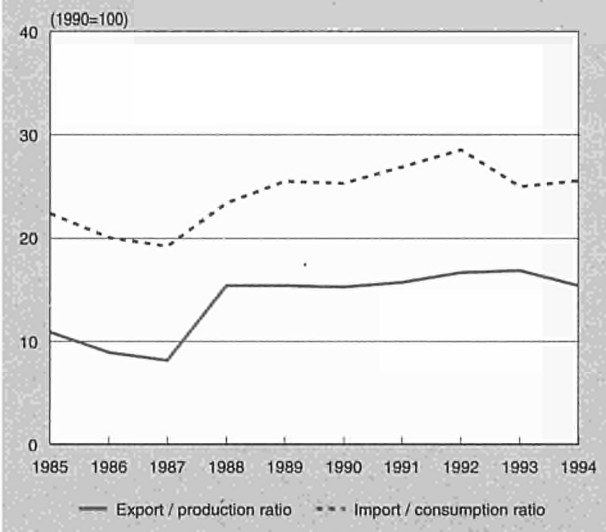
Several of the companies mentioned in the previous section operate on an international level and are recognised as world leaders in their own particular fields. English China Clays (ECC), Watts Blake Bearne (WBB), RTZ/Luzenac, Laporte, Sud-Chemie, and Imetal all have important operations in North America and other parts of the world including the Far East and Africa.

The world's largest kaolin producer, ECC of the UK, recently sold off its Construction Materials Division (as Camas plc) in order to concentrate on white minerals (kaolin and carbonates) and a developing interest in speciality chemicals (typified by its acquisition of Calgon chemicals in the USA).

Germany's main kaolin producer, Amberger Kaolinwerke (AKW), has been active on the acquisition trail first buying some of the more important kaolin operations in former East Germany (Kemmlitz and Caminau) and more recently its near neighbour in Bavaria, Eduard Kick GmbH. Meanwhile, WBB successfully avoided a take-over by Sibelco (B), which was until recently only a minority shareholder.

Other companies growing by acquisition include Talc de Luzenac (F), which increased its share of the North American talc market by taking over Montana Talc during 1994; Harwanne (CH) which added kaolin of Finistere to its existing kaolin, feldspar, quartz, and mica operations in France and Portugal; and Imetal (F), which added the synthetic graphite operations of Lonza in Switzerland to its growing portfolio of assets in the fields of andalusite, refractory and ceramic clays, and natural graphite in Europe, North America, and South Africa.

Figure 7: Physical industrial minerals
Trade intensities



Source: B.M. Coope & Partners, Eurostat

Table 6: Physical industrial minerals
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.2	0.1
Danmark	0.3	0.6
Deutschland	0.8	0.9
Ellada	11.5	11.9
España	1.7	2.0
France	0.6	0.5
Ireland	1.2	0.6
Italia	1.1	1.1
Luxembourg	0.0	0.0
Nederland	0.2	0.2
Portugal	2.2	1.4
United Kingdom	1.4	1.2

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: B.M. Coope & Partners, DEBA GEIE

REGIONAL DISTRIBUTION

Clays of a type suitable for the production of bricks and tiles are to be found in many regions of the EU, although the more specialised industrial clays are much rarer and more localised. The Cornwall and Devon region of England accounts for about two-thirds of total EU kaolin output. Other significant centres include Bavaria in Germany and Brittany in France. The main ball and ceramic clay producing districts in the EU are Westerwald in Germany, Charente in France, and Devon in the UK. The main bentonite centres are Bavaria in Germany, Milos island in Greece, Sardinia in Italy, and south-east England whilst the region around Madrid is the sepiolite capital of the world. The volcanic regions of Greece and Italy are well-known for their deposits of perlite, pumice, and pozzolana.

ENVIRONMENT

The main environmental issues concerned with quarrying physical industrial minerals are shared with those of most of the EU mining industry. The modern quarrying industry has an excellent record in overcoming potential problems of dust, noise, waste disposal, and land reclamation.

OUTLOOK

The EU will continue to be a major producing and consuming area for the physical industrial minerals and the influence of major EU producers will continue to spread well beyond Europe. Technical expertise and innovation will continue to play a major role in the development of the industry and projects in other countries - notably in Eastern Europe and the Far East - will benefit from the involvement of EU-based expertise. Within the EU itself most new developments are more likely to be extensions to existing producing areas rather than new green-field projects.

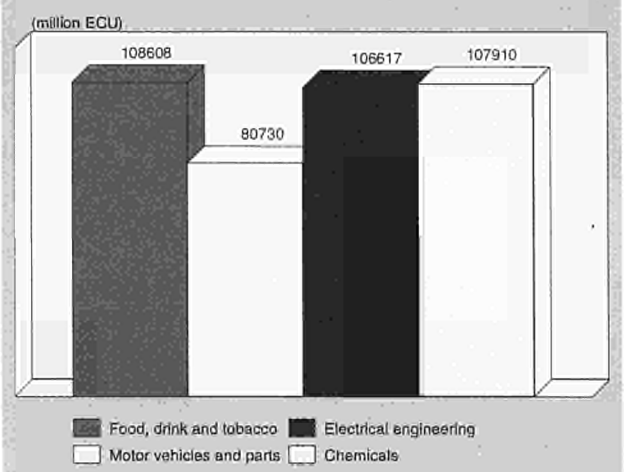
Written by: B M Coope & Partners
The industry is represented at the EU level by: International Association of European Mining Industries (EUROMINES). Address: Avenue de Broqueville 12, B - 1150 Brussels; tel: (32 2) 755 6311; fax: (32 2) 779 0523; and, Industrial Minerals Association (IMA). Address: Av. de l'Indépendance Belge 75, B - 1081 Brussels; tel: (32 2) 414 2060; fax: (32 2) 414 1188.

Overview

NACE (Revision 1) 15, 16

The EU food, drink and tobacco sector is characterised by increasingly competitive pressure, leading producers to reduce profit margins in order to preserve market share, and to pursue a concentration of the industry structure. In addition, the augmented bargaining power of major distribution chains and the proliferation of modern retail formats is providing additional pressure to producers' shrinking margins.
On the demand side, consumers reveal increasingly sophisticated needs related to the nutritional content of products, time saving in preparation, product information, animal welfare, preference for organic food, variety and convenience of purchase opportunities. These necessities will intensify in the future, originating further challenges to companies willing to develop new market niches, and pushing marginal companies out of the market.

Figure 1: Food, drink and tobacco
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

The sector is comprised of all economic activities related to the food, drink and tobacco industries. The output of the industry consists of either products addressed to final consumption or intermediate products used in further processing and industrial activities. The breakdown by sector indicates that for most categories of food and drink products, EU production exceeds consumption. Meat, dairy products and tobacco stand out as the biggest sectors in terms of production and consumption values.

The analysis of exports as a percentage of total production, however, provides a different ranking from which emerge the most export-oriented EU industries. Sugar, wine, meat and beer are the most export-oriented sectors. The food, drink and tobacco sector is a relatively high added value sector (108 608 million ECU in 1994). Predictably, Germany (23 875), the United Kingdom (21 631), France (18 169), Spain (13 910) and Italy (10 937) contribute with the highest value added to the sector. The first two countries alone represent 42% of EU total value added.

Recent trends

Average real annual growth rates for apparent consumption and production are characterised by slowing increments, a typical trend of mature markets. Both extra-EU exports and imports present an increasing trend that undergoes a sudden rise during 1993/1994 (29.9% and 17.4% respectively).

Production constantly increased over the last decade, particularly in the years 1986-91 (2.7% on average). During the same period, the overall manufacturing industry enjoyed higher average growth (3.7%), thereby confirming the slow growth nature of the food sector. However, from 1990 onwards, production in the food and drink sector has been growing faster than the total manufacturing sector.

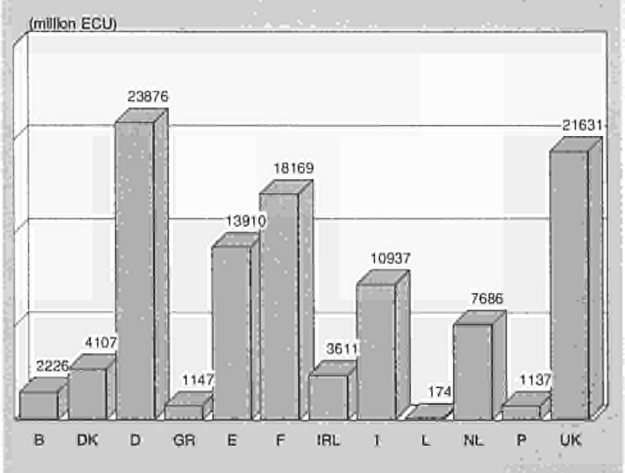
Turning to employment, while the overall manufacturing industry in the EU experienced a drop in employment levels, the decrement has been less marked for the food, drink and tobacco industry, as a consequence of the still labour-intensive nature of the sector investigated (although capital-intensive production process is on the rise), as well as its low-but-stable growth nature which reduces the risk of sudden employment hikes.

International comparison

The EU is the world's largest producer of food, drink and tobacco products, and has overtaken the USA during the past decade. In the 1985-94 period, production and consumption of food, drink and tobacco products in the EU increased by about 40% (in current prices), while the increase in exports has been somewhat lower (35%).

Japan, although expanding considerably both production and consumption (+ 84.3% and +87.4% respectively) has lessened exports (-32.3%) as a direct consequence of the considerably high exchange rates of the Japanese currency on international monetary markets of the latest years. During the same period

Figure 2: Food, drink and tobacco
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Food, drink and tobacco
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	334 080	415 375	441 566	453 059	450 470	468 420	471 583	509 337	528 850	550 380	574 310
Production	337 572	420 458	446 928	459 660	459 389	477 361	484 692	521 081	541 800	564 390	589 480
Extra-EU exports	24 672	24 977	26 058	27 908	30 768	33 359	36 982	35 965	37 430	39 050	40 660
Trade balance	3 492	5 083	5 362	6 601	8 919	8 941	13 109	11 745	12 950	14 010	15 170
Employment (thousands)	2 418	2 451	2 468	2 449	2 402	2 371	2 331	2 488	2 470	2 450	2 430

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Food, drink and tobacco
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Brewing and malting	25 314	26 572	1 373
Compound feed	28 993	29 460	1 260
Dairy products	72 335	75 277	3 851
Meat	81 014	81 223	4 792
Soft drinks	19 165	19 564	586
Sugar	16 342	16 622	1 589
Tobacco	44 898	45 062	1 062
Wine	9 662	10 537	940

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Food, drink and tobacco
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.12	1.62	2.45	1.78
Production	3.16	1.76	2.53	2.61
Extra-EU exports	0.53	5.70	2.80	29.91
Extra-EU imports	-0.75	3.93	1.30	17.45

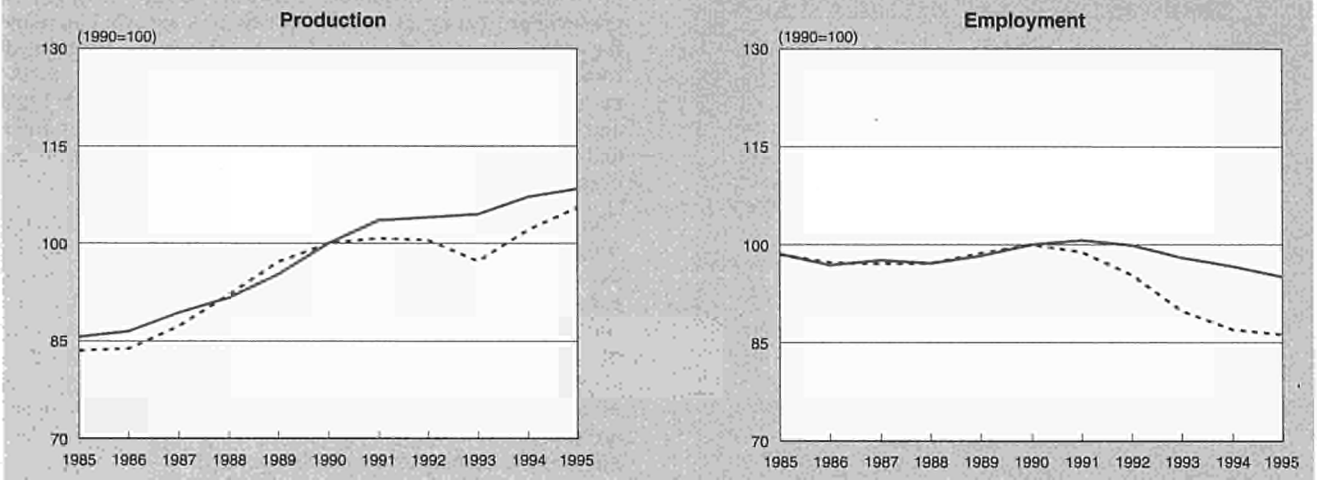
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Food, drink and tobacco
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	24 672	20 701	20 305	21 477	25 068	24 977	26 058	27 908	30 768	33 359	36 982	35 965
Extra-EU imports	21 180	17 880	17 266	19 054	20 106	19 894	20 696	21 308	21 850	24 418	23 873	24 220
Trade balance	3 492	2 821	3 039	2 423	4 962	5 083	5 362	6 601	8 919	8 941	13 109	11 745
Ratio exports / imports	1.2	1.2	1.2	1.1	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5
Terms of trade index	98.9	94.8	95.8	89.7	99.2	100.0	102.1	105.9	116.0	101.7	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15
Source: Eurostat

Figure 3: Food, drink and tobacco
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

the USA, while slightly increasing production values (+5.8%) and decreasing consumption (-6.9%), strongly increased export flows (35%), confirming the export-oriented nature of the US economy. Production figures in real terms, corrected from the effect of monetary factors, indicate a general increase of output during the 1985-94 period: 25.2% for the EU, 19.1% for the USA and 15.6% for Japan.

Foreign trade

Overall extra-EU exports of food, drink and tobacco usually exceed extra-EU imports, although with varying yearly increases. The EU food, drink and tobacco sector thus presents a satisfactory self-sufficiency level. The trade balance has remained positive throughout the decade 1985-95, even taking into account significant volatility of trade flows that alternate periods of relevant increments to more modest ones.

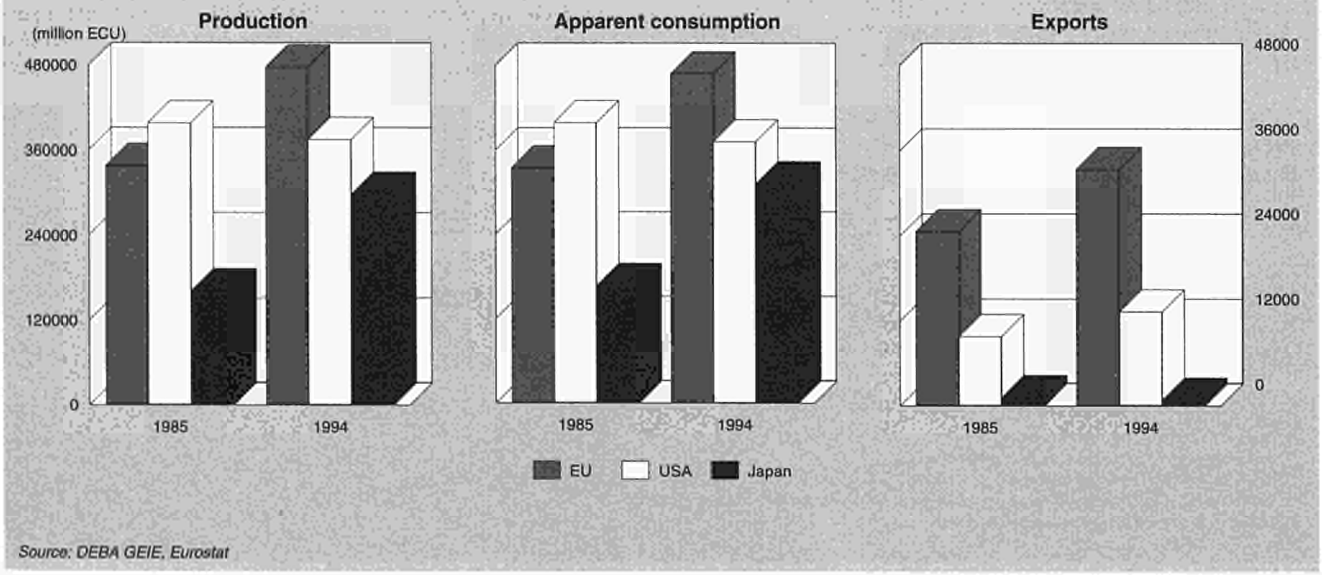
The most important destinations of extra-EU exports in 1994 were the EFTA countries (14.1%), followed by the USA (12.1%), Russia (7.4%) and Japan (6.5%). In comparison with 1989, although presenting some variations as a percentage of total EU export flows, major destinations have remained basically unchanged with the exception of Saudi Arabia whose place has been taken by Russia.

The major sources of extra-EU imports in 1994 were, once again the EFTA countries (11.5%), followed by Brazil (11.1%), USA (10.6%) and Argentina (6.9%). The shares of the most important countries of origin for extra-EU imports have remained practically unchanged since 1989.

During 1985-94, the export intensity rate has fluctuated between 6% and 7%, showing a clear increase since 1991 onwards. A noticeable 10.3% increment has been recorded in 1992-93.

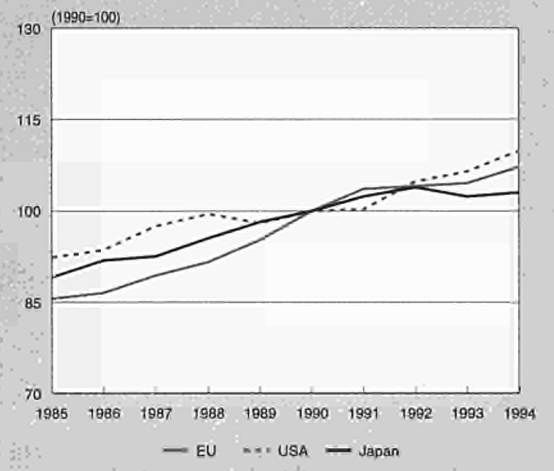
The import penetration rate confirms the good self-sufficiency level of the EU food, drink and tobacco industry. The low level of import penetration can be partly attributed to greater convenience of purchasing intra-EU goods, as a result of extra-EU import trade barriers. The increasing trend of more

Figure 4: Food, drink and tobacco
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Food, drink and tobacco
International comparison of production in constant prices



Source: DEBA GEIE

recent years, on the other hand, could imply that stronger EU currencies favoured import flows even in presence of the mentioned trade barriers.

MARKET FORCES

Demand

An increasing number of social and economic factors are affecting food, drink and tobacco consumption patterns throughout the EU. These have led to diversification from the traditional consumption and purchasing models. Further difficulties in analysing the sector arise from the circumstance that, whereas consumers have developed homogeneity of lifestyles, consumption and purchasing patterns for a growing variety of goods, food remains, albeit with some exceptions (e.g. purchasing patterns of young consumers), an area of cultural specificity linked to national tradition.

Consumer spending on food currently represents a small part of their budget. This is due to two concomitant factors, namely the general increase in disposable income registered in Europe since the end of the Second World War and the non-elastic nature of demand for food. However, the recent general economic recession, with its related reduction in disposable income, has brought to surface particular consumer attention for money-for-value when shopping. This trend, which was too soon judged as temporary and linked to the looming recession, appears instead to have become structural, and has eased the success of new retail formats, such as hard discounts.

Among major social factors affecting consumers' purchase decision are the fact that eating has lost its ritual aspect (less meals reunite the whole family, introduction of fast food), consumer demand for quick and easy preparation of food and convenience eating at home - which was greatly eased by the introduction of microwave ovens, the desire for refined food and for foreign and exotic products, the search for physical and mental well-being, resulting in a trend towards light and dietary products, more diversity in the choice of food and finally the increasing importance of vegetarian, fresh and organic food.

The variety of trends mentioned above has led to greater fragmentation of demand and, correspondingly, to a higher number of market segments devoted to products that place a particular emphasis on safety, healthiness, environmental concern, animal welfare, convenience, variety, etc. In addition, more accurate information (paediatric, nutritional, aesthetic, sporting, geriatric) has further contributed to the development of more responsible consumers even though improvements are still possible with particular respect to institutional information (i.e. coming from public sources).

Supply and competition

The labour productivity index has been growing throughout the period 1985-94, with the highest positive variation during 1994 (+4%). This confirms both the relative labour-intensive nature of the sector, along with the likeliness that restructuring measures will continue to be applied.

The gross operating rate for the sector has been, on average, 8.6% in the period 1985-94 and is strictly influenced by costs In fact, the highest positive variation correspond to periods of decreasing (or slightly increasing) total costs, limited labour cost increments and high labour productivity.

In general, cost control activities (e.g. labour saving technologies, improvement of logistics and distribution channels, etc.) have become a necessity in order to preserve producers' profit margins that the highly competitive market tends to reduce. In particular, distributors are squeezing producers' margins at their advantage and have introduced own-label goods: apart from market positioning strategies, branded products can not compete with production costs of unbranded items.

Distribution activities for the food, drink and tobacco products tend to be concentrated in major chains although substantial differences persist within EU countries. For example, the countries of Northern Europe present more advanced distribution systems (characterised by the stronger incidence of chains) than those in Southern Europe.

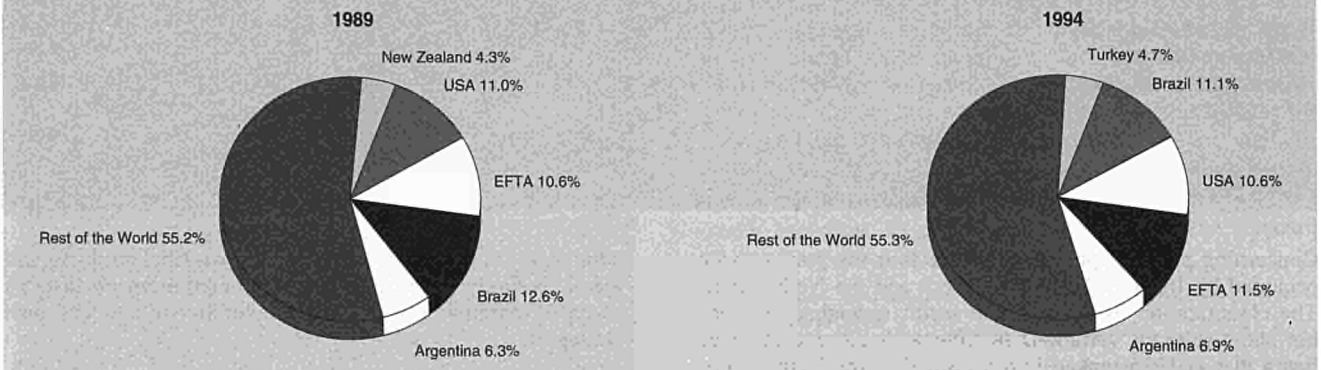
Various types of retail formats, are positioned on a different life-cycle slope according to the evolution of national distribution systems. By way of example, hypermarkets (defined as selling surface of more than 2 500 square metres) are still

Table 5: Food, drink and tobacco
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	86.8	89.2	91.5	94.3	96.9	100.0	102.9	104.1	106.6	110.9
Unit labour costs index (3)	92.2	92.7	93.7	95.3	97.7	100.0	104.8	108.2	108.0	106.0
Total unit costs index (4)	94.5	92.7	91.1	94.3	99.2	100.0	102.7	105.0	104.1	104.3
Gross operating rate (%) (5)	7.5	8.1	8.6	8.7	8.7	8.9	8.9	8.8	8.8	9.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 6: Food, drink and tobacco
Destination of EU exports



Source: Eurostat

relatively rare in countries like Spain and Italy, while they have reached maturity in Germany, the United Kingdom and France.

Production process

As in most manufacturing industries, the food, drink and tobacco sector has been affected by the general tendency to introduce labour-saving technologies and, more in general, to increase the technology content of production processes. However, the process of automatisation has not been as strong as in other manufacturing sectors. This is a consequence of the fact that technology for food, drink and tobacco processing is relatively unsophisticated, and labour still accounts for a large share of the production process input. As a proof, applications for the ISO 9000 certification from the food sector are still quite rare, albeit growing. Finally, the production process has been heavily influenced by EU legislation concerning hygiene and safety standards, something which has spurred additional process innovation.

INDUSTRY STRUCTURE

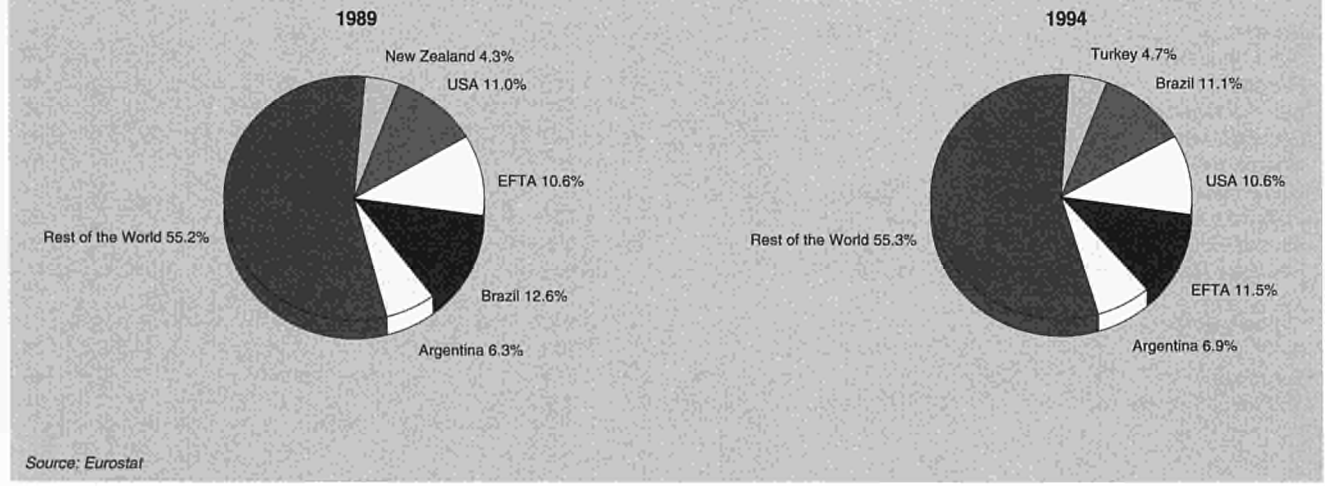
Companies

The EU food, drink and tobacco industry is still very fragmented. In fact, the incidence of smaller sized companies is still very high (92.4%), while large companies (100 employees or more) contribute to most of the sector's turnover (nearly 70%).

In the ranking of the 15 biggest EU companies, nine are British (not considering the Anglo-Dutch Unilever). The United Kingdom can boast about it's companies since it has one of the most developed food, drink and tobacco sectors, along with a very advanced distribution system.

In 1994, the three leading food, drink and tobacco firms in the EU were Unilever (NL/UK, turnover 38 299 million ECU), B.A.T. Industries (UK, 15 062 million ECU) and Hanson (UK, 14 069 million ECU). Nestlé, not ranked as an EU company because it is of Swiss origin, is the largest player in the EU food, drink and tobacco sector.

Figure 7: Food, drink and tobacco
Origin of EU imports



Source: Eurostat

Table 6: Food, drink and tobacco
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	256 063	92.4	30.1	14.7
20-99 employees	16 545	6.0	18.1	15.8
100 or more employees	4 588	1.7	51.8	69.4

(1) Estimates for EUR15.
Source: Eurostat Enterprises in Europe

Concerning product specialisation, the four top positions are occupied by Ireland, Denmark, Greece and the Netherlands. The classification by country and sector specialisation does not show relevant variations in time with the exception of Spain that in 1985 ranked fourth instead of the Netherlands. In most cases these countries are not major participants in the EU food, drink and tobacco industries.

Strategies

During 1995 the sector underwent a significant number of mergers and acquisitions activity with a total of 211 operations in the food, drink and tobacco industries and 57 in distribution. Most active countries have been the United Kingdom, France and at some distance Germany, the Netherlands and Spain. Industrial sectors that have been most affected by M&A operations were dairy products, meat, industrial baking and brewing and malting. All major multinational groups such as Danone, Nestlé and Unilever have been main bidders.

As most mature markets, the food, drink and tobacco sector is facing sharp competitive pressure and progressive market concentration. In fact, even if great fragmentation persists in most EU countries, size - and the corresponding economic weight - of companies is becoming a crucial factor in order to balance the increasing bargaining power of retailers and to achieve the minimal "critical mass" in terms of production volumes. .

The access to retailers' shelf-space is becoming increasingly expensive thus reducing producers' profit margins through various forms of allowances to retailers. Such allowances consist of "entrance fees", needed to be on the right point of sale, or promotion costs not shared with the distributor. Smaller companies often produce distributor's own label products, and are increasingly vulnerable to distributor requirements in terms of profit margins, logistics and adaptability to retailers' own strategies.

Multinationals and market leaders, on the other hand, are capitalising on their portfolio of brands, associating supply with higher quality standards. Furthermore, thanks to considerable R&D expenditure product innovations are constantly introduced, which create new high value added market segments.

Market leaders can still balance distributors' increasing economic weight since consumers still attribute importance to the presence of specific brands in non-discount retail outlets. In consumer perceptions, in fact, branded products reveal the general price level of the p.o.s. (point of sale).

To smooth relations with distributors, bigger companies tend to introduce non-conflict forms of approach to distributors (i.e. category management techniques). Given the slow market growth, companies are reacting to heightened competition by means of various forms of cost-cutting strategies although the emergence of new consumer needs is making it extremely expensive to keep track of increasingly sophisticated exigencies (i.e. time-saving preparation, exotic food, etc.).

Besides eliminating actual or potential areas of internal inefficiency, bigger companies, especially multinationals, are trying to convey to the public at large the image of the "good corporate citizen". This is why they are focusing, for example, on proactive environmental management systems, natural resource saving and waste control techniques. They are doing

Table 7: Food, drink and tobacco
The 15 largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Unilever	NL-GBR	38 299	2 012	304
B.A.T. Industries	GBR	15 062	1 555	173
Hanson	GBR	14 069	1 383	74
Ferruzzi Finanziaria	I	11 955	-528	39
Groupe Danone	F	11 679	536	68
Montedison	I	10 723	-183	32
Grand Metropolitan	GBR	9 054	584	64
Eridania Beghin-Say	F	7 721	184	22
Associated British Foods	GBR	5 859	400	50
Hillsdown Holdings	GBR	5 499	131	40
Tate & Lyle	GBR	5 289	222	15
Cadbury Schweppes	GBR	5 199	347	41
Bass	GBR	5 103	453	76
Tomkins	GBR	4 874	272	46
Société au Bon Marché	F	4 827	193	21

Source: DABLE

Table 8: Food, drink and tobacco
Mergers and acquisitions in the food and drink industry in the EU, 1995

(for bidder country)	Food and drink industry	Distribution industry (1)
Belgique/België	9	0
Danmark	11	3
Deutschland	23	10
Ellada	2	1
España	18	9
France	42	4
Ireland	3	3
Italia	12	3
Nederland	22	4
Österreich	3	2
Portugal	2	1
Suomi/Finland	1	1
Sverige	6	1
United Kingdom	49	14
Nederland-United Kingdom	8	1

(1) Distribution only related to the food and drink industry.
Source: Nomisma

this in order to anticipate, when possible, law provisions that are becoming stricter and stricter at the EU level.

ENVIRONMENT

In general, the food, drink and tobacco industry has a relatively low environmental impact compared to other manufacturing sectors. Some processing activities, though, may involve environmental damage. This is the case, for example, of the effluent pollution control of the olive oil industry or waste coming from abattoirs and meat processing factories.

One of the major issues for the industry is undoubtedly related to packaging waste control and recycling problems. The EU environmental policy encourages the development of eco-compatible technologies for the preservation of natural resources; the development and use of packaging having a reduced impact on waste quantity or pollution risks; the use of specific techniques to eliminate dangerous substances from recycled material; and the use of waste as an alternative energy source.

The food, drink and tobacco industry, as other manufacturing sectors, is ready to respond to environmental requirements, by devoting less time to implementing "command and control" regulations and more time to devising appropriate innovations to meet - and when possible - beat the desired targets. Such a proactive approach will result in lower costs, more numerous innovations and flexible processes.

Recycling of food packaging (i.e. paper, aluminium, glass) has become a primary target in many European countries. In Germany, recent legislation introduced the responsibility for whoever introduces packaging on the market to take care of its collection and disposal. The Dutch government has introduced specific limits to packaging production which will be attained in progressive phases.

Turning to health considerations, great attention is devoted to the use of colourings, sweetening and additives that may result hazardous to public health and to hygiene standards during production processes.

Table 9: Food, drink and tobacco
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.01	0.99
Danmark	2.26	1.97
Deutschland	0.71	0.71
Ellada	1.32	1.83
España	1.34	1.41
France	0.96	1.01
Ireland	2.58	2.18
Italia	0.84	0.82
Luxembourg	0.47	0.46
Nederland	1.57	1.56
Portugal	1.19	1.24
United Kingdom	1.16	1.12

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

REGULATIONS

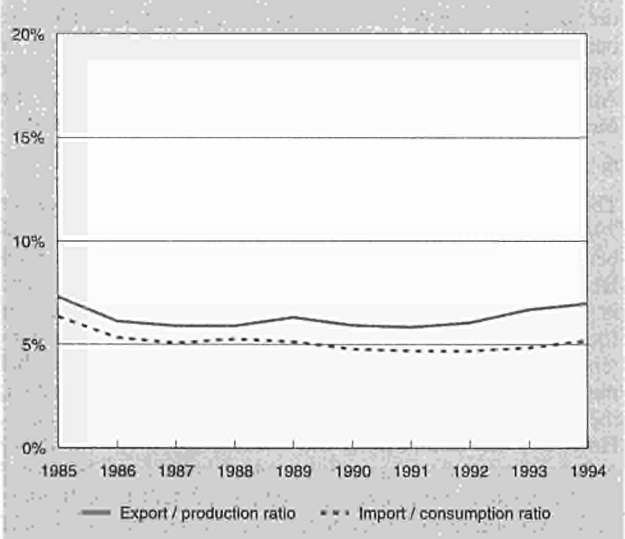
The elimination of obstacles to the free movement of goods, the protection of the consumer as well as the environment and the public health are among the main concerns of the EU legislation. The EU legislative framework is based on horizontal measures dealing with general issues (such as the internal market, quality policy and consumer policy) as well as on vertical norms, deriving from the agricultural policy or the agrimonetary system. Sectoral provisions stem from Uruguay Round agreements as well.

1. Management of the Internal Market

In order to prevent the emergence of new trade barriers within the internal market, Directive 79/112 on food labelling, Directive 93/43 on food hygiene and Reg. (EEC) 315/93 lay down specific procedures by which Member States are required to notify draft legislation to the Commission. The Commission ensures that the principle of the free movement of goods is being effectively applied.

The Commission decided to block the adoption of several technical measures at a national level, in order to allow time for the appropriate provisions to be adopted at the Community level. However, as part of the ongoing process of removing obstacles to free trade within the EU, a considerable number of new measures aimed at harmonising technical legislation have been introduced during 1995:

Figure 8: Food, drink and tobacco
Trade intensities



Source: DEBA GEIE, Eurostat

2. Colourings, Sweetenings and Additives

With respect to foodstuff and health protection, Directives 94/35, 94/36 and 95/2 are the latest pieces of legislation laying down general rules on the use of colourings, sweetenings and additives in foodstuff. The implementation of these Directives will remove trade barriers within the internal market resulting from different national rules concerning the use of additives, which constitute a significant proportion of the complaints received by the Commission relating to the free movements of goods. Directive 94/34 allows Member States, under specific conditions, to maintain their legislation on the prohibition of use of specific additives in traditional products, however.

3. Pesticides

In 1991 the Council adopted Directive (EEC) 91/414, which contains the basic rules under which pesticides can circulate in the EU. A number of provisions were adopted in 1994 to make the regime fully operational. In particular, the Council adopted Directive 94/43 establishing the principles to be applied by Member States in authorising plant protection products.

During 1995, the programme for the control of pesticides residues in agricultural products (Directives 94/29 and 94/30) was developed further, through the adoption by the Council of two more measures (Directives 95/38 and 95/39) establishing maximum pesticide residue levels (MRLs) for 13 widely used pesticides that may leave residues in agricultural products, seven of which had not been previously covered by EU legislation. A maximum period of four years is envisaged to harmonise the data requirements for acceptance of active substances. During this period, maximum levels for some particular pesticide will remain unharmonised.

4. Packaging and Packaging Waste

Significant modifications have been introduced in technical regulation about packaging processes. Directive 94/62, (which follows Directives 91/156 and 91/689) applies to all packaging and packaging waste. The Directive sets targets for the recovery and minimisation of final disposal for all packaging waste to be achieved no later than 10 years from the date of implementation of the directive in national law. By encouraging the re-use of packaging and the recovering of packaging waste, the Directive aims at minimising the environmental impact. Recently, the Commission adopted Directive 95/3, amending Directive 90/128 relating to plastic materials and articles intended to come into contact with foodstuff.

5. Food Hygiene

Following the indications contained in the Molitor report on the simplification of EU legislation, food hygiene rules are being simplified. A recent proposal is calling for one set of simple, harmonised rules to be introduced using the Codex Alimentarius standards, and for monitoring methods by the Member States to be harmonised by a body of inspectors.

6. Labelling

The Commission introduced important changes to Directive 79/112 on the approximation of national laws relating to labelling and presentation of foodstuff. With respect to food labelling, a relevant piece of legislation recently introduced is "Quantity Ingredient Declaration" (QUID), which requires food manufacturers to indicate on packaging the relative contents of the product (as for pre-packaged foodstuff, the label must include several items, such as the name of the product, the list of ingredients, the net quantity and the expiry date). However, the Commission did not ask for the compulsory indication of certain ingredients which would not be useful for the consumer (i.e. exact percentage of malt in malt whiskies). According to the Commission, that information would impose an additional burden on producers rather than a decisive part in the consumer choice. Nutritional labelling is still optional: yet, if a packaging includes nutritional information, it must be presented in accordance with certain rules.

7. Quality Policy

The new Community system for the protection of geographical indications and designations of origin for agricultural products and foodstuffs, instituted by Reg. (EEC) 2081/92 has been frequently used by Member States wishing to have their designations recognised As to the new arrangements on certificates of specific character for agricultural products and foodstuffs, the Commission has made available to those in the trade the Community symbol and endorsement which indicate products recognised as having their traditional speciality guaranteed.

8. Consumer Policy

As far as consumer policy is concerned, in 1995 the Commission presented a new consumer policy action plan (1996-1998), to face problems related with price transparency, consumer health and safety and protection of consumers' economic and legal interests in the EU.

A first result of this plan was a proposal for a Directive on product price indication, which should improve transparency in product pricing and make it easier for consumers to compare prices. Meanwhile the old system was extended by two years (Directive 95/58). According to the proposed directive, the selling price and the unit price must be unambiguous, easily identifiable and clearly legible. Most stores must introduce unit price indications by 1997, but small shops will be exempted until 2001. A very controversial point of this proposal is represented by the fact that Member States must decide for themselves how they define small shops.

9. Agricultural Policy and Agrimonetary System

During 1995, the CAP reform reached its final stage in a number of sectors (cereals, oilseeds, beef and veal, tobacco). The common market organisations (CMO) for sugar and tobacco were readjusted while amendments to the CMO in wine and in fruit and vegetables were still under discussion at the end of the year. As in 1994, traditional price proposals were rendered superfluous in many areas because of the 1992 reform which had already fixed prices in a number of key sectors.

The new agrimonetary system on the basis of Council Reg. (EEC) 3813/92 on the unit of account and the conversion rates to be applied for the purposes of the CAP, entered into force in 1993, at the same time as the Single Market was completed. The relationship between agricultural conversion rates (ACRs) and market prices in national currency depends, to a large extent, on the nature of the CMO in question. The prices of products covered by an intervention mechanism are all linked to the ACRs in the short term, although the extent of these links varies. For the other products, the relationship between the two is either very general (discernible only in the medium to long term), or non existent. A special mechanism, known as the switch-over mechanism, was applied until 1994. Using this mechanism, all conversion rates for the ECU were multiplied by a correcting factor. The abolition of the correcting factor did not have great effects during 1995.

10. Uruguay Round

The Agreement on Agriculture, although rather comprehensive and going well beyond tariffs and border measures, still represents only a partial liberalisation agreement. The quantitative cuts in support to agriculture are relatively small and spread over a number of years. Overall, a large degree of distortion in the world market of agricultural commodities will remain even after the complete implementation of the reduction commitments.

As far as imports are concerned, all agricultural tariffs are subject by ceiling rates. From July 1995, the EU replaced the variable agricultural levies and other non-tariff barriers by fixed custom duties. In addition, the Council decided to

establish concessions in the form of EU tariff quotas for certain agricultural products. This decision could reduce the preferential access to the EU market for certain agricultural products originating in Eastern Europe.

OUTLOOK

The concentration process that is affecting the food, drink and tobacco industries is likely to continue in the future, given the still high fragmented nature of the sector. At the same time, an additional effort will be required from companies to adapt to a variety of specific consumer needs and provide the corresponding product innovation. This is especially crucial if EU companies want to keep up to pace with their dynamic US counterparts.

As for demographic trends, there will be a major division of the market into two consumer macro-groups with completely different eating habits: first, the "over 45" consumers (40% of the market, affluent, quality-responsive, needing service and safety content of products); and the "below 45", particularly 18-45, (unconventional eating habits, critical consumers, looking for value-for-money, requiring the opportunity to buy anything, at any time, wherever a desire arises).

Consumer needs will be more and more oriented towards: nutritionally balanced and environmentally friendly products, efficient distribution, correct consumer information, use of the latest technologies, time saving / high service content products, variety of choice. Ecological production technologies will constantly increase their importance. It is not the case that the US and Japan are ahead of Europe on the matter and are heavily investing in such technologies.

Written by: NOMISMA

The industry is represented at the EU level by: Confederation of the Food and Drink Industries of the EEC (CIAA). Address: Rue de la Loi 74, bte 9, B-1040 Brussels; tel: (32 2) 230 8145; fax: (32 2) 230 8569.

Meat
NACE (Revision 1) 15.1

Within the EU, the meat sector has in recent years witnessed a slowdown in production while consumption has remained stable.
The trade balance has become positive only in the last few years because of growing exports, even though the annual growth rate of exports is slowing down.
The price factor, that is the possibility of putting meat on the market at competitive prices, is fundamental for the growth of the market. Consumption levels are in fact strongly affected by changes in the purchasing power of buyers.
EU meat consumption has been seriously affected by the recent "mad cow" disease uproar. The confidence of European consumers has been shattered to the point that it will take a while before the EU market recovers to its previous levels.

INDUSTRY PROFILE

Description of the sector

The animal slaughtering and meat processing industry includes all processing stages which follow animal rearing activities right up to the final market consumption stage. In particular, reference is made to slaughtering, processing, and storage of beef and veal, pork, sheep and goat meat, and poultry. Also included is the intermediate processing of products like the manufacturing of plasma and related activities and the melting of animal fats. Further details concerning animal fats are provided in the chapters on dairy products such as butter and more specifically in the chapter on fats and oils. The reference products are cuts of meat, processed meat including chilled and frozen meat, canned meat, and charcuterie. To the list must also be added pre-prepared meat-based foods.

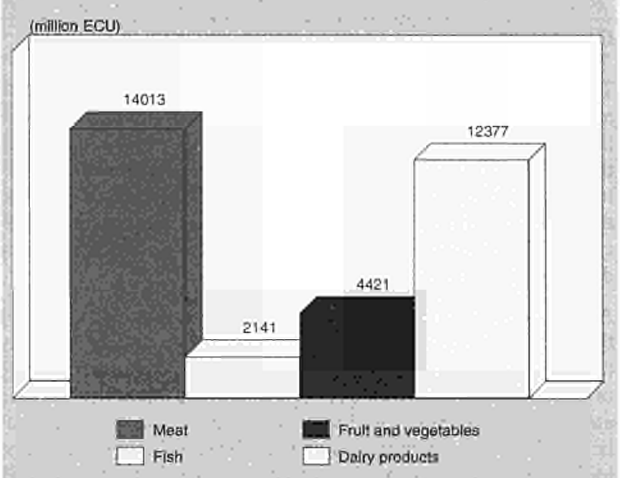
Meat represents the largest single item of expenditure with regard to the purchase of agri-foodstuffs, and on average is equal to 30% of the overall budget. Characteristically, this figure is particularly high in France, Belgium and Denmark, at about 35%, while the lowest figures are to be found in Greece, the Netherlands, and the United Kingdom at around 25%.

The meat sector is distinguished by a strong degree of specialisation and economic-production integration. In fact, close co-ordination exists between the feed industries, the livestock farmers, the slaughtering plant operators, and the distributors. Close interaction exists between the beef and milk production systems, due to the fact that most of the slaughtered animals are also milk producers. Therefore the agricultural policy measures adopted for one sector end up influencing the other one too.

The largest meat producers within the EU are France and Germany, thanks to the climatic conditions in these countries, particularly suitable for stock farming. These are followed, according to subsectors, by Denmark for pork, Italy for beef, the United Kingdom for poultry, and Spain for sheep and goat meat.

Over the years, apparent consumption of meat has progressively grown in value terms, but in the last few years the amount of increase has progressively declined. According to DEBA estimates, the figure for 1995 (81.0 billion ECU) indicates a level of consumption that is slightly higher than that for 1994 (+0.1%). Production broadly follows the same growth trend: an increase in value terms, but a progressive reduction of the annual growth rate. In fact at present prices, production increased in 1995 over the previous year (81.2 billion ECU, or +2.5%).

Figure 1: Meat
Value added in comparison with related industries, 1994



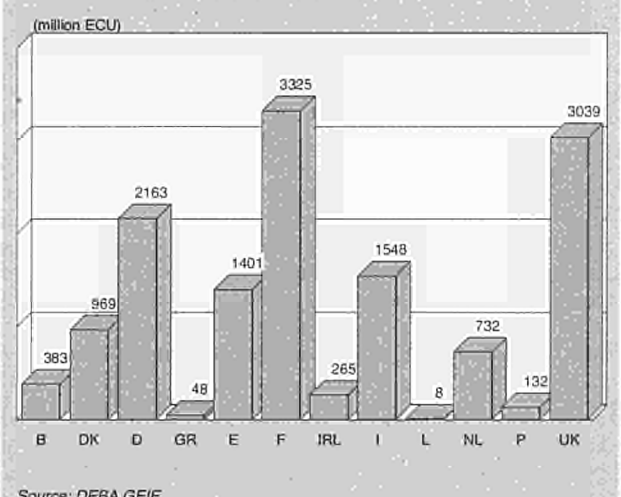
Source: DEBA GEIE

After a sharp drop at the beginning of the 1980s and in 1989-90 (-6.9%), extra-EU exports maintained an average growth rate of more than 10% for almost all of the 1990s. The good progress of exports is reflected in the trade balance, which was positive in 1994 (+209 million ECU) and was expected to be positive again in 1995 (+200 million ECU), after having been negative for almost all the 1980s.

According to DEBA estimates, there were 434 400 workers in the meat sector in 1995, against 439 100 in 1994. The reduction in employment levels can be explained by the reorganisation process underwent by the cattle slaughtering plants, which has involved many EU countries in Southern Europe.

The meat industry, in 1994, has reached a value added level of 14.0 billion ECU, which is concentrated for 60,8% in three countries: these are, in order of importance: France (3.325 billion ECU), the United Kingdom (3.038 billion ECU), and Germany (2.163 billion ECU).

Figure 2: Meat
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Meat
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	55 911	72 758	77 581	81 714	78 946	81 014	80 667	90 004	94 630	99 690	105 280
Production	54 608	72 095	77 608	81 437	79 208	81 223	81 261	90 566	95 320	100 490	106 210
Extra-EU exports	3 199	3 396	3 797	3 770	4 247	4 792	5 115	5 055	5 350	5 690	6 030
Trade balance	-1 304	-663	27	-278	262	209	594	562	690	800	930
Employment (thousands)	391.4	439.2	444.4	445.9	440.9	439.1	434.3	472.8	480.0	480.0	490.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Meat
Breakdown by major product line, 1993 (1)

(thousand tonnes carcass weight)	Total domestic use	Usable production	Total exports
Cattle and calves	7 322	7 739	1 161
Pork	14 415	15 264	820
Sheep and goats	1 373	1 152	0
Equidae	166	92	17
Poultry	6 375	6 941	727
Other meat	892	829	11
Offal	1 903	2 004	174
Total meat	32 444	34 022	2 909

(1) EUR12 including former East Germany.
Source: Eurostat

Table 3: Meat
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.27	3.08	3.74	3.68
Production	4.51	3.38	4.01	3.56
Extra-EU exports	2.90	8.03	5.15	7.27
Extra-EU imports	-0.44	2.10	0.68	9.90

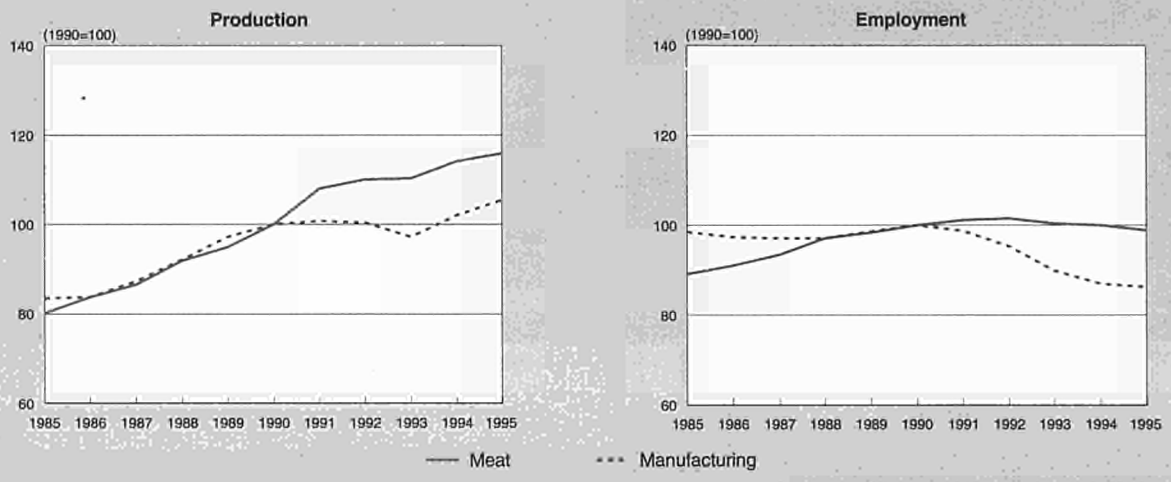
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Meat
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	3 199	3 125	3 077	3 172	3 647	3 396	3 797	3 770	4 247	4 792	5 115	5 055
Extra-EU imports	4 503	3 748	3 765	4 003	4 356	4 059	3 769	4 048	3 986	4 583	4 521	4 493
Trade balance	-1 304	-623	-688	-831	-708	-663	27	-278	262	209	594	562
Ratio exports / imports	0.71	0.83	0.82	0.79	0.84	0.84	1.01	0.93	1.07	1.05	1.13	1.13
Terms of trade index	100.2	107.0	102.1	98.6	97.0	100.0	96.7	98.5	99.2	99.7	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Meat
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

In 1993, total meat production amounted to 34 022 thousand tonnes (in carcass equivalent), mainly absorbed by the domestic market (32 444 thousand tonnes), with a small part exported (2 909 thousand tonnes).

In the EU, pork meat remains the leading product in the sector (15 264 thousand tonnes) representing about 50% of the meat produced in the EU. Beef is in second place (7 739 thousand tonnes) followed by poultry (6 941 thousand tonnes). Smaller production levels were reached by offal (2 004 thousand tonnes), sheep meat (1 152 thousand tonnes), and horsemeat (92 thousand tonnes).

Export data shows the predominance of beef (1 160 million tonnes), over pork (820 000 tonnes) and poultry (727 400 tonnes).

Recent trends

In real terms, apparent consumption of meat increased by 3.7% in the period from 1985 to 1994. The growth rate in consumption was highest in the period from 1985 to 1990 (+4.3%), slowing down in the period from 1990 to 1994 (+3.1%).

There was a clear correlation between production and consumption, the 4.5% real growth in production during the 1985-90 period was followed by a slowdown in the five-year period from 1990 to 1994 (+3.4%).

Extra-EU exports, increased in the period from 1990 to 1994 (+8%), much faster than in the period from 1985 to 1990 (+2.9%).

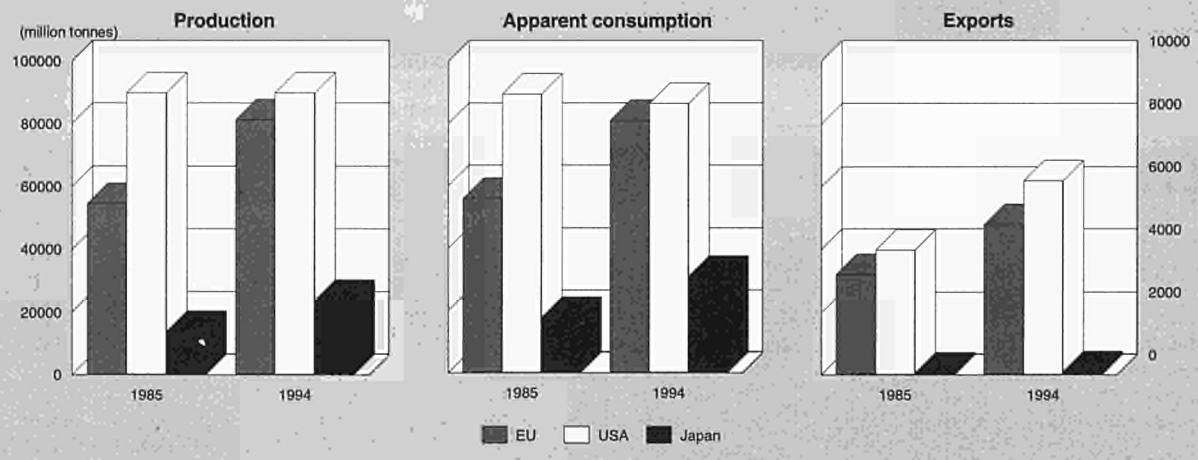
Extra-EU imports remained essentially stable (+0.7%) during the period from 1985 to 1994, but in this case too, the growth in imports was positive only in the second five-year period (+2.1%). The overall production growth during this period was accompanied by smaller workforce losses: in 1994 the drop in employment in the meat sector was 0.4% compared to a drop of 3.2% for total manufacturing.

It has been estimated, although no confirmed figures exist at the moment of writing, that the EU beef consumption has plunged by 25-30% as a consequence of the BSE scare.

International comparison

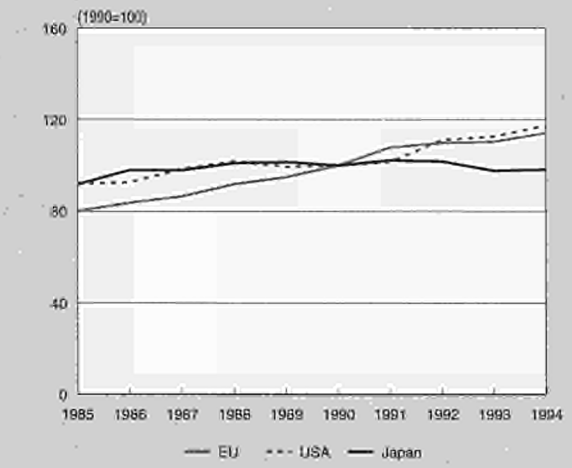
In 1994, EU production was worth 81.22 billion ECU at current prices. This makes the EU the second largest meat producer

Figure 4: Meat
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Meat
International comparison of production in constant prices



Source: DEBA GEIE

in the world after the USA (89.84 billion ECU), while Japan was in third place with 23.64 billion ECU.

Over the last ten years, both the EU and Japan have been very dynamic in terms of production: in 1985 the production of meat in the EU was only 54.61 billion ECU. The value of production has almost doubled in Japan too, going from 13.86 billion ECU to 23.63 ECU. US figures on the other hand have remained stable, going from 89.89 billion ECU to 89.84 billion ECU.

The situation for consumption is similar to that for production. In 1994, the highest apparent consumption occurred in the USA where it reached 86.31 billion ECU, even though a significant drop took place during the ten-year period. Second in importance is the EU, with 81.01 billion ECU. Consumption figures in Japan, on the other hand, have been much lower (30.89 billion ECU).

In the USA, the increase in the value of production was reflected by exports, which increased faster than in Japan or in Europe. In fact, in value terms, USA exports grew by 55.1% during the 1985-94 period, while EU exports dropped by 49.7% in value terms. The USA consequently remains the world's largest meat exporter with 6.19 billion ECU compared to EU exports of 4.79 billion ECU.

Production in the EU, at constant prices, increased faster throughout the 1980s than in the USA. However, beginning in 1991-92, this trend reversed. Especially in each year of the three-year period from 1991 to 1994 the increase of production in real terms was constantly higher in the USA than in the EU. The trend in Japan was the exact opposite; in real terms, meat production tended to fall.

Foreign trade

Extra-EU exports showed high growth rates during the 1990s reaching 4.79 billion ECU in 1994. On the other hand, imports have shown fluctuating growth rates with unexpected increases, like in 1993-94 (+15%), and equally sudden drops (-7.1% in 1990-91).

The trade balance remained negative throughout the 1980s, but starting from 1990 a progressive improvement was recorded, except for the 1991-92 period. The relationship between imports and exports expressed in current prices shows a ratio of less than 1 up to 1991, which represents a negative trade balance. Then the ratio stabilised at a value of 1 which shows that a balance has been broadly reached.

EU market outlets are quite diversified. Most meat exports still go to Japan; in 1994 this country accounted for 15.2% of exports. The relative weight of the USA and the EFTA countries has declined: in 1994 these accounted for 6% and 9% of exports respectively. Among the developing markets, Russia accounts for an interesting share (12%).

Meat imports to the EU come from a large number of countries. In 1994 the main exporting country was New Zealand with 14% of the market, then Brazil (12%), Argentina (10%), the USA (8%), and Hungary (7%). The positions of these countries in 1994 remain substantially the same as in 1989.

Finally, export intensity during the 1985-94 period remained essentially stable at an average figure of 5.5%, which increased slightly in 1994. A slight decrease was recorded only in the three-year period from 1990 to 1992.

On the contrary, the long-term trend shows a definite drop in the import penetration ratio. The ratio between imports and consumption was 5.7% in 1994 compared to 5% in 1993.

In March 1996, UK beef exports were banned by the four EU countries (Belgium, France, the Netherlands and Sweden) following increasing concern about the possible transmission of BSE to humans, openly publicised by the British government. The ban was soon extended to all the EU and the rest of the world. The ban had an adverse effect on all European beef exports, which are estimated to have fallen by 40-50% in the aftermath of the crisis.

MARKET FORCES

Demand

In 1993, in Europe, the value of the meat market exceeded 100 billion ECU. Expenditure for pork meat represented 37.9% of the total, followed by beef (32.1%), poultry (15.6%) and sheep and goat (14.4%).

In 1993, the per capita consumption of meat in the EU was 93.9 kg. The highest consumption was recorded in France (109.6 kg) and Spain (108.3 kg), while the UK had the lowest consumption (69.8 kg).

Pork remains the most widely-consumed type of meat in the European Union (41.7 kg per capita), followed by beef (21.2 kg), poultry (18.4 kg) and sheep/goat (4 kg).

Consumption of the various types of meat reflects the different eating habits within the EU, inasmuch as in some countries, animal proteins are traditionally absorbed in the form of other products such as fish, eggs, etc.

With regard to pork, the highest consumption level is in Denmark (64.5 kg), followed by Germany (57.6 kg), Spain (55.1 kg), Belgium (50.1 kg), the Netherlands (45.3 kg). At the bottom of the list are the United Kingdom (23.1 kg) and Greece (22.0 kg).

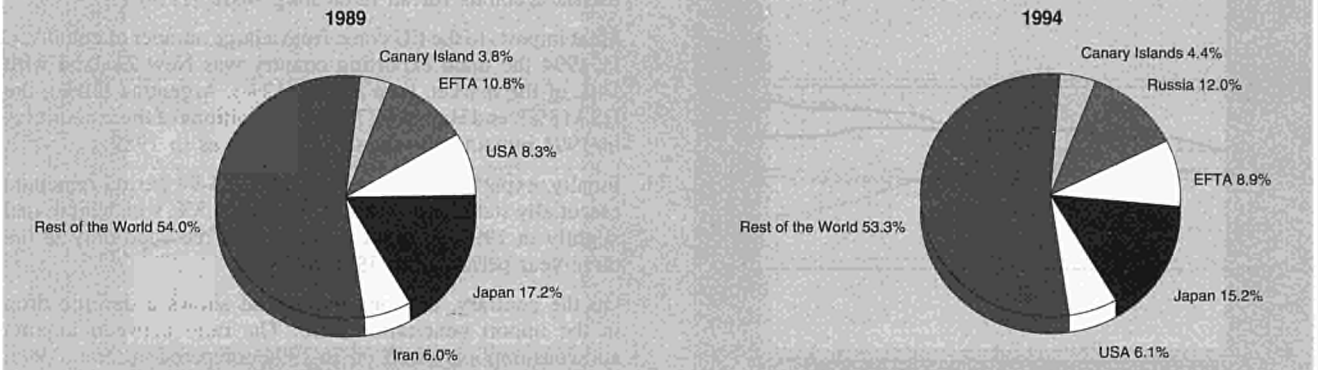
Demand for pork is directed in particular to charcuterie, eaten as snacks or a substitute for other meat products during main meals. The demand for charcuterie concerns mainly ham and salami.

The main consumer of beef is France with 28.6 kg per capita, followed by Italy (26.1 kg). Consumption levels in the central-north European countries (Germany, Benelux and Denmark) are around 20 kg. At the bottom of the per-capita consumption list are Ireland (13.8 kg) and Spain (13.3 kg).

Ireland has the highest consumption of poultry with 25.3 kg per capita, followed by Spain (23.4 kg), Portugal (21.3 kg) and the United Kingdom (19.5 kg). Denmark (13.9 kg) and Germany (12.4 kg) are at the bottom of the list.

Demand for poultry is favourably sustained by its image: white meat is favourably considered by consumers as being lighter, having a lower fat content and, another important

Figure 6: Meat
Destination of EU exports



Source: Eurostat

factor, as being cheaper. The fastest expanding subsectors are those of turkey and roast chicken, usually sold in pre-prepared portions. On some markets (such as in France), there is increasing demand for certified-label products, such as the "label rouge", guaranteeing the respect of particular poultry farming and slaughtering techniques such as, for instance, the type of feed, life spans, the percentage of various feeds used, etc.

The consumption of red meats is affected by the high price of beef compared to pork and poultry. Even countries with stronger purchasing power have tended to move away from beef. Furthermore over the years, white meat producers have invested into the modernisation of plants and realised economies of scale which allowed greater productivity and curbing of costs.

Meat consumption has been seriously affected by the recent "mad cow" disease scandal, which came to light after some scientists linked BSE with a fatal human brain disease, the Creutzfeld-Jacobs syndrome. Obviously, the beef subsector was the most harmed, but the damage was relevant for the whole meat sector, as the substitution effect was not strong enough to fully compensate for the fall in beef consumption. Given the gravity of the situation, the EU granted increased financial aid to European breeders (from 650 million ECU to 850 million ECU); however, this aid is largely insufficient to allow beef breeders to recover losses due to falling market share.

Supply and competition

Growing competition in the meat industry has strengthened the trend towards greater production specialisation.

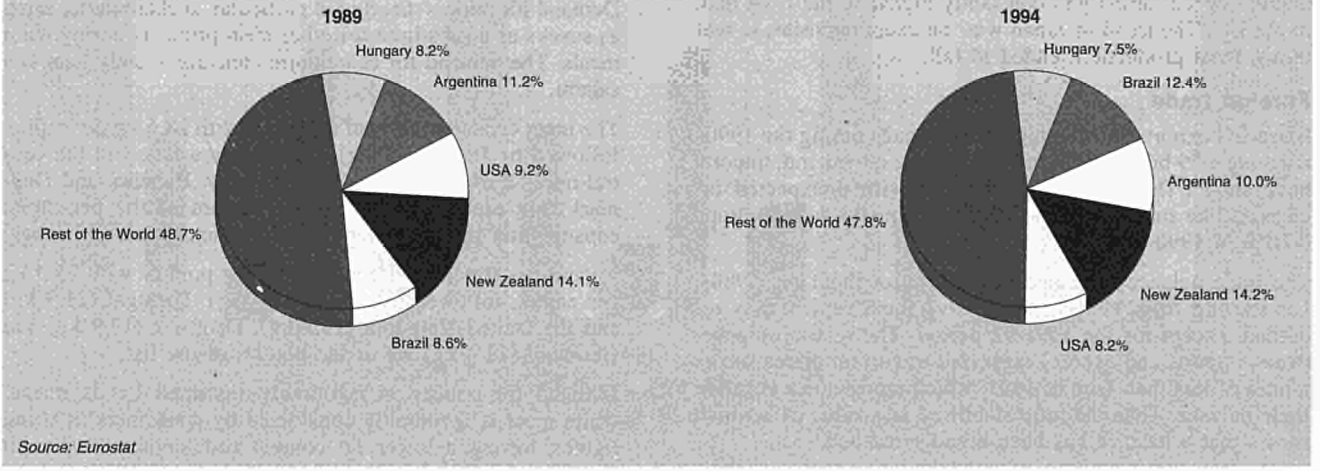
This phenomenon has caused a rise in the labour productivity index (base 100 in 1990) which increased during the 1985-94 period.

The cost of labour also rose in the period under consideration, but not to a large extent. Average costs, after showing a slight rise up to 1992, fell in subsequent years and, in 1994 were virtually in line with 1985 figures.

The gross operating rate, after reaching a peak in 1987 with 6.1%, has gradually dropped, stabilising around 5% during the 1990s.

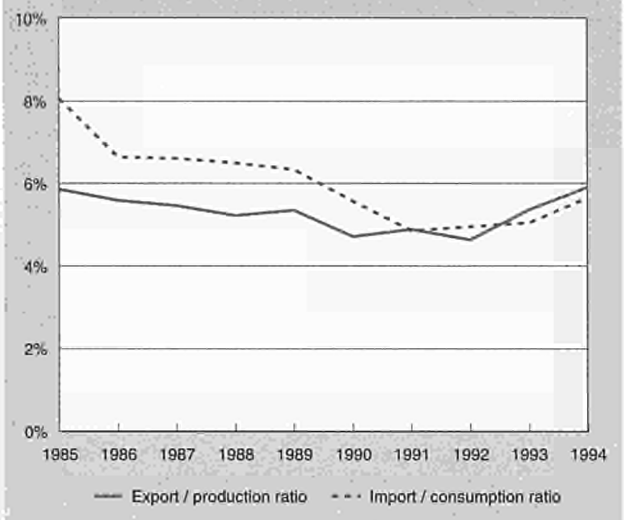
The competitiveness of the meat industry, in the beef subsector, will depend on being able to overcome the problem associated with the use of hormones and growth stimulants, approved in the USA but not in Europe. This practice gives US meat an advantage in terms of price competitiveness, although its

Figure 7: Meat
Origin of EU imports



Source: Eurostat

Figure 8: Meat
Trade intensities



Source: DEBA GEIE, Eurostat

penetration into the European market has been restricted by this health-related trade barrier.

In the beef subsector, production costs in the EU are higher than in the USA and South American countries which, especially over the last few years, have considerably raised the technological level of their plants.

With regard to the beef subsector, three large areas can be defined in terms of production density: the north-eastern arch comprising Benelux, Denmark, Lower Saxony, Westfalia and former East-Germany; the Atlantic coastal area, including the United Kingdom, Ireland, the northern regions of Spain and France, which benefits from support for less favoured areas and lower production costs; the area around the Alps, which includes Bavaria, northern Italy and the south-eastern parts of France, which benefits from support for less favoured areas (mountain areas) and on the valorisation of milk as by-product.

Production process

The meat sector's critical stage is butchering. The competitiveness of these structures derives from two factors:

Respect for hygiene regulations: European regulations establish minimum requirements for slaughterhouses. Starting in 1985, meat-processing plant controls have been harmonised so that meat is produced according to the same levels of hygiene throughout Europe. Inspectors issue slaughterhouses with a specific authorisation or stamp. Since 1 January 1996, temporary or permanent-derogation slaughterhouses are no longer allowed. Many slaughterhouses have disappeared in the EU in the past decade. It is likely that their number will fall even further in the future.

Minimum plant size: the need to lower costs and rationalise the line, in order to lower selling price, increasing or maintaining mark-up margins, presupposes the possibility of profiting of economies of scale. In the beef and pork subsectors, the companies remaining competitive on the market will have to own slaughtering plants in highly populated areas with a number of heads well above the current 100-120 per day.

In general, in the perishable goods sector, innovation tied to preservation technologies often represents a significant competitive advantage. Methods adopted to keep meat fresh are a key factor for guaranteeing top quality and hygiene standards. Among the technologies available to producing firms, that of vacuum is the most advanced both in terms of transport and product preservation. This technique is applied at the wholesale stage and produces the following advantages: significant slowdown of perishability, maintenance of bright red colour at the time of reactivating, lengthening of shelf-life from 3-5 weeks to 10 weeks, no weight loss due to evaporation. Among the drawbacks are the temporary loss of the colour of the meat, which is recovered only at reactivating. This technique is particularly popular in France, but it is progressively being introduced in many other countries.

INDUSTRY STRUCTURE

Companies

The meat sector comprises a number of large companies, as well as numerous small and medium-sized enterprises. The industry structure is fragmented although the EU's new agricultural policy and the level of concentration achieved by the distribution networks gave rise to a process of concentration between enterprises in the sector, among the most important ever occurred within the entire food industry.

The beef sector is characterised by high fragmentation. Nevertheless , slaughterhouses underwent a sharp rise in terms of average dimensions during the last decade, thereby reducing capital and labour costs while at the same time improving quality standards. On the other hand, cutting and producing pre-prepared dishes are usually performed by medium size firms, often integrated in the distribution channel.

The poultry sector has seen in recent years the emergence of several cases of development of integrated farming, butchering and distribution system. However, many slaughterhouses are still not integrated with cutting and food preparing firms. In fact, France, which is the chief poultry producing country, has 1 341 plants alone. 88 of these have a production capacity

Table 5: Meat
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	90.0	91.9	92.6	94.7	96.5	100.0	106.8	108.4	109.9	114.3
Unit labour costs index (3)	91.6	92.4	94.3	97.3	99.6	100.0	101.1	102.6	103.6	101.9
Total unit costs index (4)	94.7	93.0	90.1	92.6	100.4	100.0	99.8	103.0	100.1	98.9
Gross operating rate (%) (5)	4.9	5.6	6.1	5.1	5.1	5.5	5.4	5.0	5.1	5.1

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 7: Meat
Usable production (slaughtering) by country, 1993

(thousand tonnes carcass weight)	Cattle and calves	Pork	Sheep and goats	Equidae	Poultry
EUR 12	7 739	15 264	1 152	92	6 941
Belgique/België, Luxembourg	366	993	4	3	243
Danmark	203	1 504	2	1	167
Deutschland	1 605	3 747	41	5	599
Ellada	76	147	129	0	171
España	484	2 084	240	7	825
France	1 704	2 151	163	12	1 862
Ireland	526	213	99	1	94
Italia	1 188	1 371	81	60	1 089
Nederland	611	1 749	18	1	587
Portugal	117	307	27	1	216
United Kingdom	859	997	348	1	1 089

Source: Eurostat

of 2 500 000 heads per year. The sectioning and cutting shops are 507, 125 of which are integrated with the slaughterhouses.

The pork sector shows important differences in terms of industry structure depending on the subsector considered. In particular, ham production is often characterised by "cottage" (i.e. artisan-like) industry structure. Conversely, greater concentration of production takes place in other subsectors more suited to the application of large-scale industrial production techniques (e.g. wurst).

The major enterprises at European level operating in the meat sector belong to highly diversified multinational companies such as Unilever (UK/NL) and Nestlé (CH). Other large enterprises for which meat is the core business are Sudfleisch (D), Nordfleisch (D), Socopa (F), Arcadie (F), Vital Sogesviandes (F), Moskel (D) and Cremonini (I).

The specialisation index carries greater weight in those countries where farming is done on an intensive basis like Denmark (3.5) and Ireland (2.6). Compared to 1985, the index grew in nearly all the Mediterranean countries: Greece (0.6), Spain (1.3) and Portugal (0.8).

Strategies

The meat sector is a mature market in most countries of the EU. The strategies adopted by enterprises in the various subsectors aim at differentiating supply according to quality, origin and the farming system. In particular, reference is made to ISO standards, to labels as indicators of process differentiation (such as Geographical Origin Labels) and to the introduction of new products such as, for instance, flavoured charcuterie or with low-fat content, etc.

Such strategies are first of all conditioned by the degree of market development and by the food consumption patterns of the market.

In the beef subsector, only in those countries with high integration between farming, butchering and final meat processing and with strong consumer awareness, is the introduction of labels certifying farming methods possible. In fact, where butchering activity is extremely fragmented among small and medium-sized enterprises, it is difficult to keep a check on the product.

The most sophisticated differentiation strategies concern the charcuteries subsector which is also that with the greatest value added.

In the poultry subsector, company strategies are essentially two: (1) the certification of quality guaranteeing the use of recognised farming methods and (2) the production of pre-prepared dishes.

In 1994, 11 major acquisitions were completed, while in 1995 the number rose to 15. However, while in 1994 operations were divided out almost evenly between Denmark (3), UK (3), France (2), the Netherlands (2) and Ireland (1), in 1995 operations concerned almost exclusively the French market (6) and only marginally the other European markets - UK (3), Sweden, Spain, Denmark, Germany and Ireland (1 each).

Table 6: Meat
Gross per capita consumption, 1993

(kg per head)	Total meat	Cattle and calves	Pork	Sheep and goats	Poultry
EUR 12	93.9	21.2	41.7	4.0	18.4
Belgique/België, Luxembourg	101.8	20.7	50.1	2.1	18.2
Danmark	107.3	20.1	64.5	1.0	13.9
Deutschland	97.3	20.2	57.6	1.0	12.4
Ellada	81.5	21.0	22.0	14.1	18.0
España	108.3	13.3	55.1	6.6	23.4
France	109.6	28.6	38.1	5.5	20.9
Ireland	93.9	13.8	36.0	9.6	25.3
Italia	90.4	26.1	33.7	1.8	19.2
Nederland	89.4	19.4	45.3	1.3	20.5
Portugal	84.4	17.2	33.3	3.4	21.3
United Kingdom	69.8	17.3	23.1	6.3	19.6

Source: Eurostat

Table 8: Meat Acquisitions

1994 Bidder	Country	Target	Target country
Axelborg Gruppen	Danmark	Danpo & Farre Food	Danmark
Dane Beef	Danmark	Iversen Syd	Danmark
Leo Foundation	Danmark	Vraa Nedlagte	Danmark
Kerry Group	Ireland	Mattesson's Walls Ltd	Ireland
BSN	France	Best Corporation	New Zealand
Fleury Michon	France	Spanghero traiteur (50%)	France
HP2A (Unicopa)	France	Suchel	France
Paribas	France	Navidul	España
Duesseldorfer Senf-Und Konservenindustrie Frenzel	Deutschland	Oroshaza-Food	Hungary
Consortium	Nederland	Vleeswarenfabriek Scheemda	Nederland
Europole Nederland	Nederland	Encebe Meat Processing Activities	Nederland
Valouro	Portugal	PGESA	España
Bernard Matthews	United Kingdom	N/A	United Kingdom
Cranswich PLC	United Kingdom	Tryton Foods	United Kingdom
Grampian Country Food Group	United Kingdom	Mayhew Chicken	United Kingdom

1995 Bidder	Country	Target	Target country
Investor Group	Danmark	Class Tej	Hungary
NV-OX	Danmark	Christensen & Son	Danmark
Kepak	Ireland	British Beef company	United Kingdom
Irish Food processor	Ireland	Goodman international	Ireland
Bigard	France	Arcadie	France
Bourgoin	France	France Volailles	France
Caval	France	Scaben	France
Doux	France	Codivol	France
France Charcuterie (P. Predault)	France	Bugey Salaisons	France
Unicopa	France	Suchel	France
Heinz Annus Import-Export	Deutschland	Rommel und Betz & Co	Deutschland
Osborne y Compania	España	Sanchez Romero Carvajal Jabugo	España
Spira Invest	Sverige	Scandinavian Poultry	Sverige
Unigate	United Kingdom	Stock Lovell - Lovell & Christmas	United Kingdom
Harwood Foods	United Kingdom	South East Marts	United Kingdom
Hillsdown	United Kingdom	Chetwynd Animal By-products	United Kingdom
Sara Lee	USA	Holmeat	Belgique/België

Source: Nomisma

Among acquisitions of European companies by foreign multinationals is that of Holmeat by Sara Lee. The acquisition by European companies of firms outside Europe was limited to 3 operations in the 1994/95 period: BSN took Best Corporation (New Zealand) and Barnard Mathews took Advanced Food (New Zealand), Frenzel took Oroshaza Food (Hungary) and Investor Group took Class Tej (Hungary).

REGIONAL DISTRIBUTION

Meat production shows different regional concentrations within the EU depending on the type of animal being reared.

With regard to cattle, production is concentrated in Brittany and the regions of southern Germany like Bavaria and Niedersachsen; for pig farming, in the Netherlands, Denmark and the plains of northern Germany and Emilia Romagna; for poultry, in southern Lombardy and Veneto, and western France; finally, for sheep and goats in the central regions of Spain, the whole of Greece, Sardinia and parts of Wales and Scotland.

ENVIRONMENT

Environmental problems related to the meat sector chiefly involve the concentration of farms on the territory. This problem is particularly keen in Italy (e.g. Emilia Romagna) or the Netherlands, where the disposal of pig waste caused the pollution of deep underground strata. Industrial by-products on the other hand are often processed into fertilisers of animal feed.

REGULATIONS

Concerning the effects of GATT agreement on the whole meat sector, the main consequences for the EU will be the expected reduction of EU exports, following a 36% reduction in export subsidy and a 21% reduction in the volume of subsidised exports. The impact of market access measures will be less relevant.

Food quality and the protection of human health are two main issues for the whole meat sector. Directives 94/35, 94/36 and 95/2 are amongst the latest developments in this field: by setting general rules on the use of colourings, sweetenings and additives in foodstuff, these directives will determine a normative harmonisation at EU level, improve free movement of products and enhance competition among firms. As far as the use of hormones in breeding is concerned, it is important to note the still large discrepancy between EU norms, which are very restrictive on this issue, and those of many other extra-EU countries, especially the USA.

With respect to regulation of food quality, the more recent modification has been introduced with horizontal Reg. (EEC)

Table 9: Meat
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.62	0.77
Danmark	4.77	3.54
Deutschland	0.50	0.47
Ellada	0.33	0.62
España	1.12	1.26
France	1.37	1.43
Ireland	3.95	2.64
Italia	0.77	0.80
Luxembourg	0.36	0.39
Nederland	N/A	1.68
Portugal	0.60	0.78
United Kingdom	1.00	1.08

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

2515/94, amending Reg. 1848/93, which lays down special conditions in order to attribute certificates of specific character for agricultural products.

Important decisions were recently adopted in the veterinary and zootechnical and beef fields. A proposal of integration of Directive 91/698 has been converted into Directive 95/29: by introducing more strict rules about the protection of animals during transport (in terms of time duration and feeding), such a decision will probably slightly reduce trade of livestock within the EU. In addition, following the import ban of British beef implemented autonomously by the four EU countries, on 26 March 1996, the European Comission decided to extend the measure to the rest of the EU, on 21 June 1996, the EU Ministers of Agriculture reached an agreement for a fradual lifting of the ban. The decision specifies that the revocation of the ban is subject to the approval of the European Commission and two separate committees of scientific advisors.

Beef

The beef and veal sector is regulated by Reg. (EEC) 805/68, subsequently amended by Reg. (EEC) 2066/92 and 125/93. The EU intervention and financial incentive systems have been deeply affected by the CAP reform which is bound to reduce progressively the intervention price, enhancing instead the adoption of structural measures aimed at supporting the level of sectoral incomes as well as at reducing EU production surplus. With respect to the system of quotas, during 1995, the EU defined new import tariff quotas and decided to raise the high-quality meat quota. As far as international trade is concerned, the system ruling the attribution of export licences was set up with a ceiling on subsidised exports in order to honour commitments resulting from the Uruguay Round agreement.

The EU has launched quality-beef promotion campaigns in order to combat the fall in beef consumption. The EU strategy is to differentiate the product, making it less anonymous and more identifiable and distinguishable, but above all to reassure the customer, who is often confused by news on hormones and other growth stimulants and by publicity campaigns contrary to the consumption of animal fats.

The logical answer is to convince consumers that top-quality meat undergoes extra inspections compared to normal meats and that at any stage of the process it is possible to know where the carcass or joint of meat comes from.

Pigmeat

The basic norms that regulate the EU market for pigmeat are addressed in Reg. (EEC) 2759/75 as last amended by Reg. (EEC) 1249/89. More recently, after various proposals aimed at reducing the basic price by 30%, the Council adopted Regulation (EC) 1541/95 which reduces the basic prices for pig carcasses and adjusts criteria of standard quality. In this sector, a 1995 Council decision provides for the elimination of export subsidy expenditures for pigmeat, whilst augmenting subsidy expenditures for exports towards extra-EU countries by 18% for ham of controlled origin and by 25% for those without particular markings.

Poultry, sheep and goat meat

With respect to poultry, sheep and goat meat sectors, no crucial modification has been introduced since the 1992 CAP reform. The common organisation of the sheep market is regulated by Reg. (EEC) 3013/89. Each year, the Community sets a single base price for fresh and chilled sheepmeat for the EU market. The price takes into account seasonal market variations.

OUTLOOK

Over the next few years, overall meat production and consumption levels in the EU should not change to any great extent. On the other hand, EU measures regarding the control of the production and distribution processes will inevitably affect enterprises in the sector, increase concentration in the distribution sector and will tend to erode profit margins of producers.

Written by: NOMISMA
The industry is represented at the EU level by: European Meat Association (EMA). Address: Rue de l'Industrie 42, Bte 11, B-1040 Brussels; tel: (32 2) 513 7780; fax: (32 2) 512 8381; and
Association of Poultry Processors and Poultry Import and Export Trade in the European Union (AVEC). Address: Trommesalen 5, 4th floor, DK-1614 Copenhagen V; tel: (45 33) 25 41 00; fax: (45 33) 25 35 52; and
Liaison Centre of the Meat Processing Industry in the EU (CLITRAVI) (NACE 412.2). Address: Bld. Baudouin 21, 7th floor, B-1210 Brussels; tel: (32 2) 203 5141; fax: (32 2) 203 3244.

Processing of fishery products

NACE (Revision 1) 15.2

Seafood consumption in the EU expanded dramatically over the last ten years. However, this expansion slowed down over the last two years due to the adverse economic conditions affecting Europe. The EU industry developed under the influence of large powerful agro-food companies. Since the supply of raw material of certain popular species by the EU fishing fleet does not satisfactorily meet the industry requirements, large amounts of processed seafood are purchased in third countries, widening the negative balance of the international trade. The market segment which shows the fastest growth is that of fish-based prepared dishes, matching the changing social habits of EU consumers.

INDUSTRY PROFILE

Description of the sector

Output of the fish and seafood processing industry can be divided into five major categories:

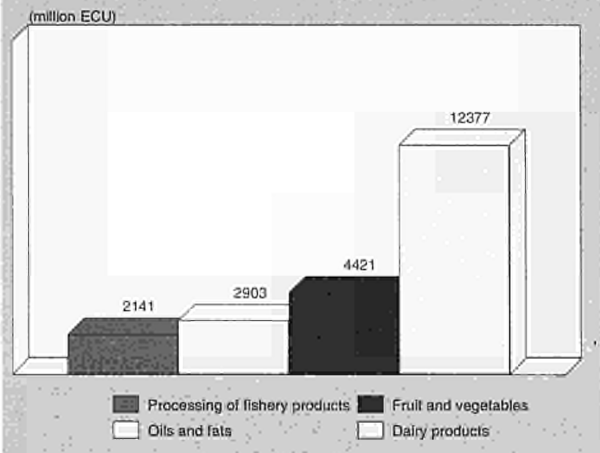
- frozen fish (excluding whole fish), e.g. frozen fish fillets, which are partly processed items using basic raw seafood material which can be either further processed into prepared dishes or sold to consumers in that form;
- dried, salted and smoked fish, e.g. smoked salmon, salted cod, consumed without any further industrial processing;
- prepared or preserved fish, e.g. tuna cans, prepared dishes, surimi, which are basically value-added ready to eat items;
- aquatic invertebrates, frozen dried or salted e.g. cuttlefish fillets, frozen mussels, which can be either further processed into prepared dishes or sold to consumers in that form;
- crustaceans, molluscs and other aquatic invertebrates, prepared or preserved e.g. crab cans, shellfish salads, which are ready-to-eat items.

A survey conducted by the European Commission in 1991 showed that the prepared or preserved fish category is by far the most important. EU production of such items exceeded 1 million tonnes in 1991, 55% of total EU production of processed fishery products (2 076 thousand tonnes). The frozen fish (excluding whole fish) category ranks second with 450 237 tonnes (22% of total EU production).

The survey also indicated that the largest producing EU country by weight was Spain with almost 24% of the total production, followed by Germany (17% of EU production) and a group of three countries including the United Kingdom, Denmark and France (roughly 11% each of the EU production).

The fish processing sector is a rather concentrated industry with 80% of the value of the production being manufactured in 5 Member States (1995 figure), with France the leading producing Member States with 20% of EC production. This group of five countries contributes 81% of total EU value added. Although ranked second in production, the German fish processing industry shows the highest value added in 1995 with 23% of the total EC value added. The production of prepared or preserved fish dominates in most EU countries. Sweden and Finland, which have both modest fish processing industry compared to the five other European major players, do not increase overall EC production significantly.

Figure 1: Processing of fishery products
Value added in comparison with related industries, 1994



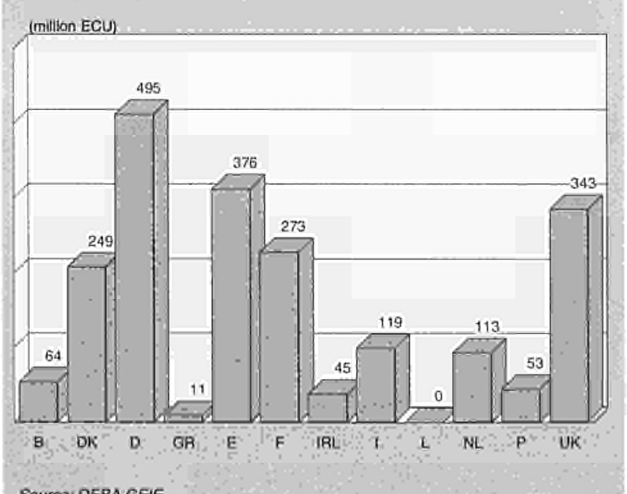
Source: DEBA GEIE

Recent trends

Apparent consumption of processed fisheries products has shown a dramatic increase over the past ten years, having almost doubled between 1985 and 1994. Meanwhile, the EU production experienced a relatively lower increase, though significant (+ 61% over ten years in current prices). The market operators have to seek raw material supply in extra-EU countries to meet the expanding consumer demand which the 1985-94 average annual growth rate of extra-EU imports shows (+9.1%). Meanwhile, the extra-EU exports remained fairly stable over the same period (+ 2.0% yearly on average), with most of the end-products manufactured by the industry being sold on the EU market. Consequently, the trade balance deteriorated sharply over the 1985-94 period reaching a deficit of almost 3 billion ECU with an export/import ratio as low as 22%. In terms of employment, the fish processing sector has shown a steadily declining trend since 1991. On average, about 1 000 jobs are lost annually.

Since 1991, most of the EU Member States have been experiencing adverse economic conditions and the development

Figure 2: Processing of fishery products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Processing of fishery products
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	6 850	10 257	11 274	11 443	11 310	11 941	12 011	12 750	13 500	14 320	15 240
Production	6 005	8 275	8 985	9 118	9 096	9 498	9 659	10 059	10 560	11 100	11 700
Extra-EU exports	677	702	776	721	785	878	933	833	870	920	960
Trade balance	-845	-1 982	-2 290	-2 325	-2 214	-2 442	-2 352	-2 691	-2 940	-3 220	-3 540
Employment (thousands)	89.8	86.8	86.4	83.3	81.7	80.8	79.9	82.0	80.0	80.0	80.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Processing of fishery products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	7.12	3.55	5.52	6.40
Production	5.03	3.06	4.15	4.56
Extra-EU exports	-0.06	4.60	1.98	8.19
Extra-EU imports	12.30	5.28	9.12	12.48

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Processing of fishery products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	677	688	726	653	663	702	776	721	785	878	933	833
Extra-EU imports	1 522	1 733	1 899	2 071	2 204	2 684	3 066	3 046	2 999	3 321	3 285	3 524
Trade balance	-845	-1 045	-1 173	-1 417	-1 541	-1 982	-2 290	-2 325	-2 214	-2 442	-2 352	-2 691
Ratio exports / imports	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2
Terms of trade index	95.0	95.1	97.6	97.0	95.8	100.0	96.4	96.6	98.8	103.8	N/A	N/A

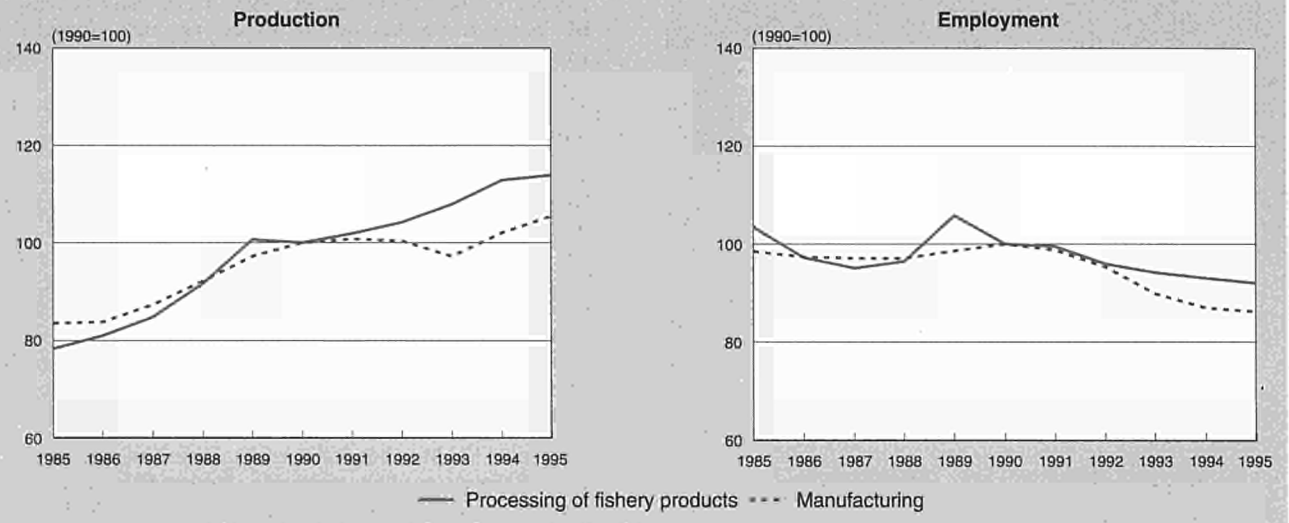
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Processing of fishery products
Breakdown of external trade by major product line in value

(million ECU)	1989		1994	
	Extra-EU imports	Extra-EU exports	Extra-EU imports	Extra-EU exports
Frozen fish excluding whole fish	652.1	184.2	1 073.5	180.1
Dried, salted or smoked fish	528.2	78.8	643.9	76.3
Prepared or preserved fish	812.8	239.1	1 041.2	257.1
Aquatic invertebrates, frozen, dried or salted	1 599.0	201.8	2 040.9	195.8
Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	458.2	69.5	547.5	72.7

Source: Eurostat

Figure 3: Processing of fishery products
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

of the fish processing industry has been hampered by the drop in consumer demand. The sustained upward trend observed in apparent consumption since 1984 has levelled off since 1991 (In 1992/93 a reduction in apparent consumption was seen, while the previous annual growth rates were over 6%). Since 1993, the apparent consumption increases, but follows an unsteady trend. In terms of external trade, the industry recovered over 1994 with extra-EU exports reaching an all time high after a marked depression in 1993. Concurrently, the extra-EU import confirmed the decreasing trend initiated in 1992.

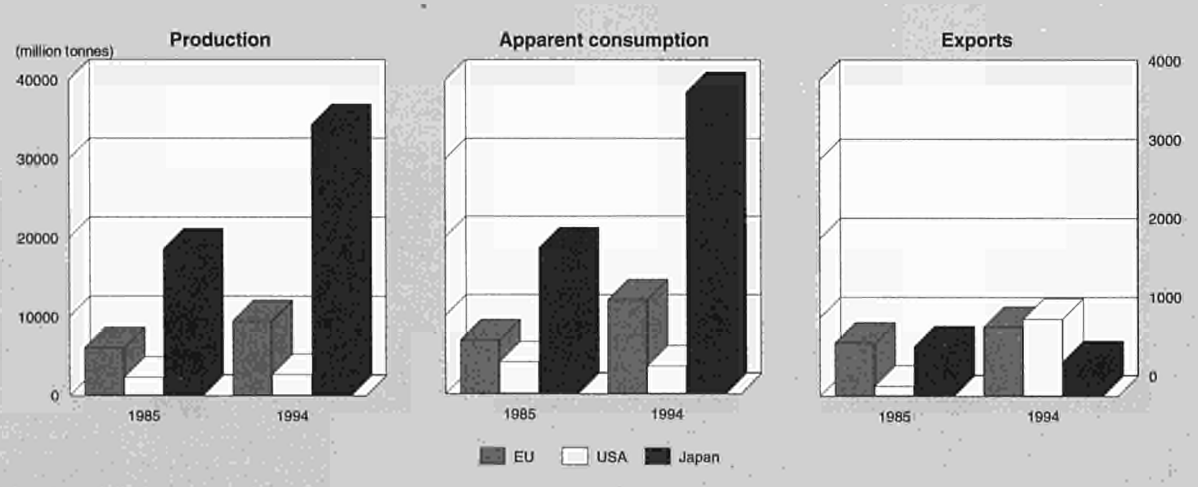
As far as employment is concerned, the figures indicate that the number of employees in the industry has shrunk (almost 12 000 jobs lost since 1989) as a consequence of both the difficulties of the smallest firms to compete on this rapidly evolving market, and the industry strategy to realise economies of scale through mergers and take-overs.

International comparison

Figure 4 indicates that whilst the European Union is doing better than the USA in terms of production of processed fishery products, it still lags behind Japan. Japan, populated by the equivalent of one third of the total EU population, is the world's biggest seafood market. Japan has seen its domestic demand for fishery products expanding dramatically over the last few years, with consumption reaching more than 65 kg per capita per year whilst the EU consumption stands at 15 kg per capita. Changing social habits have boosted the emergence of prepared/ready to cook fish products, which now supplement, to a certain extent, traditional dishes based on whole fresh fish products.

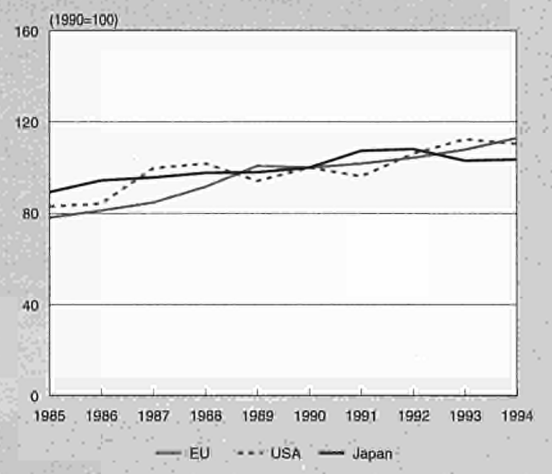
The countries of the ASEAN, led mostly by Thailand and the Philippines, now rate amongst the top world producers of processed fishery products. These countries take advantage of modern processing units manned by inexpensive manpower, to manufacture high quality products at low prices on the world market.

Figure 4: Processing of fishery products
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Processing of fishery products
International comparison of production in constant prices



Source: DEBA GEIE

Foreign trade

The import/export ratio (26% in 1995) shows that the EU is a net importer of processed fishery products. Few of the EU fishery landings are used by the fish processing industry because they are too costly, mostly directed towards the fresh market, and do not meet the industry needs of constant sources of calibrated supply of raw material throughout the year. The two major imported items are aquatic invertebrates frozen, dried or salted, mostly shrimps (approximately one third of total extra-EU imports) and frozen fish, which are both lacking in the EU landings and more expensive, when available, than similar products purchased from third countries. These products are basically semi-processed items used by manufacturers to supply the industry which further processes them into value-added items. Extra-EU exports are dominated by prepared and preserved fish, and by semi-processed materials imported from third countries and re-exported after repackaging under a European brand.

The negative external trade negative balance is therefore structural and the situation is not expected to improve in the future. The EU fishery sector suffers from severe resource depletion, and more and more extra-EU countries are now able to supply processed seafood products at EU quality standards and at attractive prices. Analysis of the sector shows that if the trade balance slightly improved in 1993, it is mostly because the EU domestic consumption of fishery products slowed down along with overall household spending. Consumer preferences shifted towards cheaper meat products like poultry for example. The 1994 and 1995 figures for trade balance both break new records.

The main suppliers of processed products are Iceland and Norway (19.8% of EU imports in 1994) which supply mostly frozen fillets of white fish (mainly cod, haddock, and saithe) and salted or smoked fish (smoked salmon from Norway). They are followed by countries like Thailand, Morocco and USA for which the seafood canning industry is healthy and expanding, and countries like Argentina and Asian countries which offer large quantities of processed fish and shellfish (mostly cultured shrimps). The EU's share of the other large seafood market (Japan) remains low (1.0% in 1994).

Individual EU Member States export their production of processed fisheries products primarily to other EU countries. The main extra-EU clients are the EFTA countries (26.4% of EU exports in 1994) which purchase ready to eat dishes and canned fish. The Japanese and US share of the destination of exports (10.4% and 9.0% respectively in 1994) are higher than their share of EU imports, but these figures have been steadily decreasing since 1989. The EU industry has gained new market share in Eastern Europe countries (Poland, Hungary, Russia).

MARKET FORCES

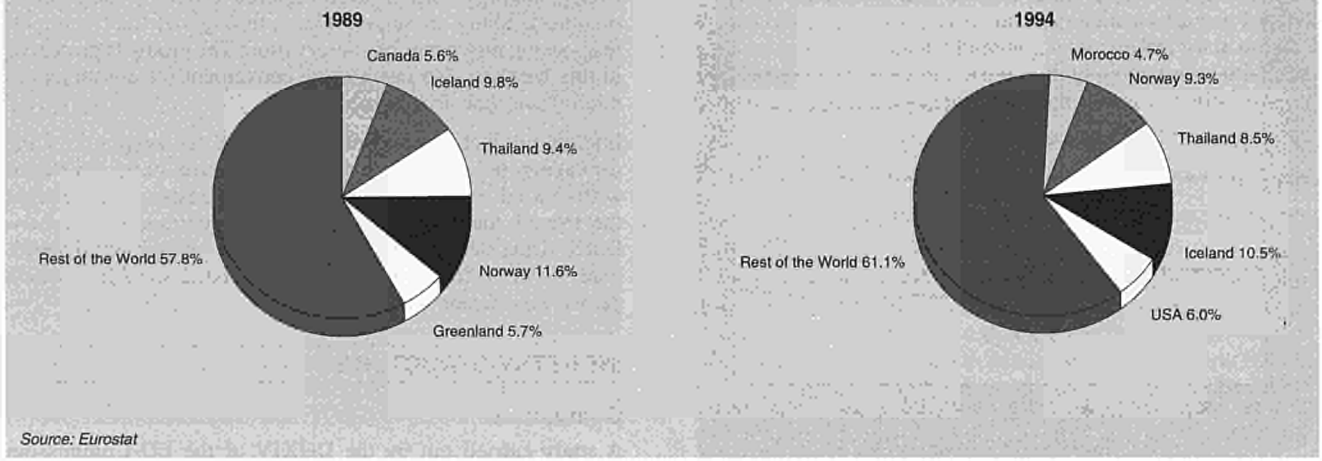
Demand

Demand for fishery products has grown dramatically over the past ten years due to a growing public awareness of the importance of fish as part of a healthy diet. In addition, the emergence of processed seafood providing an alternative to the consumption of fresh fish, traditionally viewed in Northern Europe as a smelly product that is bothersome to prepare. This, combined with other factors related to the changing social patterns, has boosted the consumption of processed items, which rose from an average of 6.7 kg/head in 1983 to 9.8 kg/head in 1991 in the EU (65% of the average consumption of fishery products). The economic crisis which affected the EU Member States over these last two years affected this increasing trend, but a further increase in consumption is anticipated to resume when the economy recovers.

Figure 6: Processing of fishery products
Destination of EU exports

Source: Eurostat

Figure 7: Processing of fishery products
Origin of EU imports



Source: Eurostat

The market for fish-based ready-to-eat meals is the most rapidly growing market in all the EU Member States with the exception of Greece and Portugal, where the purchasing power of customers is low. Reasons for this expanding market include: changing social factors such as the growing number of working women, greater leisure time, more fragmented meal times within households, and the growing number of households with one or few members. The need for simple and ready to cook meals has consequently increased. The catering sector is also increasingly adding prepared or semi-prepared meals to their menus as they meet client tastes and allow for savings in time, manpower and investment in kitchen equipment. In countries like Germany and Belgium, consumer preferences are now clearly directed towards frozen products.

The consumption of canned fish has shown an increasing trend throughout the EU, thanks to the marketing efforts of the leading firms. These firms have adopted product differentiation strategies through high quality standards and the introduction to the markets of new forms of products such as tuna-based salads and elaborated mackerel based preparations.

Lastly, the EU market for surimi seems to offer good prospects. It was estimated at 50 000 tonnes in 1994, and is still expected to grow. France and Spain clearly appear to be the leading markets in Europe for these products. Other major markets include UK and Italy. The German market for this product is small as there is no traditional consumption of crustaceans in this country.

Supply and competition

International competition on the EU processed seafood market is very tough. Many developing countries are now capable of supplying quality products at low prices, dragging the EU industry into a restructuring phase. Since the EU industry cannot compete in terms of labour and other running costs, a great amount of research has been conducted to launch alternative products of high quality standards, matching the new EU customers requirements.

The EU industry has had to restructure through mergers and take-overs in order to create economies of scale and vertical and horizontal integration. As a result, whilst the EU industry was characterised by a large number of independent small-scale units in 1984, the processing industry now includes an increasing number of large agro-food firms or financial holdings with large financial resources. This policy produced positive results for the labour productivity in the sector.

One of the most significant competitive variables for the processing industry is raw material availability and cost. Over the last three years, the average price of cod and haddock, which are widely used in the preparation of fish-based ready meals, rose by as much as 40% due to a shortage in production (e.g. average price of imported cod rose from 1.06 ECU/kg in 1989 to 1.56 ECU/kg in 1993). This forced the industry to look for cheaper alternative species and the most powerful firms with the financial and technical resources to test and promote new products were able to remain competitive in this market segment.

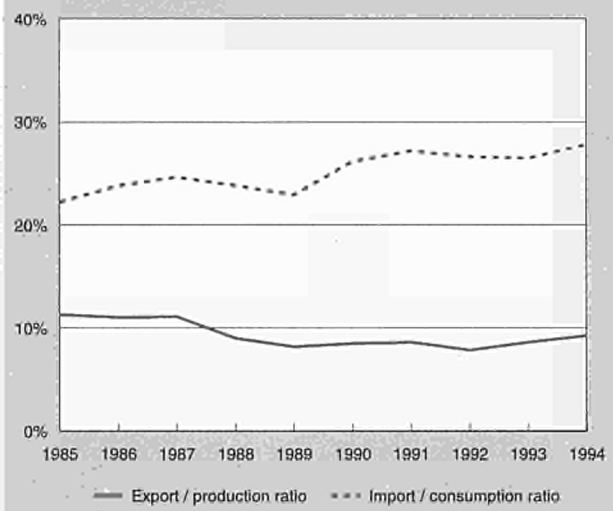
To secure their sources of supply, leading EU processing companies increasingly set up joint-ventures in third countries

Table 5: Processing of fishery products
Breakdown of external trade by major product line in volume

(thousand tonnes)	1989 Extra-EU imports	1989 Extra-EU exports	1994 Extra-EU imports	1994 Extra-EU exports
Frozen fish excluding whole fish	318.6	62.1	516.1	66.2
Dried, salted or smoked fish	167.7	21.5	186.5	18.2
Prepared or preserved fish	284.5	72.0	417.2	86.8
Aquatic invertebrates, frozen, dried or salted	440.6	39.9	573.8	55.5
Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	78.6	13.9	97.7	16.0

Source: Eurostat

Figure 8: Processing of fishery products
Trade intensities



Source: DEBA GEIE, Eurostat

where the resource are presumed abundant. This is in particular the case for Groupe Adrien (F) and Pescanova S.A. (E) in South-America and Africa, Pêche et Froid (F) and Compagnie Saupiquet (F) in West Africa and in the Indian Ocean. Concurrently, the Community has signed 28 fishing agreements, principally with Scandinavian, North and South American, African and Baltic countries, enabling EC registered vessels to operate outside Community waters.

In conjunction with the increase of raw material prices, the major firms have had to tighten their profit margins to remain competitive in the markets. Consequently, the early 90's period has witnessed a marked decrease of the gross operating rate of the industry, in spite of a significant increase in labour productivity.

Production process

Production processes of fishery products are now characterised by a certain degree of automation. Although research still focuses on the definition of new processing machines to save manpower, a great amount of work is being devoted to extending the shelf-life and quality of the end products.

The Individual Quick Freezing process is now an established preservation technique that allows processors to supply customers with frozen seafood in small, ready-to-cook quantities, instead of solid blocks which had to be cut or thawed prior to packaging or use. The benefits of IQF have led many companies to invest in this freezing method, despite the high initial costs and the need for skilled staff. Another development to extend shelf-life by up to three weeks without freezing is to apply temperature treatment after packing the raw material. This is done by using both vacuum packs and microwave pasteurisation. This technique is more economical as it entails energy savings with shorter required time for temperature treatment. Many processing plants throughout the EU are already using this means of conservation. The products preserved in this way are also much more convenient for consumers to microwave than frozen meals.

Intense product development has been taking place in the packaging industry. Notably, plastics have been developed with special properties such as thermal resistance, reducing the use of the traditional aluminium containers. Recently, Dutch firms started the commercialisation of vacuum-packed, ready to cook fresh mussels with extended shelf life, which gained significant market share.

INDUSTRY STRUCTURE

Companies

A study carried out by the DGXIV of the EU Commission indicated that there were about 2 300 companies active in the fish processing sector in 1991. More than 55% of them are concentrated in Italy, France, and Spain where the number of small-scale units remains high. Another group of countries including the United Kingdom, Denmark and Germany, host another 29% of the total number of EU processing companies. The number of processing firms were 1 860 in 1983, growing to a peak of 2 630 in 1988, before steadily decreasing to reach the 1991 number. The number of employees decreased by 8% over the 1984-88 period, increased by 9.8% between 1988 and 1989 and steadily decreased thereafter to reach the 1994 figure of 80 800. Although no precise figures are available on the size of the firms, the survey of the European Commission indicated that the average number of employees per firm decreased from 50 in 1983 to 38 in 1991.

Strategies

Motivated by the dramatic expansion of the EU market for processed seafood products in the early 1990s two multinationals, Nestlé and Unilever, have engaged in mergers and take-overs to gather within their groups the most efficient fish processing enterprises. However, in 1992-93 these major two groups slowed down their expansion. The strategy was more to keep the subsidiaries in a healthy economic condition than to further increase the size of the groups. As a consequence, internal restructuring led to the shut down or sale of non profitable units, with losses of jobs resulting.

In 1994-95, with the decrease in consumption growth, the major agro-food businesses sold off subsidiaries to businesses specialised in fish processing. Another factor which has affected the industry significantly is the membership of Sweden and Finland. Swedish firms, which had manufacturing sub-

Table 6: Processing of fishery products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	75.6	83.3	89.1	94.9	95.2	100.0	102.4	108.7	114.6	121.2
Unit labour costs index (3)	103.4	97.2	94.2	95.8	97.3	100.0	105.4	104.3	100.9	97.5
Total unit costs index (4)	92.9	92.3	92.9	95.1	95.4	100.0	105.7	105.3	101.8	101.6
Gross operating rate (%) (5)	7.1	7.2	7.4	7.4	7.8	6.8	6.8	6.5	6.1	6.2

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 7: Processing of fishery products
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.36	0.87
Danmark	7.61	7.29
Deutschland	0.54	0.52
Ellada	0.58	0.77
España	2.35	2.23
France	0.63	0.98
Ireland	1.17	2.04
Italia	0.50	0.43
Luxembourg	0.00	0.00
Nederland	0.80	1.12
Portugal	3.78	2.07
United Kingdom	1.54	1.11

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

sidiaries in Denmark to benefit from the European free market trade regulations, ended activities, while Norwegian firms decided to invest in Finland when their EC membership was refused. Spanish entrepreneurs, for whom new fishing grounds are of vital importance did take advantage of the new EC third countries fishing agreements to invest in countries such as Namibia or Argentina to secure resource access. In addition, supermarket chains are no longer simple buyers of seafood products: in 1995, some major distribution firms bought out bankrupt fishing companies to integrate the whole production process, from harvest to sales to consumer (Intermarche (F), Pescanova (E), Albert Fisher (UK)). Vertical integration of firms should be the major strategy taken by the leading groups over the forthcoming years.

ENVIRONMENT

Fishing has an undeniable impact on the environment. The most obvious illustration may be a decline in the actual level of fish stocks. Knowledge of changes in fishery stocks is the best gauge of the state of the marine population. Research into the impact of fishing on food chains is still at an early stage. But increased efforts are being made not only to understand how and to what extent these human activities disturb the previous balance in the marine environment, and also to design and encourage the adoption of more selective fishing techniques. For example, a report on the Bering Sea ecosystem has been recently released, suggesting that the two brief, intense pollock catches each year may have disruptive effects on feeding patterns of marine mammals, sea birds, and other fish, and recommends that the harvest be managed for a less intense catch over a long time period.

Environmental preservation can also be a market issue: the World Wildlife Fund International and Unilever Corporation, a major frozen seafood processor, announced the beginning of consultations to establish the independent Marine Stewardship Council. The objective of the Council will be to create market-led economic incentives to encourage sustainable fishing. Seafood products caught according to standards the Council develops would be marked with a special logo.

The continued expansion of intensive aquaculture projects has also had an impact on the environment. The concentration of fish in a limited space and their intensive feeding can lead to substantial discharges into the surrounding waters. Even the escape of farmed fish, perhaps not indigenous to the area, can drastically upset the local ecological balance.

Preservation of the environment is now a major issue of concern at the international level. The newly released Code of Conduct for Responsible Fisheries was developed by the FAO secretariat upon the recommendations of the 1992 Declaration of Cancun. The Code establishes voluntary guidelines and international standards of behaviour for responsible fishing practices that will ensure the conservation of marine resources. The Code addresses all maritime fisheries, covering areas not discussed by previous international agreements, such as coastal zone management, aquaculture and international trade of fishery products. Additionally, the non-binding nature of the Code allows for a more stringent approach to conservation issues.

REGULATIONS

The two key regulations for the fisheries product processing sector are:

- Council Directive N° 91/493/CEE of 22 July 1991 laying down the health conditions for the placing on the market of fishery products, completed by Council Directive 92/48/CEE of 16 June 1992 on the health conditions aboard certain fishing vessels. This key regulation harmonises practices within the EU and requires the hygiene standards of all establishments where fishery products are prepared, processed, chilled, frozen, packaged or stored to be approved by a competent authority. This directive also applies to processing units of third countries exporting products to the EU, to guarantee the safety of imported products at levels matching those of EU products. The deadline of this Directive is 31 December 1995

- Council Regulation (CEE) N° 3759/92 of 17 December 1992 on the common organisation of the market in fishery and aquaculture products. This regulation focuses on marketing standards, producer organisations, and prices of the products with special reference to the EU canning industry.

There are also about 50 other regulations on the name of the species to be used, on import quotas, on minimum prices of imported raw material that do not all specifically concern fisheries products, but the larger food products sector. In 1994, the DGXIV of the Commission of the EU published a useful vade-mecum of the EU regulations of interest for the economic operators of the fishery and aquaculture processing sector (ISSN 92-826-7860-1).

OUTLOOK

The EU processing industry is suffering somewhat from the recession in which the EU has stepped into over the last two years. Even if apparent consumption and production should slow down their positive growth, they are not expected to decline as demand will remain high. Globally, fish consumption is expected to further increase over the 1995-99 period and the industry should follow accordingly. Imports are anticipated to increase again as EU waters continue to deplete, propelling the industry to purchase raw materials in third countries. As exports will not show significant progress due to the structural deficit of the EU in seafood products, the deficit of the trade balance will widen.

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Fruit and vegetable processing and preserving

NACE (Revision 1) 15.3

The fruit and vegetable processing and preserving sector underwent a positive growth trend throughout the 1985-95 period. Health-related consumption patterns should allow this situation to consolidate in the future.
Most jellies, jams and marmalades are manufactured in the countries of northern Europe, particularly in Germany, while canned fruits and vegetables production is concentrated in the Mediterranean countries, especially in Spain.
The trade balance remained in the red for the entire decade and this situation is likely to continue over the next few years, following application of the GATT agreement and the recent reform of the Common Market Organisation.
Some fruit and vegetable processed products and tomato-based products have for some time now been subject to an aid system, the reform of which is currently being discussed.
At present, the major exporters to the EU are the less-developed countries (Brazil, Turkey, China and Poland), but over the next few years, it is likely that products from these countries will be distributed by leading multinational groups.
From a structural viewpoint, the absence of significant economies of scale and high labour intensiveness favoured fragmentation of the supply which characterises the sector.

INDUSTRY PROFILE

Description of the sector

This sector includes all activities related to the processing of fruit and vegetables and their preservation. The main product categories are tomato and other vegetable preserves, jams and marmalades, pickled vegetables, fruit juices and nectars. Frozen vegetables and fruits are dealt with in the chapter on deep-frozen foods.

Overall, the fruit and vegetable processing and preserving industry reached a value added level of 4 421 million ECU in 1994. This figure is not particularly high compared to other food sectors, because the sector is a mature industry using relatively simple technologies and top-quality raw materials.

In 1994, just three countries accounted for more than 50.6% of the overall value added in the sector: Germany (862.1 million ECU), France (757.5 million ECU) and Italy (620.4 million ECU).

A large part of production goes to foreign markets: exports outside the EU gradually increased from 1 466 million ECU in 1990 to 2 059 million ECU in 1995. In recent years, the strong rise in exports has also had a positive affect on the balance of trade, with a drop in its deficit.

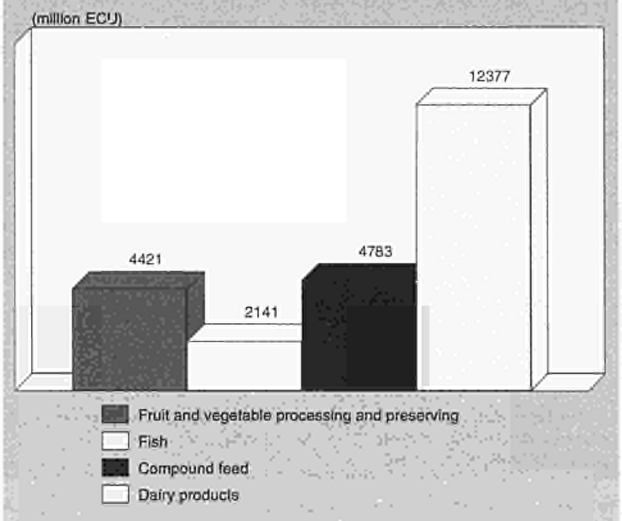
Imports from outside the EU consist above all of canned fruits and juices, and only to a lesser extent of vegetables.

According to a comparison based on the number of cans produced in 1994, France appears as the leading European producer of canned vegetables with 1 258 million tins, followed by the Netherlands with 512 million tins, the United Kingdom (270.7 million tins), Spain (246.2 million tins) and Italy (205.7 million tins). France is at the top of the list thanks to its distinct vegetable-growing vocation and to a strong integration between the production sector and processing firms.

In the case of canned fruits, production is concentrated in the Mediterranean countries. Greece, with peaches alone, produces 372 million tins, followed by Spain (342 million tins), France (225 million tins) and Italy (205 million tins).

Finally, in the jam, marmalade and jelly sector, production is concentrated mainly in two countries: Germany (212. 9 million tins) and France (160.1 million tins).

Figure 1: Fruit and vegetable processing and preserving Value added in comparison with related industries, 1994



Source: DEBA GEIE

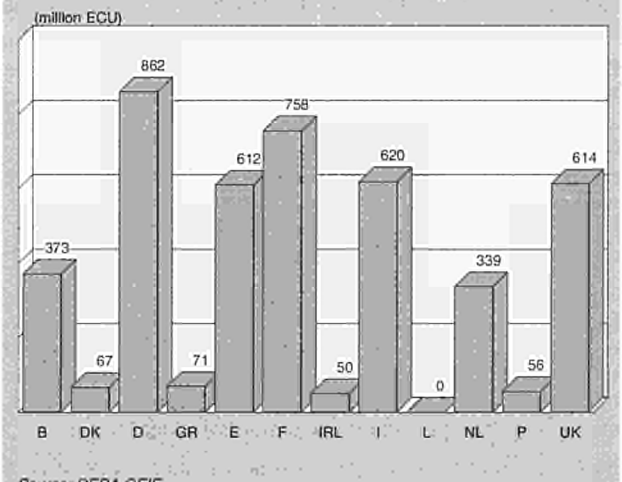
Recent trends

During the 1990s, growth in the fruit and vegetable processing and preserving sector slowed up considerably compared to the 1980s, while remaining above that of the overall manufacturing sector.

During this period, production growth was also accompanied by a slight drop in employment, to an extent, lesser than that of the overall manufacturing sector. It should be borne in mind that the sector is distinguished by a strong seasonal labour pattern, so that the demand for work allows greater flexibility compared to market conditions.

Growth in apparent consumption in real terms equalled 6.79% in the 1985-90 period. This was followed by a slowdown in the 1991-94 four-year period. In particular, the 1993-94 period

Figure 2: Fruit and vegetable processing and preserving Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Fruit and vegetable processing and preserving
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	13 628	16 729	18 875	21 345	21 855	20 389	20 549	21 102	23 150	24 220	25 420	26 740
Production	12 204	15 332	17 119	19 198	19 767	18 845	18 694	19 196	20 668	21 710	22 850	24 110
Extra-EU exports	1 556	1 631	1 466	1 512	1 551	1 690	1 961	1 924	1 768	1 870	1 980	2 090
Trade balance	-1 423	-1 396	-1 756	-2 148	-2 087	-1 544	-1 855	-1 905	-2 482	-2 510	-2 570	-2 630
Employment (thousands)	135.0	130.2	137.0	137.3	136.9	134.6	133.5	131.1	139.6	140.0	140.0	130.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Fruit and vegetable processing and preserving
Breakdown of production in volume by country and by major product line, 1994

(million 850 ml tins)	Canned vegetables, excluding baked beans	Canned fruit	Jam, marmalade, jelly and chestnut paste (thousand tonnes)
Belgique/België (1)	N/A	42.0	28.4
Danmark	N/A	N/A	48.7
Deutschland	87.5	153.1	212.9
Ellada (2)	N/A	372.0	N/A
España	246.2	342.0	41.5
France	1258.0	225.6	160.1
Italia	205.7	205.0	41.0
Nederland	512.0	77.4	26.0
Suomi/Finland	17.4	N/A	23.8
United Kingdom (3)	270.7	21.4	100.0

(1) Estimates.
(2) Only peaches.
(3) Estimates for the jam , marmalade, jelly and chestnut paste.
Source: OEITFL / OEICTO

Table 3: Fruit and vegetable processing and preserving
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	6.79	1.80	4.54	-0.15
Production	5.97	1.66	4.03	-1.36
Extra-EU exports	-1.87	6.62	1.82	11.65
Extra-EU imports	6.15	4.74	5.52	12.11

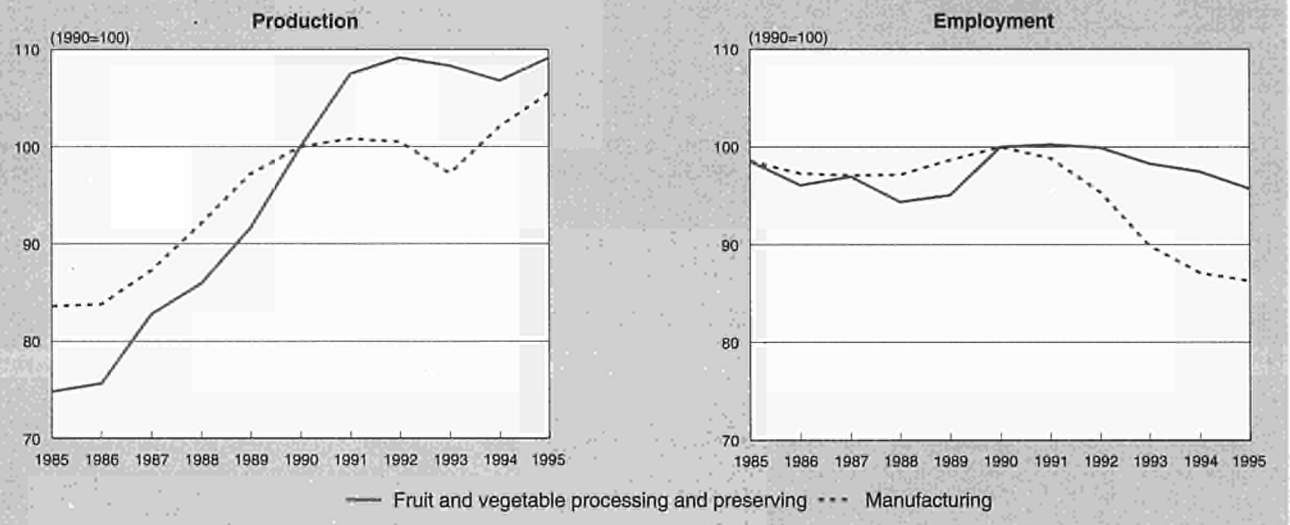
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Fruit and vegetable processing and preserving
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	1 556	1 304	1 294	1 368	1 631	1 466	1 512	1 551	1 690	1 961	1 924	1 768
Extra-EU imports	2 979	2 356	2 470	2 841	3 027	3 222	3 659	3 638	3 234	3 815	3 830	4 250
Trade balance	-1 423	-1 052	-1 176	-1 473	-1 396	-1 756	-2 148	-2 087	-1 544	-1 855	-1 905	-2 482
Ratio exports / imports	0.52	0.55	0.52	0.48	0.54	0.45	0.41	0.43	0.52	0.51	0.50	0.42
Terms of trade index	77.5	93.8	92.6	89.7	98.8	100.0	104.2	104.9	106.5	105.2	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Fruit and vegetable processing and preserving
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

was marked by a 0.15% drop. During the course of the last decade however, the growth rate was substantially positive (+4.54%).

The growth of production in real terms was totally consistent with the consumption pattern of the 1985-90 period (+5.97%) and the subsequent 1990-95 period (+1.66%).

Exports slowed down slightly in the 1985-90 period (-1.87%) and then increased sharply again in the 1990-94 five-year period (+6.62%). Over the 1985-94 decade, the overall growth was however fairly low (+1.82%).

On the contrary, the overall rise in imports was fairly high (+5.52% in the 1985-94 period). In this case, the pattern of the decade reflects the uniform intensity of the two periods: the growth rate of the 1985/90 period (+6.15%) and that of the 1990/94 five-year period (+4.74%).

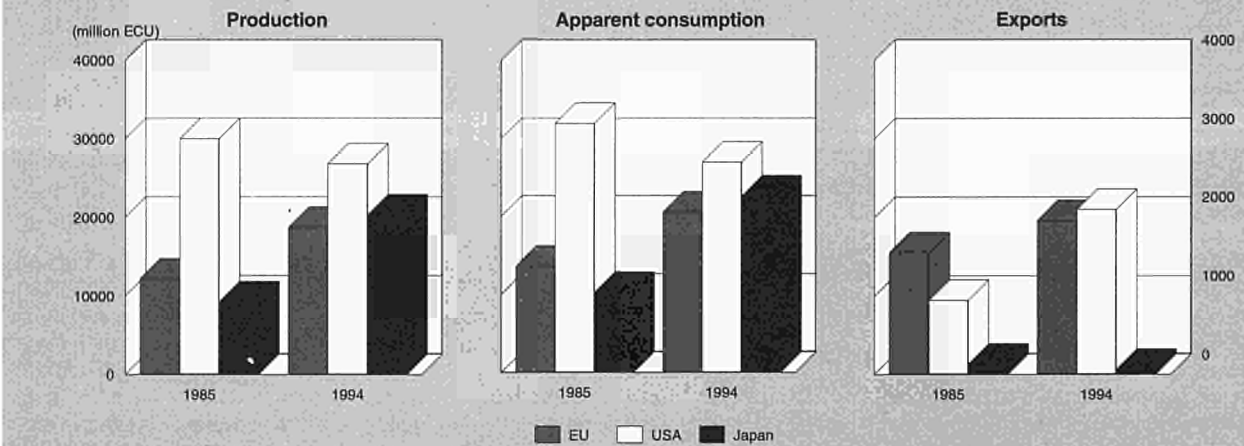
The recent expansion of the EU to include three new countries should boost growth: in 1995, apparent consumption should rise from 20 766 million ECU (EU-12) to 22 803 million ECU (a 9.8% rise). Forecasts for 1996-98 envisage further growth of consumption by virtue of the fact that in the three new EU Member States consumption of processed fruit and vegetable is high, while domestic production is relatively low. As for employment, in the short period the expansion of the EU will result in an increase in employment levels, but future labour requirements are expected to gradually drop.

International comparison

In 1994, the EU, with a production at current prices of 18 694 million ECU, was the third world producer of processed fruit and vegetables behind the USA (26 780 million ECU) and Japan with 20 305 million ECU.

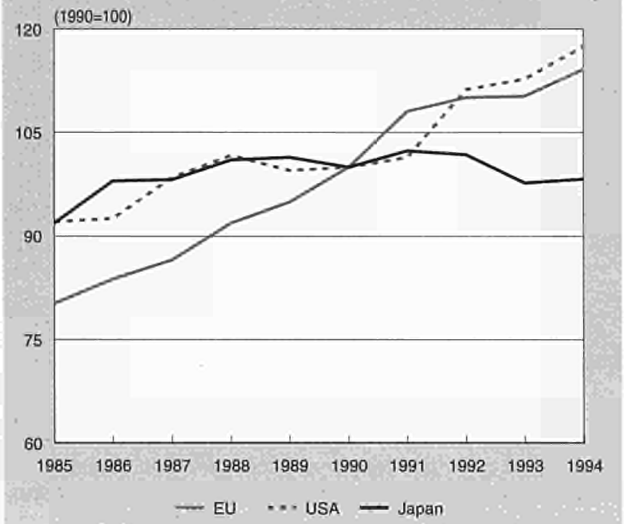
During the course of the last decade, both the EU and Japan enjoyed strong production growth: in 1985, the production of fruit and vegetable processing and preserving of the EU amounted to only 12 204 million ECU, a figure about 30% below the current one, and in Japan too the value of production has more than doubled passing from 9 243 million ECU to 20 305 million ECU.

Figure 4: Fruit and vegetable processing and preserving
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Fruit and vegetable processing and preserving International comparison of production in constant prices



Source: DEBA GEIE

This correspondent figure dropped steeply in the USA, where it fell from 30 047 million ECU to 26 780 million ECU.

Consumption follows a pattern similar to production. In 1994, the highest apparent consumption was achieved in the USA, with 26 912 million ECU, though a significant drop was recorded over the decade as a whole. In the EU on the other hand, consumption reached 20 549 million ECU in 1994, which represented a strong growth compared to the previous decade. This figure is however lower than that of Japan where it reached 22 630 million ECU, having doubled in less than 10 years.

In the USA, the drop in production was caused by a contraction of domestic demand, while exports actually rose more than in Japan and Europe. The USA remains the largest exporter of processed fruit and vegetables with 2 102 million ECU, followed by the EU with 1 961 million ECU and Japan with only 60 million ECU.

In volume terms, production in the EU and Japan rose throughout the 1990s faster than it did in the USA, while the opposite had occurred in the 1980s.

Foreign trade

Extra-EU exports at current prices were very volatile during the 1980s, reaching a value of 1 961 million ECU in 1994.

Extra-EU imports grew until the beginning of the 1990s, while over the last few years they decreased, with the only exception of 1993-94 marked by a sudden but isolated increase (+17.99%).

The balance of trade was characterised by a structural deficit, which in recent years had showed signs of reduction in the EU-12. With the expansion of the EU to 15 members, the 1995 deficit will be greater than that of 1994. A main reason for this being that the new member countries are large importers of processed fruit and vegetables from countries outside the EU.

Market outlets for EU exporters are very diversified. In 1994, most fruit and vegetable processing and preserving exports went to the USA with 21%, on an equal footing with the EFTA countries. Compared to 1989, the importance of the USA as destination of these products slightly dropped (from 25% of overall exports), while the EFTA countries' share remained practically unchanged.

The share going to developing countries has increased in parallel to the reduction of exports to the USA (with an increase from 38.5% of total exports in 1989 to 44% in 1994).

Extra-EU imports also come from a wide variety of countries, particularly from countries characterised by low labour costs and geographic proximity to the EU: Turkey's share went from 16.1% in 1989 to 26.7% in 1994 while Poland accounted for 6% in 1994 while being absent from the ranking of the largest exporters to the EU in 1989. The above mentioned countries pushed ahead to the detriment of China and Brazil.

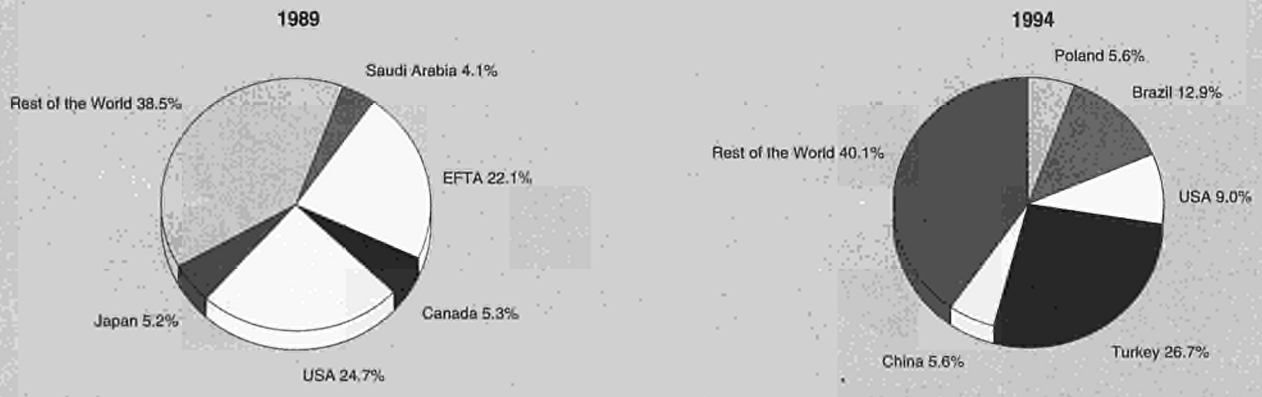
Finally, the export intensity ratio remained substantially stable for the entire 1985-94 period at an average level of 9.5%. Turning to import penetration, the long-term trend shows a marked drop: this figure was in fact 18.6% in 1994 compared to 21.9% in 1985.

MARKET FORCES

Demand

The processed fruit and vegetables sector includes tomato based products, vegetable preserves and canned vegetables. The market of these products has reached maturity.

Figure 6: Fruit and vegetable processing and preserving Destination of EU exports



Source: Eurostat

Table 5: Fruit and vegetable processing and preserving
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	75.9	78.7	85.3	91.0	96.4	100.0	107.2	109.2	110.2	109.5
Unit labour costs index (3)	98.2	99.7	97.1	98.1	99.1	100.0	103.3	103.7	103.5	106.0
Total unit costs index (4)	96.7	95.7	93.9	95.2	97.4	100.0	104.0	104.8	100.9	101.7
Gross operating rate (%) (5)	8.4	8.1	8.5	8.2	9.4	8.5	8.8	8.7	8.3	8.3

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Canned vegetables and above all preserved fruits face the competition of fresh products and of frozen products. Generally speaking in fact, raw materials of inferior quality go for canning compared to those which are sold fresh or deep-frozen: consequently, these products fall in a medium-price bracket and do not produce large returns.

With regard to tomato-based products, over the last decade, traditional products (peeled tomatoes and tomato concentrate) have been replaced to a great extent by new products such as tomato pulp and puree. Current forecasts for these products envisage a growth of North-European markets estimated at around 2% per year. It is hardly likely however that this increase in consumption will benefit European companies, as imports from countries like Turkey take more and more market share.

In the jam and marmalade sector, consumption is tied to breakfast and between-meal snacks, and the biggest growth rates have benefited products with a strong "natural" image. Within the EU, consumption of jam and marmalade is particularly concentrated in the northern Member States: the highest per capita consumption is to be found in Sweden and Finland (5.7 kg per capita per year), followed by Denmark (2.4 kg) and Norway (2.3 kg). Italy has the lowest per capita consumption with 0.5 kg.

The fruit juices and nectars segment has been enjoying steady consumption growth rates in the past decade. This is particularly true with regard to products made from 100% squeezed fruits rich in liquids and which are often also used to make long drinks and cocktails. The main reason for this success is to be found in the "healthy" image of fruit juices forwarded by marketing strategies employed over recent years, despite the fact that there has been no product innovation. Thus, health-conscious consumers have been integrating fruit juice consumption as part of their usual dietetic habits.

Germany, with 50 litres per head is the biggest consumer of fruit juices, followed by the Netherlands (22 litres) and the United Kingdom (19 litres). The EU's favourite flavour is orange.

With regard to new food trends, processed products are obviously affected by the availability of fresh produce. In this sense, though still in the market introduction stage, note should be taken of V range products. These are processed fruit and vegetable products- peeled tomatoes, cut and portioned ready for use - and vacuum packed.

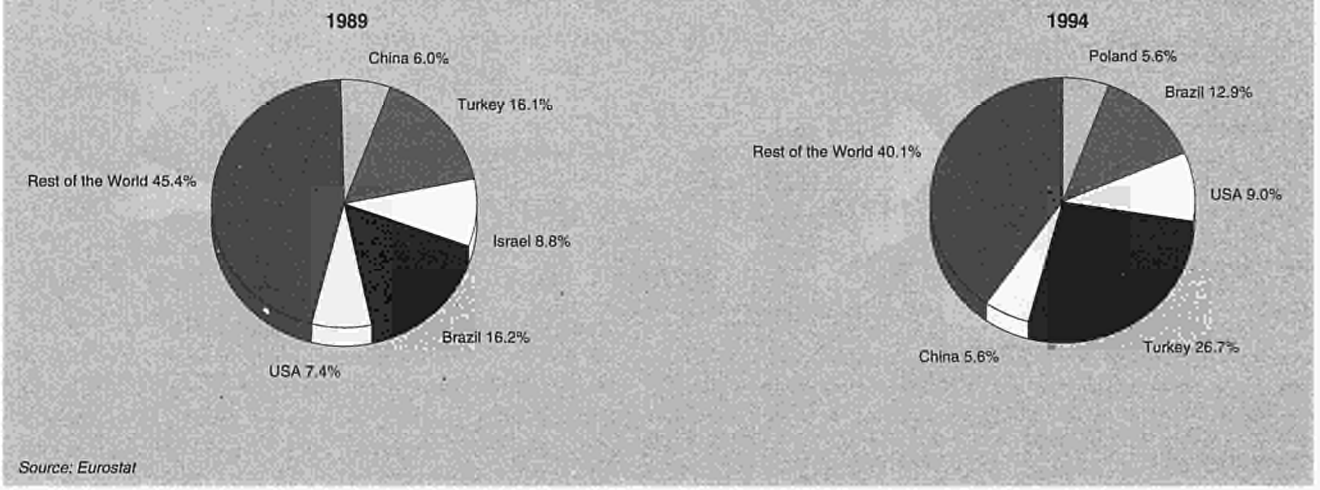
The V range approach first appeared in the mid-1980s in response to a growing demand for ready-to-use, easy-consumption food products.

Currently, such activity, carried on by a few small enterprises, chiefly involves the processing of vegetables: potatoes, carrots, etc. This market niche could benefit greatly however from an extension of the range of products to include fresh fruit, in both the retail and catering sectors: oranges and apples, both peeled and sliced, etc.

Supply and competition

In 1994, the EU produced processed fruit and vegetables for an overall value of 18 694 million ECU. Within the EU, the

Figure 7: Fruit and vegetable processing and preserving
Origin of EU imports



Source: Eurostat

Table 6: Fruit and vegetable processing and preserving Employment and production by Member State, 1994 (1)

(million ECU)	Production	Employment (units)
EU	18694	133545
Belgique/België	1 221	5 534
Danmark	263	N/A
Deutschland	3 903	20 857
Ellada	869	9 782
España	2 081	26 795
France	3 271	20 989
Ireland	133	1 159
Italia	3 608	19 332
Luxembourg	0	0
Nederland	1 343	5 684
Portugal	207	3 123
United Kingdom	1 795	19 113

(1) Estimates.
Source: DEBA GEIE

main producer is Germany (3 903 million ECU) followed by Italy (3 608 million ECU) and France (3 271 million ECU).

At EU level, the sector employs altogether 133 545 persons. The highest employment levels are to be found in Spain (26 795 persons) and France (20 989). Germany (20 857) is in front of Italy (19 332), which, in turn, is followed by the United Kingdom (19 113)

In effect, processing activities in the sector tend to be centred outside the Mediterranean countries which produce most of the raw material, with the sole exception of tomatoes.

Generally speaking, the position of the processing industry looks weak within the EU; this is due particularly to the strong pressure on prices from third country imports.

In terms of production costs, the processing of fruit and vegetable products is achieved more cheaply in developing countries or in countries like Turkey and Eastern Europe. In particular, many non-EU countries enjoy cost advantages thanks to the economies achieved in the purchase of raw materials and labours costs.

Non-EU producers are increasing their efforts to make inroads into the EU market. In the fruit sector, Del Monte and Langemberg, i.e. the two leading South African producers, have recently increased their production capacity in order to meet the expected increase in demand from the EU in the next few years. The same is true in the processed vegetable sector, where Turkey already sells a large part of its tomato based products to the countries of northern Europe.

In the 1980s, while consumption of processed fruit and vegetables was increasing, the labour productivity index (base 100 in 1990) gradually rose thanks to the restructuring of numerous facilities with consequent increase in output. Conversely, in the 1990s, labour productivity remained substantially stable and, in 1993-94, it dropped slightly (-0.58%).

One should always remember that markets like that of tomatoes are subject to a quota system per country. In these sectors, to work at the full capacity permitted by the system represents a form of optimisation of income and costs as much as it allows (1) to maintain the quota for the following year and (2) to reduce the output which is not covered by the quota, i.e. without Community aid.

The gross operating rate, after reaching a peak in 1989 with 9.4%, gradually dropped and settled at around 8.3% in 1994.

Production process

The use of technology in the sector's production process is rising.

In particular, the optimisation of processing cycles aims at keeping down production costs, while process innovation aims at improving product quality standards, a critical success factor in all segments.

In the field of tomato-based products, an important innovation was the introduction of mechanical harvesting, while important future developments will involve research and selection of new tomato varieties, in particular in relation to new derived products.

For both vegetable and fruit preserves, the opportunities for product innovation are more restricted compared to those for tomato-based products and are mainly based on an expansion of product range.

From a technological viewpoint, the production process for the preparation of jams and marmalades is fairly simple (with no specific technological barriers at entry) and there is not much room to obtain significant economies of scale. The innovations introduced into the sector principally concern the adoption of control systems which increase the reliability and the reproduction capacity of those parameters which have a greater effect on product quality.

In the field of the production of fruit in syrup or juices, technological innovations have swung towards shorter production times. Sorting and weighing are becoming particularly important factors in this field too.

Like fruit juices, fruit nectars are made using two technologies and two different packaging methods: hot filling in bottles and cold filling in cartons. Cold filling gives better taste results compared to hot filling, but storing of products for medium-long periods is better in bottles than in cartons.

INDUSTRY STRUCTURE

Companies

At present, there are 243 companies in the EU operating in the fruit and vegetable processing and preserving sector. Most of these are in Spain (126) and Italy (61) while the remaining 56 are split between France and Greece.

The fruit juice sector is strongly fragmented in terms of production facilities: about 1 400 enterprises operate in Europe. These are mainly concentrated in Germany (65%); France, Spain, Portugal and Italy account for another 22.8%.

A large number of firms are active in the tomato-based products sector. These are mainly concentrated in the Mediterranean countries. Italy is the top European producer of industrial tomatoes, with 3.3 million tonnes in 1995, followed by Greece with 1.1 million tonnes and Spain with 0.9 million tonnes.

In the fruit and vegetable processing and preserving sector, three different types of companies can be identified: (1) the diversified multinational companies, operating on international markets, (2) the small and medium-sized firms operating on regional markets and finally, (3) small and medium-sized firms occupying highly-specialised market niches.

Among the main European enterprises, a leading role is played by the following: Stule (D), Dittmeyer (D),Wesergold/Riha (D), Hero (CH), for the fruit juice sector; Granini (D), Gerber Foods (UK), Conserve Italia (I), Bonduelle (F), Cecab d'Aucy (F), Heinz (USA) and Gran Metropolitan (UK) for the vegetable preserves subsector; Hero (CH), Danone (F), Franz Zentis (D), May Holding (D), Chivers Brothers (UK), for the jam and marmalade subsector; Cirio (I), Del Monte (South Africa), Conserve Italia (I) Parmalat (I) for tomato based products.

Table 7: Fruit and vegetable processing and preserving Acquisitions

1994 Bidder	Country	Target	Target country
Cidreries du Cavados	France	Société Jus de Fruits Réunis (In Receivership)	France
Gelagri Bretagna (Coopagri Bretagne)	France	Siale Saint Cardec Company	France
Delta Dairy	Ellada	Barba Stathis	Ellada
Conserve Italia	Italia	Massa Lombardo Colombani	Italia
Christian Salvesen	United Kingdom	Tendafrost Frozen Foods	United Kingdom
Geest	United Kingdom	St Martins-Waltham Abbey	United Kingdom
Hillsdown Holdings	United Kingdom	Materne-Fruibourg (Danone)	France
HI Food	United Kingdom	FE Barber Ltd Cannery Operations	N/A
Unilever	United Kingdom/Nederland	Cica	Argentina

1995 Bidder	Country	Target	Target country
Yolat (Parmalat)	Brazil	Mogalin	Venezuela
Flensted	Danmark	JYKA Food Industry	Danmark
Salade Minute	France	Vinet Louis Bernard	France
Polette & Cie	France	Chevalier (Bongrain)	France
Carnaudmetalbox	France	Globus Konzervipari - Tin plant	Hungary
Schwartau Int. (Oetker)	Deutschland	Hero	Switzerland
Doehler	Deutschland	EURO-Citrus	Nederland
Brooke Bond India (Unilever)	India	Pepsi Foods - Punjab Plant	India
Investor Group (Mantua)	Italia	Columbus (Fincooper)	Italia
Del Monte Royal Foods	South Africa	Confruit	Italia
Arla Ekonomisk Forening	Sverige	Klintebys AB	Sverige
Hero	Switzerland	Divida	Switzerland
Del Monte Foods International	United Kingdom	Hero (some food divisions)	Switzerland
Unilever	United Kingdom/Nederland	Colman's-Robinson's (Reckitt & Colman)	United Kingdom
Universal Food	USA	Top Foods	Nederland
Dole	USA	Pascual Hermanos	España
Campbell Soup	USA	Dalgety - Homepride Sauces Business	United Kingdom
Seneca Food Corporation	USA	Pillsbury Company /Grand Met	USA

Source: Nomisma

The index of specialisation shows that the fruit and vegetable processing and preserving carries considerable economic weight in some countries, especially in Spain, which in 1994 had a 6.52 ratio, while the one of the other EU Member States varied between 0 and 1. Overall speaking, the weight of the fruit and vegetable processing and preserving sector is low compared to that of other food sectors and even the Spanish situation is slowly becoming consistent with the one of that of the rest of the EU.

Strategies

The industry has adopted product diversification and product innovation policies in line with the recent trends expressed by the market.

It is not likely that innovation will however solve the problems of the sector because profit margins on the product range are rather low and consequently levels of investment in R&D cannot be particularly high either.

Processed fruit and vegetables are in fact one of the "commodity" categories which most feel the effect of competition from modern distribution channels, thereby collocating processed fruit and vegetables in a medium-low price bracket. Many small and medium-sized enterprises and even some of the largest groups work as co-packers for modern distribution and discount chains.

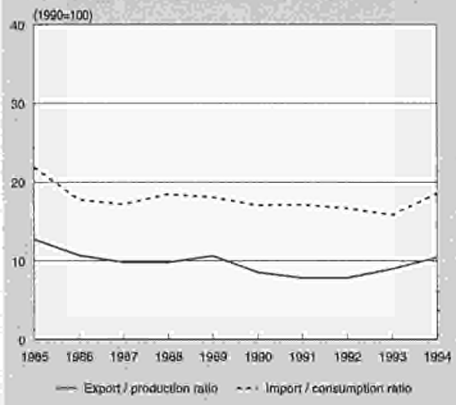
The strategy of the European industry for the forthcoming years consequently centres on cutting production costs and promoting research into innovative products to create new niche markets.

In 1995, strong activity in the fruit and vegetable processing and preserving market led to 18 acquisitions, i.e. twice as much of those recorded in 1994. In 1994, 4 out of a total of 9 acquisition took place between companies of the same Member State, while in 1995 this number rose to 7.

1995 was above all characterised by acquisitions of European industries by multinational US and South-African groups: Universal Food (US) took over Top Foods (NL), Dole (US) took over Pascual Hermanos (E), Campbell (US) took over Dalgety (UK) and Del Monte (SA) took over Confruit (I).

A major restructuring of market forces is under way within the EU, while the domestic market remains fairly stable. The reason for this restructuring is to be found in the recent GATT agreement, which will ease the introduction onto the European market of fruit and vegetable-based products from extra-EU countries at very competitive prices. Such situation is quite promising for the multinational groups while it is a concrete threat for European companies. The multinationals are thus all set to acquire local firms to guarantee product identification thanks to brand names and distribution outlets.

Figure 8: Fruit and vegetable processing and preserving Trade intensities



Source: DEBA GEIE, Eurostat

Table 8: Fruit and vegetable processing and preserving Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.08	1.85
Danmark	1.08	0.83
Deutschland	0.65	0.67
Ellada	7.67	6.52
España	1.44	1.56
France	0.98	0.91
Ireland	1.04	0.61
Italia	1.36	1.34
Luxembourg	0.00	0.00
Nederland	1.05	1.53
Portugal	1.40	0.87
United Kingdom	0.71	0.64

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

ENVIRONMENT

Processing of the raw materials for deep-freezing originates wastes represented by packaging and vegetable wastes. As far as vegetable processing residues are concerned, methods of disposal exist which have a low environmental impact.

Packaging ecology will represent a major topic in the future and enterprises will soon have to comply with recent regulations on recycling and re-utilisation of food containers. For the time being, the main type of wrapping is cans for processed fruit and vegetables and plastic or glass containers for juices and tomato-based products.

The other main environmental problem affecting the sector is represented by the use of pesticides. The programme for the control of pesticides residues in agricultural products was recently strengthened through the adoption by the Council of two measures (Directives 95/38 and 95/39) establishing maximum pesticide residue levels (MRLs) for 13 widely used pesticides that may leave residues in agricultural products, 7 of which have not been previously covered by Community legislation. A maximum period of four years is envisaged to allow for the generation of accurate data. During this period maximum levels for some particular pesticide will remain unharmonized between EU countries.

REGULATIONS

During 1994, the Commission analysed the current situation for both fresh and processed fruit and vegetables and likely trends in both the world and the Community market. Following the Commission's communication of 1994 (COM 94/360), two proposals for Council Regulations on the reform of the common organisation of those markets were adopted in 1995. Such proposals were mainly intended to consolidate the positive aspects of existing market organisations (orientation towards market forces, decentralisation, concentration of supply) and to correct their perceived weaknesses (reform of subsidised withdrawals and improvement of quality standards).

Fresh fruit and vegetables

The Common Market Organisation (CMO) for fresh fruits and vegetables dates back to Reg. (EEC) 1035/72 which has been subsequently amended by other Regulations. Fresh fruits and vegetables CMO also apply to the production of processed citrus fruits and bananas. The basic aim of this organisation is to balance supply and demand at a fair level of income for growers, taking into account the trade with extra-EU countries and the necessary specialisation inside the Community. Means to achieve this objective are the price control mechanism, the maintenance of common quality standards, as well as a withdrawal system, to take production off the market in cases of disturbances.

The major change discussed in 1995 for CMO in fresh products is the creation of operational funds financed partly by producer contribution and partly by public (national and Community) funds. These funds may be used to supplement Community intervention to a limited extent, under the condition that a sound structural programme is proposed and implemented by the producer organisation concerned.

As far as price regulation is concerned, pending its proposals on a reform of CMO in this sector, the Commission decided that the basic and the buying-in prices for 1995/1996 should be kept at the same level as before.

Processed fruit and vegetables

CMO for processed fruits and vegetables is based on Reg. (EEC) 426/86, as last amended by Reg. (EEC) 1569/92. This organisation operates through a complex system of processing aids and price controls. The stabilisation measures in force in this sector are of two kinds and vary according to the product: (1) the fixing of a guarantee threshold which, if exceeded, results in a proportional reduction in production aids; (2) the limiting of the aid by the introduction of a production quota scheme.

The 1995 Commission proposal for reforming the processed fruit and vegetables CMO outlines a new aid system for tomato processing as well as a general simplification of market stabilisation measures

As far as international trade is concerned, commitments arising from Uruguay Round negotiations modified the system of trade in fruit and vegetables with extra-EU countries: the reference-price system has been replaced by a system of decreasing entry prices; export refunds are subject to limits on value and quantity.

Finally, it has to be noticed that a considerable lack of uniformity between EU countries still exists in fiscal legislation and taxation rates affecting this sector.

OUTLOOK

Many factors influence favourably the demand for products in the sector: the health trends, the high degree of diversifi-

cation, the practicality of preserved fruit and vegetable-based products.

The larger enterprises in the sector will tend to accentuate the process of concentration of supply, which is still very fragmented, and will continue to focus on product innovation so as to be able to offer the widest possible range of products.

The recent EU enlargement will favour increased consumption. However, the risk does exist that non-community producers will benefit more from this situation. This might translate into a rise in extra-EU imports with a consequent reduction in the number of enterprises operating within the EU.

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Deep-frozen products

NACE (Revision 1) part of 15.1, 15.2, 15.3

Deep frozen foods are characterised by positive market trend, particularly in the segment of ready meals, while the remaining products, though achieving high consumption levels, are distinguished by lower growth rates. Consumption of ready meals, however, is still mainly concentrated in Northern European countries.
In general, prospects for growth in the deep frozen food market look very good over the next few years, since deep freezing technology can be easily applied to a wide range of food products. Presently, vegetables and potatoes represent about 40%, quantitatively, of overall deep frozen food purchases in the EU. In recent years, the United Kingdom, Austria and the Mediterranean countries have shown the greatest rates of growth.

INDUSTRY PROFILE

Description of the sector

The deep frozen foods industry may be broken down into six product categories: vegetables and potatoes; fish and shellfish; bakery and pastry goods; ready meals; fruit and juices; meat and poultry.

In Europe, consumption of deep frozen foods exceeds 8 000 tonnes per annum. The most important category is vegetables and potatoes, followed by meat products and then ready meals. The leading position of vegetables and potatoes is determined by its popularity among consumers in Northern European countries like Germany, the United Kingdom and France. In the Mediterranean countries, where consumers' preference still goes to fresh vegetables and fruit, deep frozen versions of these products had less success and consumption stayed below the European average. The most traditional deep frozen food products, such as vegetable and meat products, have already reached the saturation point on some markets (e.g. Northern Europe) in terms of natural market cycles. The most promising growth areas are ready meals, baked and pastry goods.

Recent trends

In 1994, consumption of deep frozen foods grew in nearly all EU countries, with 4% to 8% increases over 1993. Sweden and Italy posted the greatest growth (around 10%). The only exception was Germany, which posted a slight drop compared to the previous year. Germany is the second largest market for deep frozen food in the EU, with 1.89 million tonnes, behind the United Kingdom's 2.27 million tonnes, but ahead of France with 1.69 million tonnes.

Moving on to the analysis of the individual product groups, all categories, with the exception of bakery goods and poultry, showed uninterrupted growth in terms of volume in 1994. The most significant increases over 1993 were posted by the following products: vegetables (+2%); potatoes (+7%), fish (+6%); and pre-prepared food (+20%). The rapidly increasing popularity of ready meals is closely tied to changing consumer lifestyles, whereby less and less time is devoted to food preparation.

Within the EU, consumption of deep frozen foods is primarily concentrated on vegetables and potatoes, which, taken together, amount to 3.31 million tonnes, or about 40% of total consumption. At country level, deep frozen vegetable sales are strongest in the United Kingdom (426 000 tonnes), France (420 000 tonnes) and Germany (327 000 tonnes).

Consumption of frozen potatoes is highest in the three countries which are also the largest producers of this tuber: the United Kingdom (405 500 tonnes), France (400 000 tonnes) and Germany (343 500 tonnes). Frozen potatoes consumption figures reflect their extensive use in professional kitchens and the growth of fast food chains.

The most important product category, after vegetables, is ready meals, with sales of 1.55 million tonnes. Here, as well, the major consumers are the United Kingdom (568 900 tonnes), Germany (352 000 tonnes) and France (300 000 tonnes).

In third place among product categories one can find poultry with 891 000 tonnes, followed by fish and shellfish (874 600 tonnes), which is primarily consumed in Northern Europe and Spain, the latter with 338 200 tonnes.

Meat-based deep frozen products, on the other hand, are most heavily consumed in Northern Europe and almost absent in Southern Europe; they account for an overall consumption figure of 670 000 tonnes.

Table 1: Deep-frozen products
Consumption in volume, 1994

(thousand tonnes)	B (1)	DK	D (2)	E	F (3)	I	NL (4)	A (4)	FIN	S	UK	EUR 15 (5)	USA	JAP
Vegetables	23.9	33.4	327.0	208.0	402.0	258.4	46.5	44.2	17.6	34.9	426.1	1 798.0	1 351.4	396.7
Potato products	60.6	25.3	343.5	82.3	400.0	76.0	92.1	27.9	18.6	44.9	405.5	1 516.0	3 285.5	214.3
Fruit products	0.0	1.6	25.8	5.9	7.0	1.5	0.5	1.8	3.2	3.6	0.0	50.9	444.3	2.9
Pastry products	0.4	36.7	175.3	73.6	260.0	10.7	2.6	0.0	7.7	13.6	21.0	601.1	0.0	20.0
Prepared products	21.6	52.6	352.0	69.0	300.0	65.4	43.7	33.0	6.7	57.6	568.9	1 548.9	0.0	829.2
Fish	11.9	22.7	146.4	157.2	186.0	54.8	14.0	14.7	10.0	29.3	191.1	611.5	162.9	58.9
Molluscs and shellfish	2.7	10.7	15.8	181.2	0.0	14.9	0.0	0.0	0.5	22.0	29.1	488.7	95.6	150.3
Processed meat	3.0	18.9	109.5	20.3	140.0	9.2	75.5	0.0	0.0	21.7	100.4	385.9	0.0	144.0
Meat and game	0.4	0.0	0.0	0.0	0.0	0.1	N/A	0.0	2.3	14.5	158.0	284.4	0.0	N/A
Poultry	1.6	50.3	401.0	0.0	0.0	16.4	N/A	0.0	3.0	50.1	370.6	891.3	0.0	3.9
Total	188.2	252.2	1 896.1	797.5	1 695.0	507.1	274.8	121.6	69.6	292.2	2 270.7	8 364.9	5 339.8	1 820.2

(1) Retail consumption, except total which also includes catering consumption.
(2) Processed meat and meat and game together.
(3) Estimations; fish, molluscs and shellfish together.
(4) Fish, molluscs and shellfish together.
(5) Excluding Greece, Ireland, Luxembourg and Portugal.
Source: FAFPAS

Table 2: Deep-frozen products
Total consumption in volume by Member State

(thousand tonnes)	1990	1991	1992	1993	1994
Belgique/België	N/A	137.6	140.6	182.5	188.2
Danmark	217.6	227.0	232.0	247.0	252.2
Deutschland	1 616.0	1 785.6	1 854.1	1 899.3	1 896.1
España	534.0	569.8	616.5	756.5	797.5
France	1 342.5	1 429.9	1 809.2	1 625.5	1 695.0
Italia	380.3	412.6	449.5	469.5	507.1
Nederland	246.5	254.2	258.1	264.2	274.8
Österreich	96.5	105.9	112.2	117.3	121.6
Suomi/Finland	69.0	68.1	63.3	62.6	69.6
Sverige	251.8	248.7	260.6	271.1	292.2
United Kingdom	1 052.5	1 100.2	2 031.0	2 190.0	2 270.7

Source: FAFPAS and Swiss Frozen Food Institute.

Table 3: Deep-frozen products
Consumption by main product in volume (1)

(thousand tonnes)	1990	1991	1992	1993	1994
Vegetables	1 448	1 559	1 672	1 781	1 822
Potato products	1 131	1 231	1 396	1 472	1 577
Fish	944	966	1 030	1 056	1 115
Meat	560	557	752	701	674
Bakery products	610	757	942	1 133	601
Ready meals	365	463	647	1 303	1 570
Poultry	582	707	1 117	945	893
Total	5 639	6 240	7 557	8 391	8 252

(1) EUR15 excluding Greece, Ireland, Luxembourg and Portugal; 1990: excluding Belgium.
Source: FAFPAS and Swiss Frozen Food Institute.

Table 4: Deep-frozen products
External trade by main product line (1)

(million ECU)	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports							
Meat	1 444.3	1 747.6	1 407.5	1 627.5	1 660.9	1 681.1	1 885.8
Fish	447.0	455.0	468.6	515.0	485.4	511.2	592.9
Vegetables	58.1	65.4	66.1	60.4	62.5	71.2	76.4
Fruit	15.9	15.1	15.4	18.7	18.4	17.2	24.6
Orange juice	18.2	16.0	17.9	17.8	12.0	8.8	14.7
Extra-EU imports							
Meat	464.7	562.3	534.0	518.4	536.3	558.3	627.8
Fish	1 520.6	1 512.9	1 869.5	2 140.8	2 110.8	1 837.3	1 963.7
Vegetables	137.7	139.9	154.8	182.4	185.1	165.2	203.7
Fruit	174.3	177.1	229.9	296.5	299.3	286.0	377.1
Orange juice	580.3	581.8	591.9	509.8	536.7	418.4	529.9

(1) EUR12.
Source: Eurostat

The deep frozen fruit category accounts only for a very small share of the market, scarcely more than 50 000 tonnes, half of which is sold in Germany.

Turning to consumption in value terms, between 1989 and 1993 the deep frozen food market posted an increase in value only in the EU nations with the greatest purchase power: Denmark (from 345 to 763 million ECU); Germany (from 1 920 to 2 682 million ECU); France (from 3 091 to 4 176 million ECU) and the Netherlands (from 389 to 546 million ECU). A slight drop was recorded for Spain (-3%) and Portugal (-1%). Figures for Italy remained practically unchanged.

Production reflects the trend in consumption. In 1993 production of deep frozen vegetables and potatoes in the EU accounted for 46.6% of total production. Vegetable products,

alone, amounted to 1.31 million tonnes, whereas potatoes reached 1.22 million tonnes. The leading deep frozen vegetable manufacturer is Germany, with 332 000 tonnes, ahead of the United Kingdom (319 000 tonnes) and France (260 000 tonnes). These three countries account for around 70% of the total output. The situation is nearly identical when it comes to potatoes, where the three aforementioned countries are the major producers, in the same order: Germany (354 000 tonnes), the United Kingdom (282 000 tonnes) and France (230 000 tonnes).

Turning to fish, Spain is the leading producer (180 000 tonnes), ahead of Germany (137 000 tonnes) and the United Kingdom (106 000 tonnes).

The United Kingdom is the leading producer of deep frozen meat (650 000 tonnes), well ahead of Germany (109 000 tonnes) and France (105 000 tonnes). This category represents over 50% of the United Kingdom's total production, whereas in the other countries it represents less than a 10% share. The most widely popular products in the United Kingdom are low cost items, in particular hamburgers and sausages.

Germany takes the lead in the ready meals category (46% of total output) but takes second place in the deep frozen pastry division (21.5%), where it follows France with 27%.

International comparison

In 1994 the EU consumed 8.36 million tonnes of deep frozen food products, more than either the USA (5.34 million tonnes) or Japan (1.82 million tonnes). The analysis by category reveals that the US market is clearly dominated by "French fries" sales, whereas in the EU the various categories have a more even market share, indicating greater diversity of supply.

In 1994, deep frozen foods showed significant growth in Japan, after several years of stagnation. In particular, there was an increase in deep frozen rice dishes, sushi and noodle dishes.

On the other hand, in the USA the industry is going through significant changes due to the fierce competition on an already saturated market and rapidly changing consumer tastes, switching from high-calorie to low-fat items.

Foreign trade

EU exports of deep frozen foods consist primarily of meat-based products, which represent about 84.2% of deep frozen food exports. In the period between 1988 and 1993, extra-EU exports of meat-based frozen food grew steadily in value terms from 1.4 to 1.6 billion ECU. This growth can be explained by the EU's surplus in beef production. The major customers are Eastern Europe, Russia, Egypt, the Middle East and the nations of Central Africa.

The second largest item for export is represented by deep frozen fish (8% of total exports), which is also exported to a wide variety of countries. Exports of other deep frozen food categories are of negligible importance.

Between 1988 and 1993, imports of deep frozen foods primarily involved fish-based products, which increased from 1.1 billion ECU to about 1.5 billion ECU.

The second most important type of deep frozen foodstuff imported is concentrated orange juice, used by the beverage and juice industry as a raw material for creating a variety of drinks. The primary suppliers are Florida and the Latin American countries.

MARKET FORCES

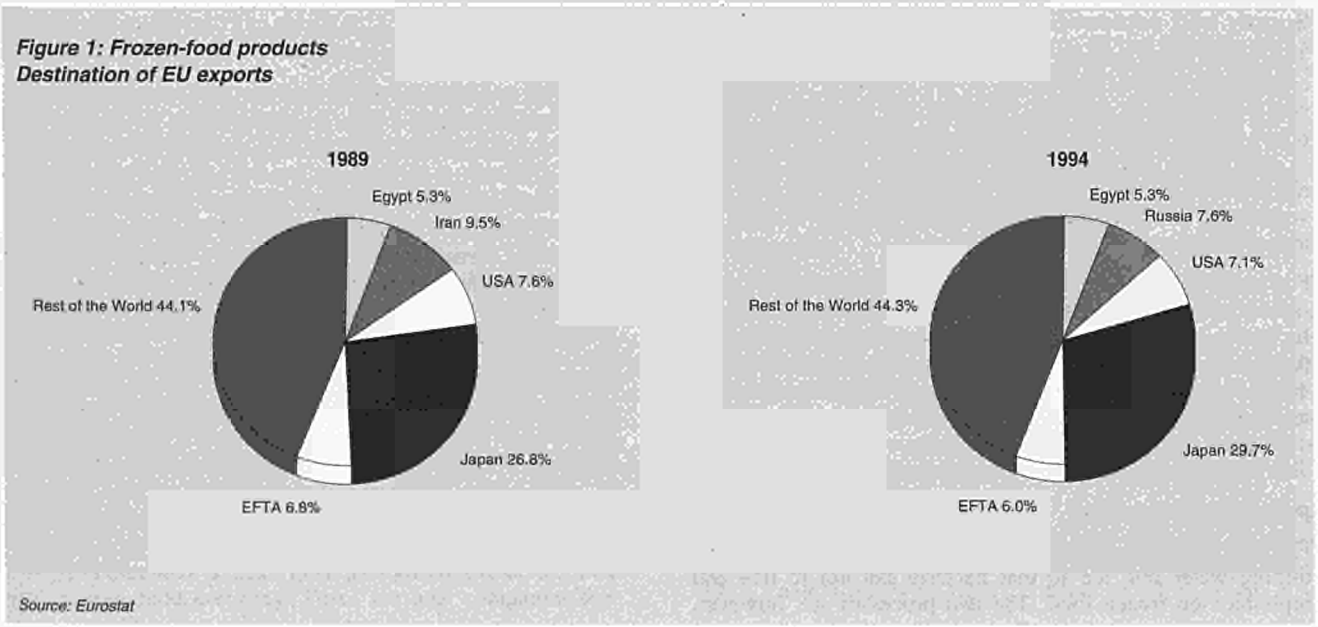
Demand

The food category that experienced the greatest growth throughout Europe was ready meals and desserts, accounting for the highest number of new product developments and the greatest degree of added convenience. Deep frozen ready meals with international flavour, especially Oriental, Italian and Indian food, represent the single fastest growing segment. In the deep frozen vegetable category, the greatest growth has been in stir-fry packs and prepared side-dishes. Lastly, the increase in European-wide potato consumption should be mentioned, prompted by this product's short cooking time and convenient price. The most important single product is straight chips. New niches for the sub-sector are emerging, such as low-fat chips and chips with different shapes, like extra-long and spiral chips.

The highest per capita consumption in the EU, in terms of both volume and value, is to be found in Denmark, with 34.4 Kg/per capita and 147.9 ECU. In second place we find Ireland with 26.2 Kg. In both cases, the high level of consumption is accounted for by imported products more than locally manufactured goods.

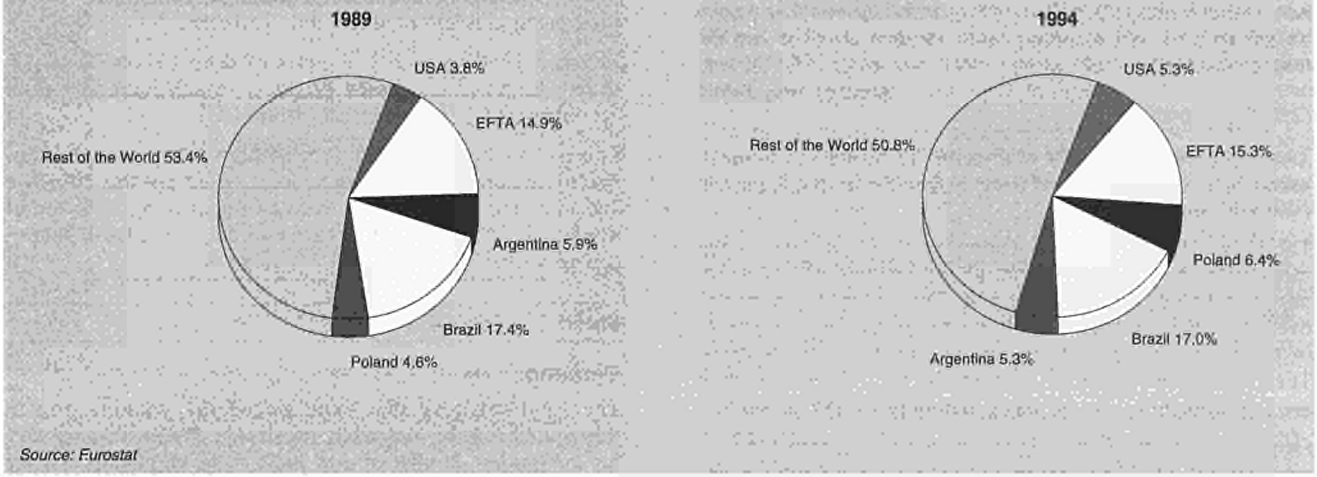
The major deep frozen food manufacturers have relatively lower per capita consumption levels, both in terms of quantity - the United Kingdom (24.2 Kg), Germany (21.7 Kg), and France (16.4 Kg) - and value. The data regarding the United Kingdom did not include ready meals and frozen pizza.

Figure 1: Frozen-food products
Destination of EU exports



Source: Eurostat

Figure 2: Frozen-food products
Origin of EU imports



Source: Eurostat

Demand is significantly influenced by marketing campaigns used in the different countries and the availability of modern household appliances.

Carrying a wide range of different deep frozen products involves greater space problems and higher costs than traditional grocery products. The deep frozen product requires a freezer case or freezer counters that consume high amounts of energy. Expanded product range and the policy of carrying different brands dictate larger stores that will ensure indispensable product visibility. The trend in many countries to move toward a more modern distribution system will bring with it the spread of deep frozen foods. In addition, the increase in sales of elaborated, sophisticated deep frozen products in the more saturated markets is closely linked to the routine household use of such appliances as microwave ovens.

Microwave sales figures for the entire EU indicate that these appliances, already common in Northern Europe, are gaining popularity in Mediterranean countries like Spain and Italy, and this should encourage more extensive use of deep frozen foods. The industry's incontestable strong point remains the fact that the deep freezing process has proven to be sufficiently flexible to be applied to almost the entire range of perishable products, allowing the industry to adjust its supply to changing consumer behaviour and tastes.

Supply and competition

The expansion of frozen food in most mature markets of Northern Europe will be conditioned by the increased competitiveness of fresh food products, characterised by falling average prices and the spread of own-label products. The development of shelf-stable and chilled products are the greatest threat to ready meals in the long term, while deep frozen fruit and vegetables face the challenge of fresh products treated for longer conservation.

For many years, the management of the "cold chain" represented an important entry barrier in the frozen food sector. In Germany and France, reorganisation and optimisation of the refrigeration cost were achieved, taking it out of the production chain. Additionally, computerised logistic systems integrated with other production and planning functions were developed. In some cases, the taking over of logistics by distribution has resulted in the appearance of new producers.

Production process

Freezing and deep freezing are based on the same principle: turning water into ice so that bacteria can not to live and reproduce on frozen food. The two processes are, however, different. Freezing means achieving low temperatures slowly. This way, large ice crystals are formed that damage the preserved food cells and when thawed, the food looses precious proteins, sugars and vitamins. By deep freezing, low temperatures are achieved very quickly, so the ice crystals are smaller and do not cause the loss of precious nutrients. In short, deep freezing preserves the fresh taste and appeal of food.

The deep frozen food industry does not really involve complicated, or particularly advanced technology. However, the wide range of applications deep freezing offers the food industry serves to keep this industry on its toes, stimulating research and development of new products. The preparation process varies, depending on the type of product being deep frozen and the degree of product sophistication.

The choice of product and deep freezing facility have a financial impact on the production cost. Deep freezing systems can be broken down into three major categories: mechanical systems, cryogenic systems and mixed systems. The mechanical systems were the first to be introduced and they work by means of forced air, immersion in a liquid and direct contact with the product. They are generally used for deep freezing irregularly shaped products, like fish, poultry and fruit pulp intended for further processing. Plate freezers are good for deep freezing products held in a container suitable for selling, like ready meals or less complicated products like spinach, leafy vegetables and so on.

A second type of deep freezing technology involves cryogenic procedures that utilise special gases suitable for treating food products. This sort of deep freezing facility is very versatile, since it can be run by different types of gas, making it possible to operate the facility using the cheapest power source available. The costs of cryogenic plants are high, but this type of technology turns out to be economically feasible when deep freezing smaller batches of a product or if sales are subject to great fluctuations. Deep freezing higher volumes of product is left to mechanical facilities.

Mixed systems are used in situations where the deep freezing occurs either before or after the food processing. Products involved in this sort of deep freezing process are generally fillets of fish and fish sticks, pre-cooked products and meats.

Table 5: Deep-frozen products
Acquisitions

1994 Bidder	Country	Target	Target country
BSN	France	Vivagel (Unilever)	France
Naarden Internacional	España	Alimentos refrigerados	España
Nestlé	Switzerland	Anonima de Alimentacion	España
Albert Fisher Group	United Kingdom	Rahbek Group	Danmark
Christian Salvesen	United Kingdom	Tendafrost Frozen Foods	United Kingdom
Investor Group	United Kingdom	Lyons Seafoods (Allied Domecq)	United Kingdom
Unilever	United Kingdom/Nederland	Menissez	France

1995 Bidder	Country	Target	Target country
Ardovies	Belgique/België	Siale	France
Digrom	Belgique/België	Unicopa	France
Danisco	Danmark	Groko	Nederland
Danish Prime Food	Danmark	Mou Dybfrost	Danmark
Coopagri Bretagne SCA	France	Siale (Saint-Caradec Factory)	France
Gel 2000	France	Vik Surgeles	France
Compagnie Generale de Surgele	France	Clairgel	France
Compagnie Generale de Surgele	France	Telegel	France
Danone	France	Gelax	Italia
Delta	Ellada	Froza	Ellada
Argel	Italia	Bocon	Italia
Pescafina	España	Riazor	España
Hero (Schwartau - Oetker)	Switzerland	Trattoria	Switzerland
Grand Met	United Kingdom	Pet Inc	USA
Brake Bros	United Kingdom	Frigosud	France
Northem Foods	United Kingdom	Green Isle	Ireland
Dalepack Foods	United Kingdom	Cavaghan & Gray	United Kingdom
Unilever	United Kingdom/Nederland	Groupe Touflet	France
Unilever	United Kingdom/Nederland	Frudesa (Danone)	España
Unilever	United Kingdom/Nederland	Frigorifico Rioplatense	Argentina

Source: Nomisma

INDUSTRY STRUCTURE

Companies

The industry is dominated by a few giant multinationals that have about 70% of the market share cornered. At the same time, there are a number of small and medium-sized companies concentrated in the regional markets and specialised in a limited number of specific products. France has the largest number of producers (around 400) In 1992, there were about 90 producers in Germany, 135 in Spain, 90 in Denmark, 65 in Italy and around 130 in the United Kingdom.

Some of the most important multinationals operating in Europe are Nestlé (CH) and Unilever (NL/UK), implementing multi-label policies and featuring an extremely varied range of products. Campbell (USA) has major interests in the deep frozen vegetable division, working through the Groko import company, which owns manufacturing facilities in the Low Countries, the United Kingdom, as well as affiliates throughout the rest of Europe. Involved primarily in the northern European markets, Dr. Oekter (D) offers an interesting case in point. It is a company that has major interests in the non-food sector, which has diversified to include food products, especially deep frozen foods. Other groups active in the industry are Bonduelle (F), Cogesal (F), operating in ready meals and the ice-cream sector and Vital Sogeviandes (F), in deep frozen meats. In Germany, along with the multinationals, Coppenrath & Wiese operate in the ready-to-serve meal and bakery divisions, where there is fierce competition by the own-label products. In Belgium, Iglo enjoys a 40% market share, while in Spain Pescanova is, apart from the multinationals, the main deep frozen food company. There are also companies specialised in simply distributing and delivering deep frozen products, like the German firm Eismann & Bofrost.

Deep frozen vegetable and potato production facilities are often located near growing areas, since the time it takes to get the products from the fields and orchards to the deep freezing plant can be crucial to product quality. Fish are also immediately deep frozen right on the fishing boats and later processed on land. Pre-cooked and other types of processed foods are prepared in a special section of the plant.

There is an enormous variety of deep frozen products and it is not always appropriate to process all kinds of foodstuffs in the same plant, as this can lead to inefficiency and additional costs. This is where the co-packer companies come in: by assuming the manufacturing burden of certain products, they help the deep freezing plant owners circumvent onerous production facility and plant expansion projects.

Strategies

The variables that influence demand change significantly if the retail catering market is included in the equation. In retail, the purchaser is also the final consumer, whereas, in the catering market, the deep frozen product is purchased in order to be offered to the restaurant and professional kitchen industry. The retail industry is the driving force in the industry's development. The major strategies adopted by the companies involve: 1) Product innovation; 2) Label policies.

1) Market growth depends largely on genuine innovations, that is, new types of foods that translate into new products or entire product lines. Not only does product innovation make direct comparison with fresh products possible, it can also

create updated, modern interpretations of traditional dishes. This way, deep frozen food makes it possible to internationalise eating habits, introducing traditional regional cuisine to the entire European continent. Moreover, the originality and high level of product service offered justify a higher premium price than with traditional products.

2) The high degree of innovation is the tool with which the industry tries to anticipate changes in consumer behaviour and thereby beat the competition. Only the biggest companies, however, can shoulder the investments required for proper research and development. This is why big companies, especially the multinationals, play such a key role in the deep frozen food industry. Multinational involvement has made it possible to pursue a multi-label policy, whereby the same company can offer premium price products along with less expensive items under a different label. Brand name products are often promoted by huge advertising budgets.

Deep frozen foods are, therefore, more and more targeting a customer that not only appreciates the product's easy preparation, but also its sophistication. In the catering field, however, the major selling points remain ease of preparation and lower prices.

In 1995, the deep frozen foods market witnessed to no less than 20 acquisitions, a much higher number than in the previous year, when only eight companies changed hands. Whereas the United Kingdom witnessed three such operations in 1994, the most active market place in 1995 was France. This should come as no surprise, since France happens to have the largest number of deep frozen food manufacturers (over 400). Of the eight acquisition deals concluded, four were among French companies, while the rest involved French companies being purchased by Belgian, Greek and English firms.

In 1995, there were only six acquisitions made by multinational groups in Europe: Danone (F) bought Gelax (I), Hero (CH) bought Trattoria (CH), Unilever (NL/UK) bought the Groupe Touflet (F) and Frudesa (F), and Frigorico Rioplatensee Grandmet (UK) bought Plet Inc. (USA).

ENVIRONMENT

Environmental protection has become an issue than cannot be ignored by the deep frozen food industry. The deep frozen food industry transforms perishable raw food materials into finished products that meet consumer's needs in terms of practical convenience. It is therefore up to the individual companies involved to safeguard the environment from which they obtain their raw materials by minimising the environmental impact of their processing systems and packaging materials.

Processing raw materials designated for deep freezing produces two types of waste: (1) primary and secondary packaging; (2) vegetable and animal waste.

The problem of packaging waste is being addressed by means of reducing the amount of packaging involved, the use of recycled materials and the recycling of used packaging.

Turning to vegetable waste materials, there are ways of eliminating waste that have minimal environmental impact. The options are: disposal in authorised dumps; animal feed; use as compost. The first two options are hard to pursue, in that vegetable wastes are not really garbage and the animal feed industry is becoming increasingly selective about the ingredients it uses. The third solution assumes that the waste processing company has access to agricultural land, which is generally only the case with co-operatives.

REGULATIONS

The approximation of the laws of the Member States relating to quick-frozen foodstuff for human consumption was achieved by Council Directive 89/108 laying down general rules on production, transport and distribution of frozen foodstuffs. Detailed provisions on labelling requirements and the storage period were also introduced. According to this Directive, Member States must conduct random checks on freezing equipment and on temperature levels.

Additional provisions concerning the monitoring of temperatures in the means of transport, warehousing and storage of frozen products have been recently introduced with Directive 92/1. Lastly, methods of analysis for the official control of the temperature of frozen foods intended for human consumption are specified in Directive 92/2.

OUTLOOK

Changing lifestyles and eating habits should stimulate further growth in deep frozen food consumption. Consumption should increase particularly for high value added products sold in the retail network. Indeed, beyond the appealing convenience, shoppers are more and more enticed by a product's degree of sophistication. For the catering industry, the main selling features of deep frozen foods will remain ease of preparation and the lower prices, relative to fresh foodstuffs.

The range of deep frozen products is therefore destined to increase over the next few years, carving out a market niche in all the various food categories. Of course, this market expansion will also have a positive effect on international trade, boosting imports and exports in terms of both volume and value.

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Oils and fats
NACE (Revision 1) 15.4

At the EU level, the increase in production in the sector has been driven by rising industrial demand, associated with fast growth in final consumption. Despite the high average growth rate of exports in recent years, the balance of trade in the sector still shows a strong deficit.
In the oilseed and margarine segments, extensive mechanisation of the production process has favoured the creation of an extremely concentrated industrial structure. Greater competition is to be found in the olive oil segment, where competition is increasingly focusing on product quality. The sector is also characterised by a strong tendency towards product diversification and in this context an increasingly important role is played by image and communication strategies.

INDUSTRY PROFILE

Description of the sector

This sector comprises the production and processing activities of vegetable oils and fats usable both as inputs in the manufacturing process of other industrial sectors and as end products for direct consumption.

From the production and processing of oilseeds, oils are obtained for use in several production processes (paints, inks, textile dyeing, lubricants and plastic materials), as well as oilcakes and meals, used mainly as animal feed. The direct use of oilseeds (colza, sunflower, groundnuts and corn) for human consumption is traditionally small at EU level, with the sole exception of soya proteins and lecithins, for which there has been a rise in consumption spurred by their beneficial effects on health.

The production of olive oil, in its different qualities, is almost entirely for human consumption, as is the production of margarine and fats for spreading (entirely vegetable or composite).

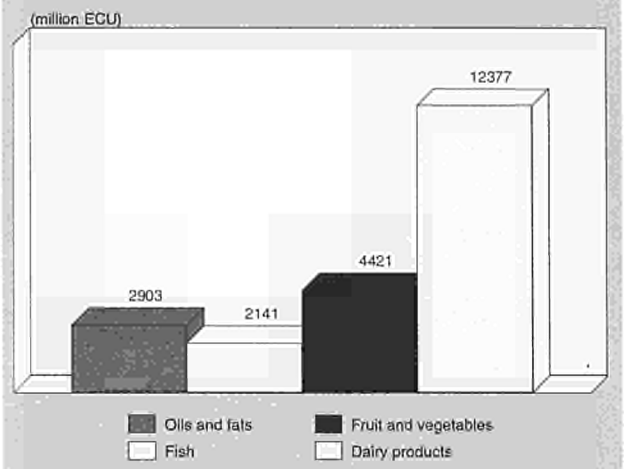
The wide fragmentation of oilseed production throughout the EU finds its origin in the second half of the 1980s, as a result of specific agricultural support measures. In 1994, the increase in production appeared to slightly slow down compared to the previous year. Production levels are likely to rise again in the near future, since the oilseed cultivation area in the EU (5 128 million hectares) permitted by the Blair House agreement between the US and the EU may be enlarged in the future.

At European level, by far the most important crop in the sector is soya which, with 10.1 thousand tonnes, accounts for about 60% of total production volume. Colza's share is much lower (21%) - in 1994 the colza crop area was reduced in the context of a CAP-inspired price support measure - as is that of sunflower (13%).

At country level, Germany remained Europe's biggest producer of colza in 1994, followed by the Netherlands. France and Spain are the largest producers of sunflower seeds. Italy and France are the biggest producers of soya. The land under soya crop is undergoing strong expansion in Germany, France, Spain, Italy and the United Kingdom.

For oilseeds in general, at European level only France and, with much lower consumption, Denmark, show a positive self-sufficiency balance. Cancelling the effect of the expansion of sowable land, poorer yields per hectare contributed in 1994 to the worsening of the balance of trade of the Union, which was already in deficit. A deficit persists for oilcakes and meals.

Figure 1: Oils and fats
Value added in comparison with related industries, 1994



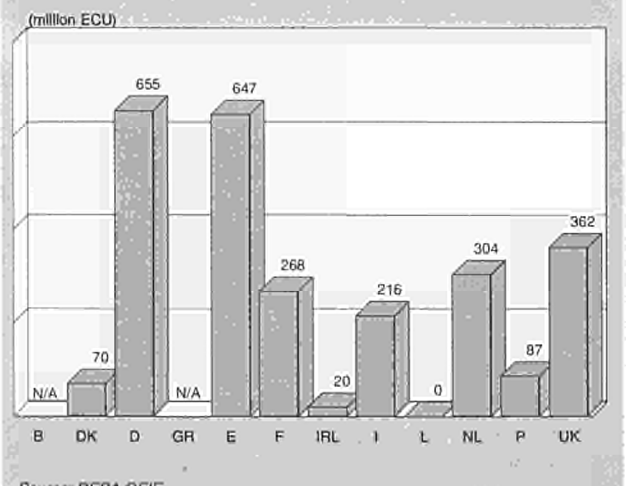
Source: DEBA GEIE

Concerning the production of vegetable oils (except olive oil), the EU is self-sufficient. Only certain products are imported (mainly palm, laurics and castor oil). The first-processing industry operating within the EU is located above all in Germany (28% of total EU production volume), the Netherlands (19%), Spain (12%) and Italy (11%).

The EU remains the world's largest producer of olive oil. Its overall share for 1994 fluctuated - as confirmed by FAO data (Source: Food Outlook 1995) - at around 78% of world production. In the EU, there are just five producing countries: Spain, Italy, Greece, Portugal and France. While the latter's production is substantially negligible, the other countries take leading positions in world rankings with Italy and Spain fighting for the top position. The 1994/95 campaign confirmed a drop in Spanish production, partially compensated by an increase in Italian production.

Similar trends affect the table oil sector. Despite a slight drop in the quantity of oil sent to extra-EU countries, the EU's trade balance is positive, though not as good as the previous year. In 1994/95, there was in fact a considerable increase in imports from non-EU countries. The EU does however

Figure 2: Oils and fats
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Oils and fats
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	21 526	19 965	21 452	21 151	20 646	20 997	22 538	21 359	22 574	23 070	23 640	24 290
Production	18 146	16 950	19 077	18 725	18 326	18 352	19 603	19 367	20 273	20 770	21 330	21 970
Extra-EU exports	2 157	1 534	1 486	1 394	1 572	1 563	1 959	2 353	2 154	2 220	2 300	2 380
Trade balance	-3 380	-3 015	-2 375	-2 426	-2 320	-2 646	-2 935	-1 992	-2 301	-2 300	-2 310	-2 320
Employment (thousands)	56.4	49.1	51.0	53.8	50.5	49.5	48.8	47.7	49.4	50.0	50.0	50.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Oils and fats
Breakdown by major product line in volume, 1994 (1)

(thousand tonnes)	Production imports	Total exports	Total
Vegetable products: (2)			
Liquid	6 759	358	1 524
Laurics	44	976	19
Linseed	170	0	72
Castor	13	71	0
Palm	0	1 716	43
Total	6 986	3 121	1 658
Protein meal:			
Soya	10 102	13 031	1 008
Rape	3 698	867	127
Sunflower	2 376	1 304	5
Cotton	374	418	5
Copra	23	874	11
Palmkernel	5	1 745	23
Lin	294	197	7
Maize	247	880	0
Others	60	805	7
Total	17 179	20 121	1 193
Marine products:			
Fish meal	547	984	390
Marine oils	138	411	51
Total	685	1 395	441

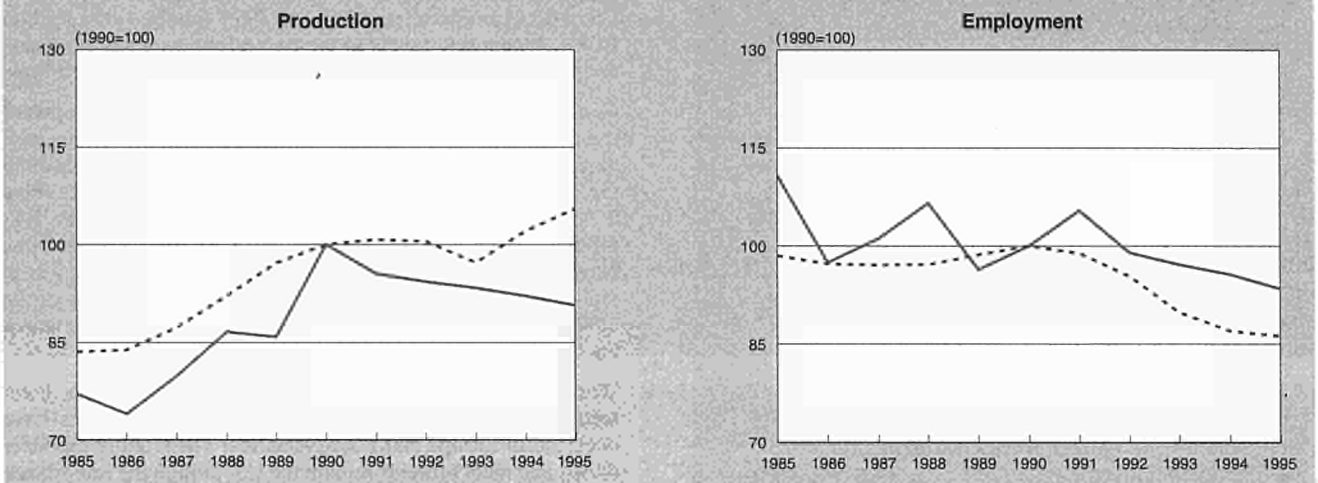
(1) Due to the modification of the data collecting system on the intra-EU trade exchanges, import and export figures may present some imprecisions.
(2) Excluding olives.
Source: Fediol

Table 3: Oils and fats
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.05	-1.47	2.10	0.32
Production	5.34	-2.04	2.00	-1.38
Extra-EU exports	-1.91	4.02	0.68	15.54
Extra-EU imports	0.87	3.23	1.91	14.21

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Figure 3: Oils and fats
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

remain the world's largest exporter, with the US as principal buyer.

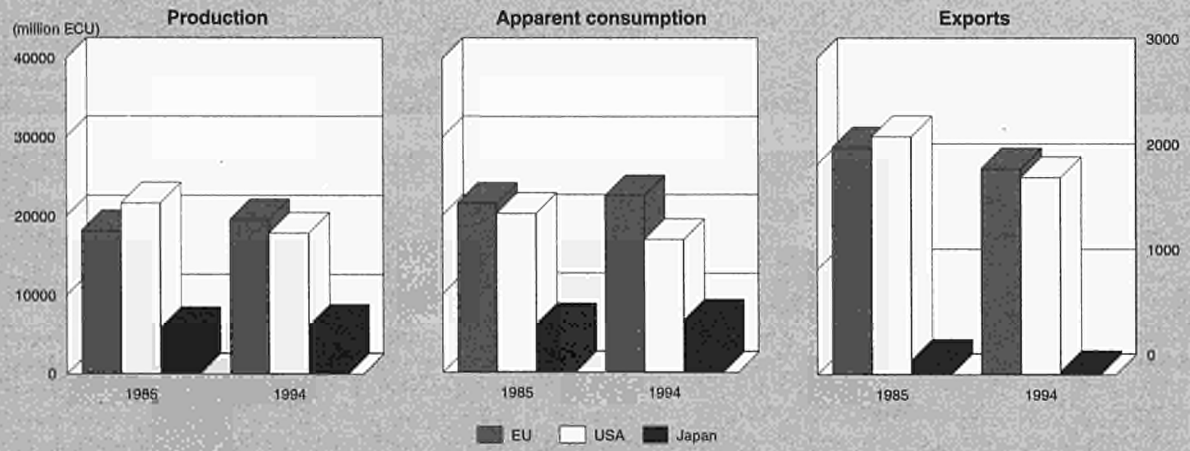
With regard to margarine and spreadable fats, production quotas within the EU are split up among several countries. In 1994, Germany accounted for about 25% of total production, followed by the United Kingdom (19%), the Netherlands (12%) and Belgium (9%). Overall production at EU level was still more than double that of the second world producer, the US, the country which takes most of extra-EU exports.

The figures relating to margarine products indicate a slight tendency towards an increase in production for 1994, though the trade balance continues to remain strongly in deficit.

In 1994, a strong increase of value added was recorded in the oil and fats sector (11%) compared to the previous year, reaching 2 903 million ECU. At community level in fact, despite the drop recorded in Germany (-7.5%), there was a strong rise in value added in Spain, France and the United Kingdom. Despite this, the value added of the sector remains one of the lowest within the food industry. In 1994, it touched only half that of the fruit and vegetable sector and just one sixth that of dairy products.

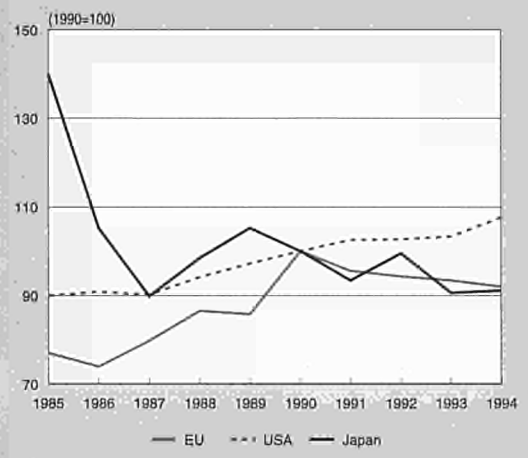
As regards the various segments of the sector, despite the fact that the standardisation of the production process is tending to narrow profit margins, very different performances are recorded for the single products. In the oilseed segment, the products with the highest value added are protein and lecithin meals. In the case of olive oil, because of increasing production costs, a partial recovery of profit margins for operators in the sector has been promoted at EU level by providing incentives for passing from traditional cultivation methods to intensive mechanised methods and the implementation of brand and quality policies. Finally, as far as margarine and spreadable fats are concerned, product diversification strategies and above all the creation of lower fat content products have boosted the popularity of these products, and helped to defend profit margins in the sector.

Figure 4: Oils and fats
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Oils and fats
International comparison of production in constant prices



Source: DEBA GEIE

Recent trends

During the 1985-90 period, average real growth in consumption and production of oils and fats was around 5% per year. In 1991, a downward trend began (-1.5% a year for consumption and -2.0% for production), which appeared to continue until 1994 for production only, while consumption remained more or less stable. In the 1990-94 period, export to non-EU countries began to speed up, particularly in 1994 (+15.0%). At trade balance level, this increase was offset by an equally strong flow of imports which, after a period of substantial stability (with an annual increase of around 2% in the 1985-1994 period), suddenly accelerated (+14%).

The oils and fats sector followed rather closely the overall trend of the EU's total manufacturing industry, albeit at a slightly more volatile pace as far as production is concerned. With regard to employment, in the manufacturing sector the drop intensified in the 1990-94 period (-15%); in the oils and fats sector on the other hand, this drop was strongest in the 1985-89 (-12% approx.) and 1991-92 periods.(-6%) and then followed a more gradual pattern after 1992.

International comparison

A comparison between the production of the EU and that of Japan and the US shows a strong drop in nominal value of US production between 1985 and 1994 (about 4 000 million ECU). Production levels in the two reference years for Japan and the EU do not on the other hand show any great differences.

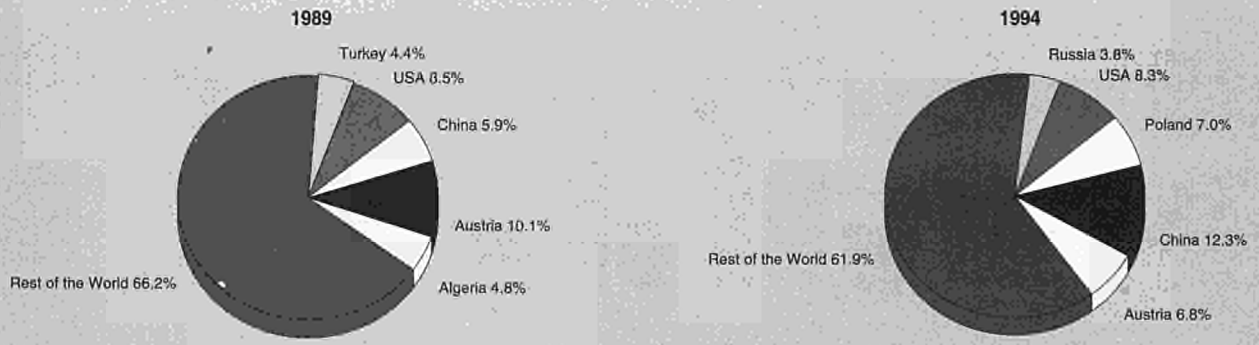
Considering production in real terms, these show an upward trend for both the US and for the EU until 1990, the base year of the series. Production patterns in the sector after 1990 are completely different. The indices for the US in fact show a very positive trend (over 2% a year), while in the EU, production dropped considerably (-8% at 1994). In that same period, Japan also underwent a sharp drop in production in real terms, the pattern of which, after the drastic crash of the 1985-1987 period (-40%) continued in a fairly regular manner up to 1994.

World production of oils and oilseed cakes has grown threefold over the last thirty years. The biggest increases have occurred in Europe and South America. The leading producer of oils and meal proteins remain the US, though the importance of this country fell in the second part of the 1980s after a period of continuous expansion. The second largest world producer of vegetable oils is China. Despite a drop in the oilseed harvest, 1994 marked an overall increase in the volumes of vegetable oils (69.7 million tonnes). This increase was likely to have strengthened in 1995, reaching 70.3 million tonnes (+4%).

In terms of volume, soya plays a leading role in oilseed production. For 1994, at world level, the soya harvest fell slightly, due mainly to low yields in the US, the world's largest producer. Their share has dropped from over 70% to around 50% of world's production over the last twenty years. From around the mid 1970s, the drop in the US share, accompanied by a fall of production in China, has been offset by strong production increases in the EU, Brazil and Argentina. The production shares of the two South-American countries, respectively third and fourth world producers of soya seeds, are much more important than that of the entire EU, which remains a net importer of this product.

The case of colza is different. Here, the EU is the world's third largest producer, behind China and India, and followed by Canada and the former Soviet Union. With the exception of Canada, 1994 confirmed the expansion of this crop throughout the main world production areas. Production of colza has benefited everywhere from increased crop land areas and greater yields and has increased by 1.5 million tonnes in China,

Figure 6: Oils and fats
Destination of EU exports



Source: Eurostat

Table 4: Oils and fats
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 157	1 318	1 288	1 297	1 534	1 486	1 394	1 572	1 563	1 959	2 353	2 154
Extra-EU imports	5 536	4 344	3 727	4 387	4 549	3 861	3 821	3 891	4 208	4 894	4 344	4 456
Trade balance	-3 379	-3 025	-2 438	-3 091	-3 015	-2 375	-2 426	-2 320	-2 645	-2 935	-1 992	-2 301
Ratio exports / imports	0.39	0.30	0.35	0.30	0.34	0.38	0.36	0.40	0.37	0.40	0.54	0.48
Terms of trade index	88.0	88.4	84.1	76.1	82.0	100.0	102.2	98.7	94.7	100.9	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

by 1.1 million tonnes in the EU and by 900 thousand tonnes in the East European countries.

Until the mid 1980s, the world production of sunflower seeds increased sharply in all geographic areas. The biggest production increases occurred in America. Slightly lower increases occurred in the Asian countries and in the EU. Trends in the East European countries and the former Soviet Union were negative. Despite this however, the former Soviet Union remain at the top of the list of world producers (20%), followed by Argentina (19%) and the EU (18%).

Coconuts, cotton seeds and groundnuts, though being a relevant source of raw material in the world production of oilseeds, are much less important than soya, colza and sunflowers within the EU. These crops are concentrated above all in the Asian countries, with the US in second place followed by the former Soviet Union. Production trends for the sector showed a sharp rise for 1994.

The production of olive oil varies considerably from one year to the next due to weather conditions. The growth of the world market directly reflects the evolution of the EU market. In 1994 the EU, with a production of about 1.45 million tonnes accounted for around 80% of world production. The remaining non-EU producers are concentrated in the Mediterranean area: Tunisia, Turkey, Syria, Morocco and Israel. A slight drop in overall production occurred in 1994. This was caused, in part, by a relatively strong drop in Spanish production.

Finally, the EU remained world leader in 1994 in the production of margarine and spreadable fats, with production levels twice those of the US and nearly ten times those of Japan.

Foreign trade

Though the US remained one of the largest destination market (about 8%) of extra-EU exports in the oils and fats sector, 1994 was also marked by a tendency for EU exports to move away from the Mediterranean area (Libya and Algeria) towards Asian markets (12% to China) and those of Eastern Europe (7% to Poland and 4% to Russia).

As for extra-EU imports, Brazil continues to play a lead role, accounting for 30% of EU imports. The share of the US continues to fall compared to the past, while Argentina is the second largest exporter to the EU with a share of around 21%. Compared to 1989, imports from Malaysia rose steeply.

1994 also saw a continuation in the improvement of the export penetration rate which reached 10% compared to 7% in 1991. The import penetration rate also increased, touching 22%, a figure which remains anyway below that recorded in the first half of the 1980s.

At international level, the oilseed trade moves between two areas: America, strongly export oriented and Europe and Asia,

Figure 7: Oils and fats
Origin of EU imports

Source: Eurostat

Table 5: Oils and fats
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	69.6	76.0	78.9	81.3	89.0	100.0	90.6	95.3	96.1	96.3
Unit labour costs index (3)	112.3	112.3	108.8	105.5	107.5	100.0	112.7	118.6	118.5	120.9
Total unit costs index (4)	122.5	97.3	89.3	98.6	103.9	100.0	103.2	100.2	102.7	110.8
Gross operating rate (%) (5)	4.8	5.1	7.0	6.8	5.6	6.3	6.2	6.0	5.9	6.7

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

where most imports go. The intensity of trade in oilseeds is explained by two factors: the relative cheapness of transporting bulk raw material and the fact that processing plants are generally located elsewhere than production fields. The EU remains a net importer of oilseeds, despite the production increases recorded in the second half of the 1980s. Particularly important in this sense is soya, which accounts for the biggest share of EU imports. Less important, although always in deficit, is the community's trade balance for colza and sunflowers. The EU has always been a net importer of oilcakes and meals. On the other hand, the EU can boast a high degree of self-sufficiency in vegetable oil.

MARKET FORCES

Demand

Demand for oils and fats originates from their importance as inputs in the manufacturing process of many other sectors, as well as from their direct use for human and animal consumption. Human consumption is directed above all towards olive oil, vegetable oils, margarine and low-fat content products, while seeds, oils, fats, oilscakes and meals, besides as animal feed, are also used in many other industrial processes. At EU level, during 1994, the overall demand for oils and fats rose slightly. Different trends however affected individual products.

At the beginning of the 1980s demand for fats and oily substances for industrial use represented less than one third of direct human consumption levels. Industry demand has grown substantially over the last few years, whereby it now represents over 40% of overall demand. Currently, such substances are used to make cosmetics (soaps, perfumes and detergents), in the pharmaceutical and chemical industries (paints, inks, textile dyes, lubricants and plastics). Particularly important is the demand for oilseeds: within the EU, about 95% of oilseeds are used for industrial processing.

Within the community, a large share of the demand for seeds, oils, fats, oilcakes and meals comes from the livestock breeding sector. Demand for fats and oils for animal feeding is strongly dependent on price levels. Recently, the EU, like Asian countries and the US, showed a tendency towards an increase in this kind of demand, offsetting the drop caused by the fall in consumption which hit the East European countries and Mexico.

The human consumption of vegetable oils underwent strong growth throughout the EU over recent years. In the food sector, the most consumed products remain groundnut oil and sunflower oil. Demand for the latter has in fact strengthened compared to other oilseeds. Thanks to its pleasant taste, low-fat content and vitamin content, sunflower oil is used more and more in catering too, while groundnut oil is preferred by final consumers. Recent interest for exotic food and the desire to try new flavours have oriented European consumers towards a greater consumption of soya oil, especially in Germany and Italy. Direct human consumption of colza on the other hand is located mainly in France and Germany.

The consumption of margarine is traditionally concentrated in the countries of northern Europe, with very high peaks in Germany, Denmark and Belgium. After a period marked by a downward swing, especially in Italy, France and the United Kingdom, the consumption of margarine and spreadable fats is stabilising. The most lively market segment continues to be that of low-fat content products.

Finally, as already mentioned, human consumption is directed above all towards olive oil, vegetable oils, margarine and similar products. The qualitative composition of consumption within the EU is strongly affected by both different eating habits and by the characteristics of domestic supply within each country. 1994 witnessed a certain stagnation as regards consumption of olive oil, while low-fat content spreadable products continue to be preferred to butter. Vegetable oil consumption continues its upward trend.

Within the EU, the consumption of olive oil is above all concentrated within those countries which are the biggest producers (Italy, Spain, Greece, Portugal and France). After a period of strong demand growth, in 1994 the olive oil market underwent a slight drop. Variations in demand can be attributed to price levels against reduced consumer spending, more than to competition from other vegetable oils.

Supply and competition

The US, Argentina and Brazil all have strong surpluses of oilseed production. The countries of Asia and Europe, despite the considerable production increase recorded over the last few years, remain strongly dependent on imports.

It should be noted however that in recent years, the best absolute levels of oil yields from processed products have been recorded by the South-American producers. The oilseed grinding processes are not concentrated exclusively in the producer countries. This determines a strong trade exchange at world level, which is behind the strong incidence of transport and supply costs on the sector's cost structure. Intra-EU trade is also important. The main processing facilities are in Italy, the Netherlands, Germany and Spain.

Standardisation of production technologies in every production stage (grinding, extraction of raw oil and refining) permits relevant economies of scale.

The volatility of the price of raw materials represents another feature of competition within the sector. At the end of 1994, prices in the sector had reached record levels, as world stocks of oilseeds reached their lowest level of the last decade, while world imports maintained an upward trend, fuelled by the fear of scarcity in the major importing countries. The situation

Table 6: Oils and fats
Production and consumption of olive oil

(thousand tonnes)	1992/93 (1) EU	Non-EU	World	1993/94 (2) EU	Non-EU	World	1994/95 (2) EU	Non-EU	World
Production:									
Olive oil	1 392	422	1 814	1 257	479	1 736	1 304	499	1 803
Edible olive promace oil	119	10	129	113	12	125	109	9	118
Total	1 511	432	1 943	1 370	491	1 861	1 413	508	1 921
Consumption:									
Olive oil	1 374	519	1 893	1 362	547	1 909	1 316	532	1 848
Edible olive promace oil	115	35	150	104	29	133	102	16	118
Total	1 489	554	2 043	1 466	576	2 042	1 418	548	1 966

(1) Year runs from November 1 to October 31.
(2) Provisional figures.
Source: Fedolive

Table 7: Oils and fats
Oils and meals produced from oilseeds by country, 1994

(thousand tonnes)	Oilseeds processed (1)	Share (%)	Unrefined oilseeds & fats produced (1)	Share (%)	Meals & cakes produced (2)	Share (%)
EUR12	24346	100.0	6986	100.0	17179	100.0
Belgique/België	1 908	7.8	534	7.6	1 361	7.9
Danmark	350	1.4	121	1.7	219	1.3
Deutschland	6 817	28.0	2 097	30.0	4 669	27.2
Ellada	755	3.1	140	2.0	575	3.3
España	2 864	11.8	741	10.6	1 983	11.5
France	2 404	9.9	940	13.5	1 509	8.8
Italia	2 012	8.3	486	7.0	1 790	10.4
Nederland	4 446	18.3	988	14.1	3 284	19.1
Portugal	775	3.2	205	2.9	553	3.2
United Kingdom	2 015	8.3	734	10.5	1 236	7.2

(1) Excluding olives, maize germs, grape and tomato pips.
(2) Excluding olives.
Source: Fediol

Table 8: Oils and fats
Production of olive oil by country

(thousand tonnes)	1992/93 (1) Olive oil	Edible olive pro-mace oil	Total	1993/94 (2) Olive oil	Edible olive pro-mace oil	Total	1994/95 (2) Olive oil	Edible olive pro-mace	Total
EUR12	1 391.6	119.4	1 511.0	1 316.3	108.8	1 425.1	1 304.0	109.0	1 413.0
Ellada	310.0	29.8	339.8	254.0	20.3	274.3	358.0	32.0	390.0
España	623.0	49.8	672.8	550.0	44.0	594.0	481.5	39.0	520.5
France	1.6	0.0	1.6	2.3	0.0	2.3	2.5	0.0	2.5
Italia	435.0	34.8	469.8	480.0	38.0	518.0	430.0	34.0	464.0
Portugal	22.0	5.0	27.0	30.0	6.5	36.5	32.0	4.0	36.0

(1) Year runs from November 1 to October 31.
(2) Provisional figures.
Source: Fedolive

Table 9: Oils and fats
Margarine: Production by country (1)

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994
EUR15 (2)	1 975.5	2 015.1	2 283.7	2 389.2	2 475.8	2 481.6	2 467.5
Belgique/België	182.8	184.8	189.1	196.1	208.9	216.9	272.3
Danmark	102.0	106.6	110.5	117.6	114.5	95.9	118.5
Deutschland	454.0	479.2	560.6	632.5	687.4	664.0	611.0
Ellada	27.4	31.0	32.2	34.5	33.4	32.2	31.0
España	88.4	78.2	81.7	84.4	80.5	84.2	85.3
France	160.7	160.8	168.2	164.9	163.5	160.8	142.4
Ireland	18.6	26.4	22.3	23.8	18.4	18.6	17.5
Italia	74.0	73.6	80.7	82.6	82.7	86.3	82.6
Nederland	244.3	247.3	255.6	271.5	280.2	292.3	294.3
Österreich	46.9	42.0	48.1	48.1	50.5	50.5	47.2
Portugal (3)	58.7	59.4	60.0	62.6	63.7	60.8	50.8
Suomi/Finland (4)	35.9	39.8	48.7	54.4	64.2	77.5	81.1
Sverige (4)	106.6	108.5	150.9	149.3	145.5	153.0	148.3
United Kingdom (4)	375.2	377.5	475.0	467.1	482.4	488.6	485.0
Japan	N/A	N/A	249.7	242.8	249.2	255.6	252.4
USA	N/A	N/A	1 258.7	1 266.3	1 249.7	1 222.6	1 146.8

(1) Data for 1994 are provisional.
(2) Excluding Luxembourg.
(3) Shortenings are excluded from 1994 onwards.
(4) Estimates.
Source: IMACE, IFMA

subsequently levelled off and prices remained fairly stable throughout 1995, due to favourable world harvest prospects. (Source: FAO; Food Outlook 1995).

As already mentioned, the world supply of olive oil for 1994 underwent a slight drop which above all involved Spanish and Greek productions. In the recent past, high labour costs and the incidence of raw material purchase costs favoured a certain concentration of production. Recent changes in demand, on the other hand, tend, to an increasingly greater extent, to favour traditional and agricultural producers. Enterprises are turning their attention towards top-quality product range (i.e. extra-virgin oil). This has obliged many producers to change their product and communication strategies and has boosted the importance of diversification policies. The exploitation of potential market expansion is however in part prevented by the medium-small size of the enterprises traditionally present in the extra-virgin segment. The changes under way had serious effects on costs: in 1994, the cost of olive growing rose on average by 10% compared to 1984, considerably exceeding the average increases recorded for the entire farming sector.

At EU level, the production of margarine is heavily concentrated in those countries with the biggest consumption levels (Germany, Denmark, the Netherlands and Belgium). In 1994, EU production was almost double that of the US, the second largest world producer. The production process is highly capital-intensive and tends to narrow profit margins for enterprises operating in the sector. Price-based competition is being partially replaced by product diversification and innovation.

For the oils and fats sector as a whole, the total unit cost index, after a sharp drop in the second half of the 1980s, started rising again in 1991, and this trend was confirmed in 1994. The reduction of unit costs in the 1985-90 period was favoured by a process of productive reorganisation, with a steep fall in the number of workers and a sharp reduction in labour costs, which after 1991 started to rise again. In the same period, heavy production increases were recorded, which subsequently tailed off and have almost disappeared over the last few years.

Production process

Olive oil.

The production of pressure oil is the result of first product processing. The production structures involved in this first phase are the oil mills. The extraction of oil must is done using industrial technologies (centrifugation) as well as traditional methods (pressure). The second processing stage on the other hand consists in refining the oil and includes the processing of the olive residues. This stage is characterised by standard technologies and allows high economies of scale both in the blending and bottling stages. The case of extra-virgin oils is different. Most extra-virgin oils are marketed directly at the mills, within a short time interval from pressing the olives. Companies traditionally operating in this segment of the market are therefore of medium-small size.

Oilseeds.

Apart from direct use for human or animal consumption, most oilseeds are used by industry for grinding or subsequent processing into oils, oilcakes or meals. The first processing stage involves a preliminary treatment to clean the oilseeds, drying and removal of the integument, which precedes the extraction process in order to improve the yield. The extraction of the raw oil is done using special solvents according to a standard technique. The innovations which have recently affected the extraction process concern the expansion of the average size of factories and reductions in energy required to make these work. The raw oils then undergo a refining process, followed by decolourisation, hydrogenation and deodourisation of the product. The refined oils thus obtained can be used not only for eating, but also for other industrial processes (animal feed, resins, soaps and detergents in general).

Margarine.

Behind the margarine production process lies a procedure involving the emulsifying of vegetable fats normally done by medium-large and highly mechanised industrial structures. The most important process innovations were introduced because of the need to diversify the product in terms of fat content. Numerous other changes were made to the production process to cater for the need to maintain unaltered the or-

ganoleptic characteristics of the products and their quality during distribution. Starting in the early 1990s, the development of new products seems increasingly more directed towards enriching the products with vitamin compounds. Particular attention has been given to quality rather than price strategies.

INDUSTRY STRUCTURE

Companies

The grinding of seeds, the preparation of protein oilcakes and meals, the extraction of oils and their refining are all highly mechanised processes. Given the rather common technology involved in the production process, economies of scale can be obtained mainly by processing large volumes. In this context, a small number of multinational companies have been successful. Over 75% of the EU vegetable oils market is currently in the hands of six large groups: Eridania-Beghin-Say (F-I), Unilever (UK-NL), Van De Morteel (B), ADM (US), Cargill (US) and Bunge (US).

In 1994, about two million firms were involved in Europe in the production of olive oil. This figure shows the level of market fragmentation. Geographically speaking, production is localised above all in the countries of the Mediterranean belt. The structure of production plants differs according to the segment considered. As regards the virgin oil segment, the production process is marked by traditional methods, with a large number of small plants using pressure pressing techniques. A wider degree of industrialisation is to be found in the segment of standard quality olive oil, generally produced using a centrifugal process, followed by product blending and sometimes refining. In this market segment, there are numerous highly mechanised medium-large enterprises which purchase oil in bulk and then simply blend and pack it. In the standard quality olive oil segment, the size of the plants has favoured the creation of increasingly greater industrial concentration by a small group of multinational companies which has profoundly changed the pre-existing competitive structure. The world's leading olive oil producer is Medeol, under whose control are some of the largest companies in the sector: Carapelli (I), Koipe (E), Elosua (E), Lesieur (F) and Ducros (F).

With regard to margarine and spreadable fats, the structure of the sector is characterised by the presence of highly mechanised companies of medium-large size. The concentration of the demand in the countries of northern Europe has favoured the localisation of some of the largest firms in this area, though competition from French companies remains strong. The Unilever group, through its branches in the single countries (for instance, Astra-Calvé in France) controls alone the biggest share of the EU market.

Strategies

Given the mature nature of the oils and fats market, growth prospects for enterprises in the sector as a whole depend heavily on finding new market outlets (e.g. Eastern Europe) as well as on the internationalisation of consumer tastes. Such prospects have encouraged mergers and acquisitions of companies by the larger groups in the sector. The M&A activity in the sector intensified in 1995 compared to the previous year, going from four to nine operations. Most of these operations involved European companies, though operations in the former Soviet Union intensified, involving above all Unilever. Other UK companies were also quite active.

In the segment of vegetable oils for human consumption, the growing availability of own-label goods, together with the growing importance of large distribution networks, with increasing numbers of hard-discount stores, has resulted in an overall lowering of prices. Price competition has thus intensified. At the same time, greater importance has been given to quality, product image and communication strategies. Apart from Unilever operations in Kazakhstan, the major take-over operations in the vegetable oil sector led to increased concentration on the European market. In 1994, in France, Elf Sanofi was bought out by Caussade. 1995 stood out above all for the operations of two large Belgian companies, Alpine and Van De Moorteel, who took over Desmet (B) and Saipol (F) respectively. Finally, worth of mention is the acquisition of Huileries Debeil (B) by the US group Cargill.

Table 10: Oils and fats Acquisitions

1994 Bidder	Country	Target	Target country
Caussade Financement	France	Elf Sanofi - Seeds Business	France
Unilever	United Kingdom/Nederland	Cirio Bertolli De Rica (oil business)	Italia
Unilever	United Kingdom/Nederland	State owned company	Kazakhstan

1995 Bidder	Country	Target	Target country
Alpine Industries	Belgique/België	Desmet Chemfood Eng. - Soybean Extraction Plant	Belgique/België
Vamo Mills (Vandemoortel International)	Belgique/België	Saipol (Soprol - French National Oilseeds Prod.)	France
Eridania Beghin Say	France	Oliprovence	France
Koipe	España	Cereol Iberica (Ferruzzi)	España
Enalsa	España	Alnatur	España
Unigate	United Kingdom	Vedial SA	France
Associated British Food	United Kingdom	Kraft Foods - Amer Speciality Branded Consumer	USA
Unilever	United Kingdom/Nederland	Products (Oils and Fats Division)	Sverige
Cargill	USA	Huileries Debeil	Belgique/België

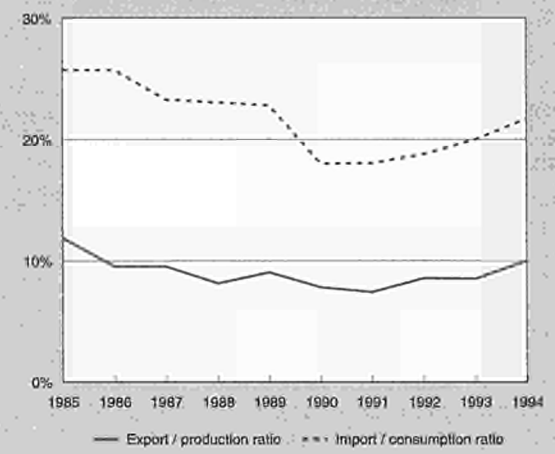
Source: Nomisma

Table 11: Oils and fats
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.90	N/A
Danmark	1.28	0.78
Deutschland	0.75	0.71
Ellada	1.69	2.25
España	2.68	3.27
France	0.58	0.49
Ireland	0.41	0.22
Italia	0.82	0.82
Luxembourg	0.00	0.00
Nederland	N/A	2.37
Portugal	1.42	1.58
United Kingdom	0.71	0.75

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Oils and fats
Trade intensities



Source: DEBA GEIE, Eurostat

With regard to olive oil, the market is very much split up on the supply side between extra-virgin oil and standard quality oil. The increasing consumer preference for extra-virgin oil has slowed down the process of industrial concentration underway in the sector, guaranteeing an important strategic advantage to the small companies which specialise in market niches. At the same time, the medium-large companies, controlled by the leading multinationals, have opted for greater product diversification, including in their range, alongside standard quality oils, extra-virgin oils or oils with indication of guaranteed origin. The Anglo-Dutch group Unilever, which already controlled a large share of the Spanish and Italian market, in 1994 acquired the control of the Cirio-Bertolli-De Rica oil pole from the Italian group Sme. The Eridania-Beghin-Say group, under the control of Ferruzzi, is currently owner of Medeol, which in turn controls the two leading Spanish oil producers (Koipe and Elosua). The recent merger of Koipe, Elosua and Carbonell, has made Medeol the world's leading olive oil producer.

ENVIRONMENT

The environmental impact of the activities which make up the sector is considerable. The use of pesticides for safeguarding crops, the use of solvents in the extraction of vegetable oils and processing of fats, the production of processing wastes alongside large quantities of packaging wastes represent just some of the environmental problems faced by the oils and fats industry.

REGULATIONS

The sector is considerably influenced by labelling and packaging measures, recently modified by horizontal directives aiming at improving consumer information and health protection.

As to relevant developments in fiscal regulation, standard quality trading practices have been encouraged by the taxation harmonisation process.

A very important norm for the whole oils and fats sector is Council Directive 76/621. The directive fixes the maximum level of erucic acid authorised in oils and fats intended for human consumption and in foodstuffs containing added oils and fats. This level, calculated on the total level of fatty acids in the fat component, must not exceed 5%.

Olive oil

The key regulation for olive oil is Reg. (EC) 136/66 as last amended by Reg. (EC) 2046/92. A mixed system was introduced, using both price support and deficiency payments, in the form of production aid and consumption aid, for the purpose of both guaranteeing an adequate income for producers and making the product competitive on the market alongside oils produced from oilseeds. The phasing out of the consumption aid in 1994 determined a corresponding increase in production aid.

General rules on the granting of production aids to olive oil producers have been recently modified by Reg. (EC) 636/95 while specific measures in the olives sector have been introduced with Reg. (EC) 1267/95.

As far as price regulation is concerned, each year, the Community fixes the production target price, the representative market price (which may be adjusted during the marketing year in the event of substantial fluctuations), the intervention price and the threshold price (fixed in such a way that the selling price for imported products is the same as the representative market price).

Measures to protect and improve quality are the main concern of Reg. (EC) 356/92, 1429/92 and 1683/92. Regarding quality policy, relevant effects for the sector will stem from the new Community system for the protection of geographical indications and designations of origin, instituted by Reg. (EC) 2081/92.

Oil seeds

Since the 1993-94 marketing year, oilseeds regulation stems from Reg. (EC) 1765/92 and 1766/92. The system is designed for the joint management of cereals, oilseeds and protein crops, given that these three types of crop are interdependent. The system is based on a compensatory payment mechanism and set-aside incentives. The amount of the compensatory payments is fixed per hectare and granted on the basis of the regional base area.

Oilseeds market regulation was partly changed again at the start of the 1994-95 marketing year, as a result of the Blair House Agreement between the US and the EU. More recently, Reg. (EC) 2336/95 reduced the compulsory set-aside rate to 10%.

Spreadable fats

The basic regulation concerning spreadable fats has been approved at the end of 1994, modifying Reg. 1898/87 and 222/88. Reg. 2991/94 provides for the exact definition of the products concerned (margarine and dairy spreads, resulting from a mixture of butter-fat and vegetable fat) as well as for marketing standards and health protection rules. The major changes are related to definitions of categories of butter and spreads: three categories were replaced with three separate definitions and the proportions of fat content were modified.

OUTLOOK

The tendency towards an increase in imports in the sector as a whole will continue, therefore maintaining a deficit in the balance of trade.

With regard to products for human consumption, strong differences will persist in consumption at EU level. In the countries of southern Europe, the consumption of margarine remains fairly low while that of vegetable oils, with an evident preference for olive oil, is higher. The most dynamic segments of the market remain those tied to greater health-image products (olive oil and low-fat content products).

The good growth prospects for the oilseed sector are tied to recent changes in the eating habits of consumers, as well as to quality improvements under way.

Strong concentration in the vegetable oil and margarine sector, as well as the growing importance of large distribution networks, will increase price competition and product quality standards.

Written by: NOMISMA

The industry is represented at the EU level by: Federation of Seed Crushers and Oil Processors in the EEC (FEDIOL). Address: rue de la Loi 74, Bte 4, B-1040 Brussels; tel: (32 2) 230 3125; fax: (32 2) 230 0946; and Fédération de l'industrie de l'huile d'olive de la CEE (FEDOLIVE). Address: bd. Baudouin 21, Bte 7, B-1210 Brussels; tel: (32 2) 223 0141; fax: (32 2) 223 1244; and

Association of the Margarine Industry of the EEC Countries (IMACE). Address: avenue de Tervueren 168, B-1150 Brussels; tel: (32 2) 772 33 53; fax: (32 2) 771 47 53.

Dairy products
NACE (Revision 1) 15.51

World production of milk is decreasing even though major differences exist within specific milk derivatives product groups. The yoghurt and cheese segments are growing and consumers are devoting a greater attention to low-fat products. Butter consumption has been penalised by the trend for healthier food consumption models.
The dairy industry is affected by a considerable reduction in the number of companies as a consequence of the milk quota system (introduced by the CAP reform) and of the concentration process that is having its impact on this increasingly competitive market.
Economic changes in Eastern European countries, higher extra-EU milk production and the lowering of international trade barriers will imply additional competitive pressure for the EU dairy industry.

INDUSTRY PROFILE

Description of the sector

The dairy sector covers activities related to thermo-treatment of milk for alimentary use and milk derived products and by-products. The latter are generally used as intermediate processed products (i.e. casein) or end-products such as cream, butter, yoghurt and cheese. Ice-cream made from cream is discussed in a separate chapter which will also cover chocolate, cocoa and confectionery.

The dairy industry represents one of the most important sectors within the European food industry and it is significantly influenced by national and EU agricultural policies and international trade agreements.

The dairy industry is a high value added one. This is especially true for faster growing segments such as yoghurt and fresh and soft cheese. These product categories include the so-called "innovative" dairy products, such as desserts or spreadable cheese with added flavouring.

The desegregation of value added by Member State shows considerable variance. Italy and Germany follow France in the ranking of high value added countries. Figures show that even though Germany and United Kingdom are the main EU dairy producers, they rank, respectively, third and fourth as far as value added is concerned. This is the consequence of the fact that the two latter countries produce greater volumes of dairy products with lower value added (i.e. milk) as compared to France and Italy.

Fresh milk products (except cream) are the most important sub-product in production terms, while whole milk powder is the largest export category within the sector, followed by cheese, fresh milk products and drinking milk. Whole milk powder accounts for about 12% of usable production and 20.6% of total exports.

Milk and fresh milk products are mostly traded at intra-EU level and consumption and altogether represent about 85% of total production.

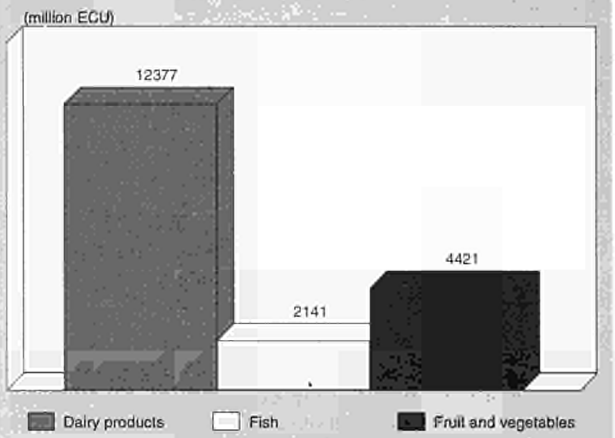
Recent trends

After the favourable evolution of 1991 and 1992, the global demand for dairy products has been marked in 1993 and 1994 by a substantial stability. Dairy demand has shown a low dynamism although major differences exist within product categories. Exceptions concern, notably, cheese (especially fresh and soft cheese) and yoghurt. Cheese and whole and skimmed milk powders were shipped in larger quantities while a decrease was recorded for butter and condensed milk.

On the side of supply, world dairy production has been influenced by the rapid growth of production in Oceania and by the progressive return to normal production levels in East European countries and former Soviet Union.

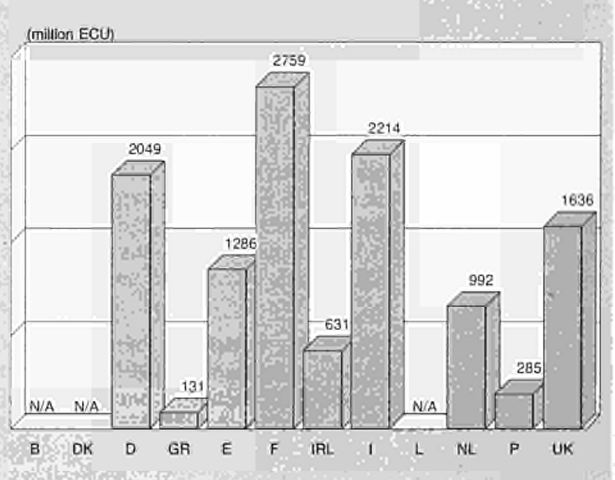
At the aggregate level, EU consumption of dairy products has shown decreasing growth rates in the period 1990-94, compared to higher rates in the period 1985-90. As a result, the overall trend of the period 1985-94 presents an average increase of 2.8%. The slower growth of the period 1990-93 seems to have come to an end in the period 1993-94 with a 4.6% increase which is higher than the average 3.0% of the period 1985-90. Extra-EU exports show negative annual growth rates that, though improving in the period 1990-94, indicate a considerable worsening in the period 1993-94 (-6.4%). Data on imports show that the EU is becoming more dependent on extra-EU dairy products: in fact, average real annual growth in extra-EU imports reached 6.1% in 1993-94, as compared to just 0.6% during the 1985-90 period.

Figure 1: Dairy products
Value added in comparison with related industries, 1994



Source: DEBA GEIE

Figure 2: Dairy products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Dairy products
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	50 981	1 406	64 200	65 670	68 129	68 917	72 335	75 946	82 845	85 920	89 310	93 100
Production	54 043	64 821	67 026	68 592	71 350	72 189	75 277	79 353	86 340	89 370	92 660	96 330
Extra-EU exports	3 764	4 294	3 645	3 683	3 980	4 103	3 851	4 557	4 537	4 570	4 610	4 650
Trade balance	3 062	3 415	2 827	2 922	3 221	3 272	2 942	3 407	3 496	3 450	3 350	3 230
Employment (thousands)	272.0	252.2	256.5	256.8	259.0	255.1	251.2	248.3	268.7	270.0	260.0	260.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Dairy products
Breakdown by major product line, 1993

(thousand tonnes)	Usable production	Total domestic use	Total exports
Fresh products except cream	35 218	34 858	370
Drinking milk	29 947	29 608	345
Cream	1 191	1 155	36
Concentrated milk	1 216	823	310
Whole milk powder	936	443	512
Skimmed milk powder	1 266	1 039	132
Butter	1 712	1 676	303
Cheese	5 709	5 376	475

Source: Eurostat

Table 3: Dairy products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.03	2.44	2.77	4.56
Production	2.62	2.33	2.49	3.94
Extra-EU exports	-3.70	-0.27	-2.19	-6.41
Extra-EU imports	0.58	-0.41	0.14	6.09

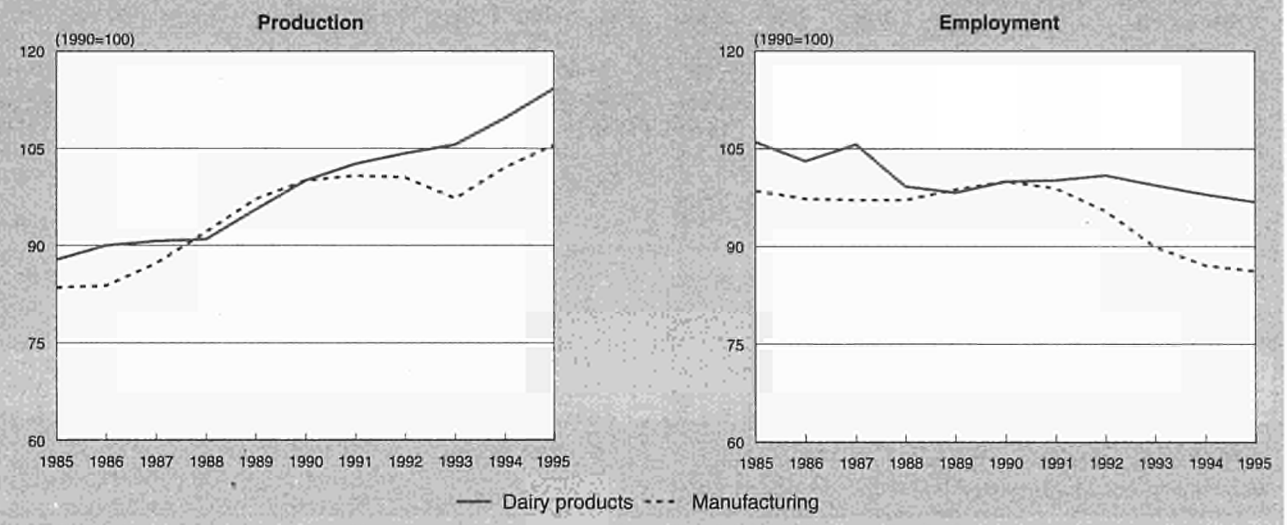
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Dairy products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	3 764	3 013	3 081	3 598	4 294	3 645	3 683	3 980	4 103	3 851	4 557	4 537
Extra-EU imports	702	735	709	761	879	819	761	759	831	909	1 150	1 041
Trade balance	3 062	2 278	2 372	2 836	3 415	2 827	2 922	3 221	3 272	2 942	3 407	3 496
Ratio exports / imports	5.4	4.1	4.3	4.7	4.9	4.5	4.8	5.2	4.9	4.2	4.0	4.4
Terms of trade index	96.8	84.6	74.2	79.1	99.1	100.0	94.3	94.7	97.3	94.7	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Dairy products
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Dairy production shows a growth trend, stronger than the overall EU manufacturing industry. The comparison of the dairy production with the aggregate manufacturing sector shows a growing dairy production even during the 1993 recession period.

Data concerning employment indicate a decrease related to the structural changes brought about by the concentration process within the industry.

Even though the industry has been affected by an employment decrease (as most manufacturing sectors), the loss of employment has been less marked than in the manufacturing industry as a whole. This could imply further employment reductions in future years.

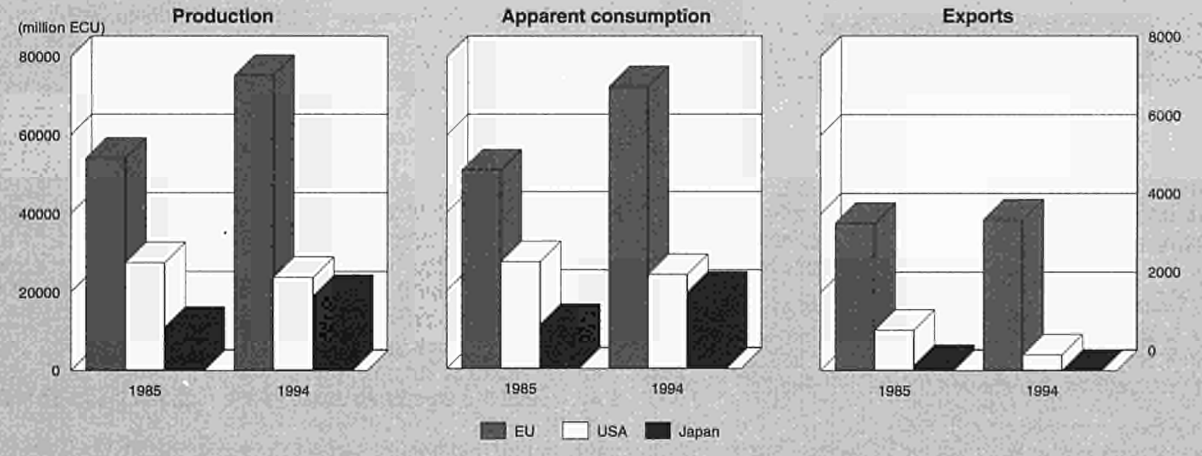
International comparison

In 1994, world milk production has been approximately 1-2% lower than the previous year and the perspectives of international dairy markets look uncertain. Major uncertainties relate to the increased milk productions in extra-EU countries and to the general lowering of trade barriers that will determine a stronger international competitive pressure. EU milk production has been affected by a considerable decrease in livestock numbers due to the CAP reform, only partially compensated by a productivity growth and by the effect of the Italian, Spanish and Greek quota increases.

Developing countries (particularly India, the Philippines and South Korea) have increased their milk output (about 2%) even though such growth, as already mentioned, has been counterbalanced by a corresponding reduction of consumption in developed countries. Slight production growth was also recorded in the USA, Australia and New Zealand.

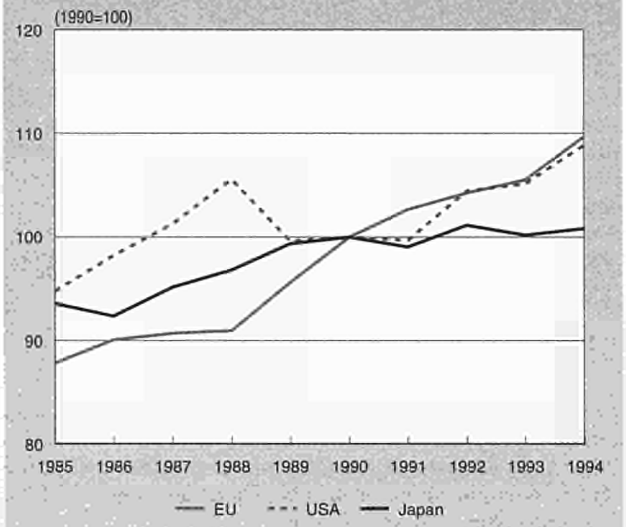
As for trade in milk derivatives, the EU is still the world main exporter, followed by Australia, New Zealand and USA. Nonetheless, GATT provisions should determine the decrease of EU export quotas in the medium term, to the advantage of Oceania. As for export destinations, Algeria and Venezuela have been significant importers of powdered low-fat milk, whereas powdered whole milk has been imported mostly by

Figure 4: International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Dairy products
International comparison of production in constant prices



Source: DEBA GEIE

Japan and Mexico. Japan, furthermore, has also been one of the leading cheese importers. The global market for butter continues to be affected by a decrease in demand mostly determined by lower consumption rates in developed countries.

During the last ten years, besides being the largest world producer, the EU has been the main consumer and exporter of dairy products. Even though the EU has increased its production levels, it is Japan that shows the greatest increase (71.7% in value terms, as a consequence of the appreciation of the yen in the past decade). The USA, on the contrary, have decreased their dairy production.

The analysis of production in constant prices suggests a more accurate interpretation. Annual percentage increases in constant prices indicate a clear upward trend for the EU, a milder one for Japan and a great variability for the US. The years between 1989 and 1991, in particular, present comparable increases for the US and Japanese industries.

Foreign trade

In current terms, extra-EU exports show a steady drop in the years 1985-86 and very volatile increases in following years. In general, data confirm positive growth with the exceptions of years 1989-90 and 1993-94. A similar volatility affects extra-EU imports which show a clear decrease in the period 1989-92. The trade balance indicates significant growth in the years 1987-89 and, in more recent periods, a decrease of about 10% in 1993-94 offset by a slight increase in the period 1994-95.

Major destinations of EU exports are the EFTA countries (particularly Switzerland and Norway), the USA and Saudi Arabia. The comparison of 1989 and 1994 data denote a further growth of exports in the above mentioned areas at the expense of Japan and Algeria.

The origin of EU imports does not show great variations in the period 1989-94. In particular, over 50% of EU imports originate from Switzerland and New Zealand, though with a slight decrease in 1994 as compared to 1984. Russia, which was not ranked in 1989, accounts for 7% of extra-EU imports of dairy products.

The export intensity ratio of the sector shows a negative long-term trend indicating that intra-EU consumption accounts for a larger and larger part of dairy production. The import penetration ratio remained quite stable over the period considered, with a slight increase in most recent years (1993-94).

MARKET FORCES

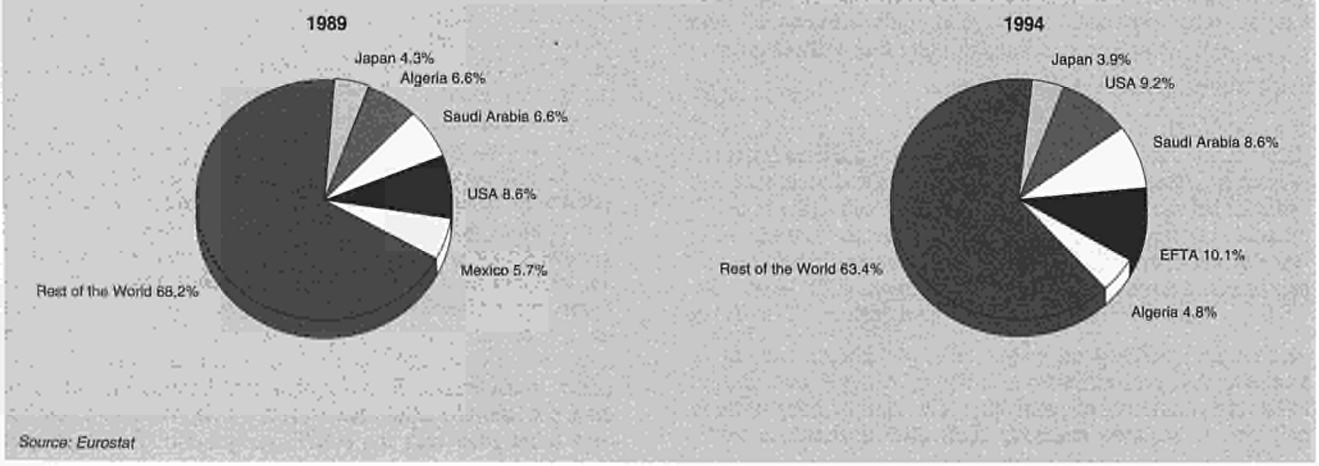
Demand

While studies and researches at the European level are pointing out an increasing homogeneity in purchasing attitudes for durable and semi-durable goods, food trends seem to be well rooted in specific cultures. For this reason, it is difficult to identify European food purchasing and consumption patterns. Nonetheless, in recent years a growing number of companies have successfully implemented marketing strategies aimed at comparable consumer types across EU countries.

In general, among dairy product groups, it is evident a slight decrease in the per capita consumption of fresh milk, a substantial increase in the consumption of fermented and flavoured milk drinks and yoghurt, and an overall increase in the consumption of cheese (the relative increase being higher in the fresh and soft cheese segments).

Product differentiation is high for dairy product categories also considering that they refer to saturated markets. This is the reason why product innovation and differentiation are

Figure 6: Dairy products
Destination of EU exports



Source: Eurostat

Table 5: Dairy products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	82.9	87.3	85.8	91.7	97.2	100.0	102.5	103.3	106.1	112.0
Unit labour costs index (3)	95.1	93.7	98.2	96.5	96.3	100.0	104.8	109.0	108.0	104.3
Total unit costs index (4)	92.5	93.5	93.1	96.7	101.2	100.0	99.3	102.2	101.6	101.6
Gross operating rate (%) (5)	5.5	5.6	5.5	5.7	5.8	5.5	5.8	5.7	5.7	6.1

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

among the main marketing tools to individuate and exploit new market niches.

Greater concerns for nutritional issues and the increasing number of health conscious consumers are deeply affecting the consumption of dairy products and re-orienting the strategies of most companies. They are presently offering low-fat versions of their original products. The spread of such products could also be attributable to the high margins guaranteed to distributors.

One of the major characteristics of the demand trend is represented by the socio-demographic development of the European population by age. Older groups are growing in number and will therefore represent an increasingly interesting segment for marketing high value added and differentiated dairy products. In the past, innovations in milk products markets were mainly targeted to younger consumer groups trying to develop products suitable to their needs (calorie content, fitness, health). Elderly groups are, nonetheless, the most intensive buyers of diet products, even though they were not originally targeted to them.

Milk is a fundamental part of human diet in all EU countries, but given the high market saturation of the product, producers have tried to revitalise its image through the use of nutritional additives and flavourings. They have also tried to increase its consumption besides the traditional ones (i.e. breakfast and cooking), by introducing milk as a (healthier) competitor to soft drinks. This strategy has sharpened competition with other beverage segments that have a greater appeal on consumers, especially on younger ones.

Butter consumption is decreasing, reflecting consumer's preference for products with lower calories' content. From a geographically perspective, North European countries tend to use grater butter quantities whereas Southern areas prefer vegetal fats, especially seed and olive oil.

The cheese market is characterised by a very high number of cheese types, often of regional nature; for this reason they also tend to have a stronger regional consumption though a number of actively traded cheese types exist within the EU. As a general trend, lower fat content products are growing faster.

Throughout the 1980s, the European yoghurt market has shown a considerable growth (about 10-12% per annum) stimulated by new product launches aimed at meeting consumer needs for the best quality/price ratio. Many producers are also trying to develop South European markets whose consumption rates, though growing fast, are not yet comparable with North European ones. The yoghurt sector shows the highest growth among dairy subsectors.

Supply and competition

Since 1984 more than one million milk producers have closed down. This trend has been particularly notable in France and Italy, with percentages exceeding 50% of the total number of original dairy industries. However, even though the number of producers in the European Union has decreased, on average, by more than 40% and the number of milk cows by more than 20%, actual milk production has only decreased by 10%. This points out to a double trend: the increase of unit yield

Figure 7: Dairy products
Origin of EU imports

Source: Eurostat

Table 6: Dairy products
Usable production by country, 1993

(thousand tonnes)	Fresh products except cream	Drinking milk	Cream	Concent-rated milk	Whole milk powder	Skimmed milk powder	Butter	Cheese
EUR12	35 218	29 947	1 192	1 216	936	1 266	1 712	5 710
Belgique/België, Luxembourg	1 203	924	60	12	50	61	69	70
Danmark	674	579	51	13	103	23	77	322
Deutschland	7 897	6 056	597	514	206	439	484	1 337
Ellada	630	600	9	0	0	0	5	186
España	4 516	4 062	45	48	12	15	25	248
France	5 842	4 323	210	64	277	390	451	1 549
Ireland	692	671	21	0	34	132	145	98
Italia	3 327	3 152	90	0	1	0	94	882
Nederland	1 727	1 299	52	374	175	72	194	623
Portugal	982	876	6	0	7	10	17	64
United Kingdom	7 728	7 405	51	191	71	124	151	331

Source: Eurostat

and the rationalisation of industry structure. A similar situation has occurred in the milk collecting and processing industry, where the number of businesses has dropped from over 9 000 in 1973 to less than 4 000 in 1993. This trend has favoured the bigger companies whose position has been further strengthened. At present, more than 60% of the EU milk production is delivered by approximately 70 industries, which represent less than 2% of the total number.

Even though the concentration process is one of the most notable aspects of the industry structure, still a considerable number of smaller diary producers exist and they are seriously threatened by the concentration process in the retail industry. Furthermore, the increasing number of own labels' dairy products sharpens the competitive pressure in the industry.

Unit labour cost increased at a higher rate than total production costs. This fact could explain the increased productivity of labour within the dairy industry. It must be pointed out that, even though unit labour costs are growing, gross operating rate is basically stable and even increasing during 1994. This confirms the high value added nature of the dairy industry.

Production process

Given the strong competitive pressure in dairy markets and the necessity to differentiate products in order to exploit new consumer niches, a strong attention has been devoted to "innovative" dairy products especially in the cheese and yoghurt segments. In this respect, innovation in the dairy industry concerns product characteristics more than production processes.

Production-wise, emphasis has been given to capital intensive production techniques. This has also guaranteed higher hygiene standards according to EU regulations.

INDUSTRY STRUCTURE

Companies

As for most food products, dairy markets show the coexistence of a group of bigger companies and a great number of small and medium sized ones. The introduction of the milk quota system has increased competition between companies to get sufficient quantities of the raw material to be transformed.

Table 7: Dairy products
Number of enterprises

(units)	1983	1985	1988	1991	1992	1993	1994
EUR15 (1)	6 123	5 472	6 114	3 911	3 454	3 028	4 362
Belgique/België	71	83	77	60	N/A	N/A	50
Danmark	171	86	65	67	47	44	40
Deutschland (1)	546	489	408	315	354	N/A	N/A
Ellada	N/A	N/A	985	N/A	N/A	N/A	N/A
España (2)	N/A	N/A	595	N/A	N/A	N/A	540
France	1 497	1 332	1 143	998	N/A	N/A	815
Ireland	93	90	84	31	N/A	N/A	N/A
Italia	3 115	2 816	2 625	2 416	2 391	2 353	2 330
Luxembourg	2	2	2	N/A	N/A	N/A	N/A
Nederland	49	38	33	24	22	22	20
Österreich (2)	203	195	N/A	N/A	156	136	117
Portugal	N/A	N/A	97	N/A	N/A	N/A	N/A
Suomi/Finland	N/A	N/A	N/A	N/A	84	85	70
Sverige	N/A	N/A	N/A	N/A	61	58	57
United Kingdom (4)	376	341	N/A	N/A	339	330	323

(1) Including former East Germany from 1991 onwards.
(2) 1994 is an estimate.
(3) 1987 under 1985 heading.
(4) Excluding producer processors.
Source: EDA

Table 8: Dairy products
Dairy cow numbers

(thousands)	1983	1987	1992	1993	1994
EUR15	30 953	28 286	22 679	22 023	22 704
Belgique/België	984	922	758	690	677
Danmark	1 003	811	712	714	699
Deutschland (1)	7 829	7 099	5 365	5 304	5 273
Ellada	225	245	203	206	206
España	1 861	1 837	1 468	1 378	1 351
France	7 104	5 892	4 605	4 451	4 428
Ireland	1 628	1 527	1 400	1 281	1 292
Italia	3 068	3 024	2 317	2 277	2 261
Luxembourg	69	65	51	50	N/A
Nederland	2 554	2 166	1 837	1 804	1 697
Österreich	995	964	902	828	810
Portugal	305	395	381	375	356
Suomi/Finland	N/A	N/A	N/A	N/A	415
Sverige	N/A	N/A	N/A	N/A	509
United Kingdom	3 328	3 339	2 680	2 665	2 730

(1) Including former East Germany from 1992 onwards.
Source: EDA

This situation has triggered a merger and acquisition activity with a consequent reduction in the number of firms at EU level.

In most cases, bigger companies are multinationals that operate on the whole EU territory. They implement, as a consequence, coherent product strategies at the European level. They also offer a wide product range in order to cover major product segments and the most profitable product niches.

The leading companies at the European level are: Yoghurt: Danone, Yoplait, Muller, Zott, Milram, Northern Food, Unigate, MD Food; Cheese: Campina Melkunie, Kraft, Coberco, Friesland Frico Domo, Entremont, Besnier, MD Food; Milk: Campina Melkunie, Diary Crest, Unigate, Waterford, Parmalat, MD Food.

Main dairy producing countries are in decreasing order Germany, United Kingdom, France and Spain. Even if main dairy products are fresh milk (45,6%), drinking milk (38,8%) and cheese (7,4%) for all the above-mentioned countries, France shows a greater specialisation in the cheese sector, also being the leading producer. Germany is the most important producer of cream, concentrated milk, whole milk powder and skimmed milk powder.

From the available data, Italy and France have the greatest number of dairy firms. This indicates the more fragmented nature of the two national dairy industries and the need for a concentration process which is likely to take place in the future.

Data concerning cow numbers are coherent with the economic weight of the single nations within the EU diary industry. As a general trend, it is evident the decrease in livestock numbers as direct consequence of the milk quota system imposed at the EU level.

Product specialisation information puts in evidence strong values (though decreasing ones) for Ireland and Denmark. These countries show higher product specialisation ratios as compared to major actors in the dairy European industry. This implies a strong activity concentration in the sector even taking account the smaller economic weight of the two countries.

Strategies

The introduction of quotas on milk production can be identified as the starting point for numerous merging activities that have affected the sector. Besides the quota regulation, structural adjustments are a prerequisite to achieve and maintain the necessary strategic link to downstream sectors and to gain international competitiveness in the European market. In this respect, the degree of concentration is not the only decisive factor for competitiveness in the industry, even though the range of dairy product assortment, bargaining power, product-innovation and variation, research and development and distribution are closely related to it.

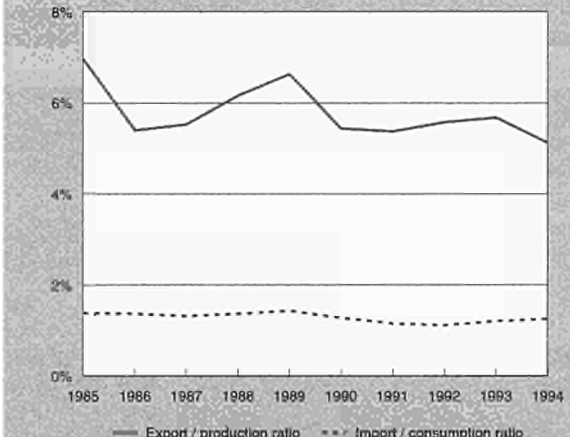
The merger and acquisition activities in 1994-95 indicate that the most active EU countries have been, in decreasing order, France, the United Kingdom, Italy, the Netherlands and Germany.

French acquisitions, mostly related to the Danone group, show a particular interest for Mediterranean countries, notably Spain, Greece and Italy. During 1995 the Danone group has also shown a considerable attention for companies in Poland.

Italian acquisitions mostly concern Italian and Latin-American companies and they have all been performed by two major groups (Cirio Bertolli De Rica and Parmalat).

In the United Kingdom, a notable domestic M&A activity has become evident after the abolition of the Milk Marketing Board.

Figure 8: Dairy products
Trade intensities



Source: DEBA GEIE, Eurostat

Table 9: Dairy products
Acquisitions

1994 Bidder	Country	Target	Target country
MD Foods Amba	Danmark	MD Food Norge	Norway
Dairygold Co-operative Society	Ireland	Horlicks Farms and Dairies	United Kingdom
BSN	France	Galbani	Italia
BSN	France	Delta Dairy	Ellada
Fromageries Bel	France	Cademartori	Italia
Fromageries Bel	France	Queserias Ibericas	España
Papillon	France	Lacandou	France
Naabtaler MilchwerkeBechtel	Deutschland	Gruenland Allgauer Kaesewerke	Deutschland
Fage	Ellada	Pindos	Ellada
Fage	Ellada	Vakali	Ellada
Cirio Bertolli De Rica	Italia	Ala	Italia
Cirio Bertolli De Rica	Italia	Polenghi	Italia
Parmalat	Italia	Soprocar	Chile
Parmalat	Italia	Fejertej	Hungary
Cragnotti & Partners	Luxembourg	Cirio Bertolli De Rica	Italia
Campina Melkunie	Nederland	Suedmilch	Deutschland
Campina Melkunie	Nederland	Sachsenmilch	Deutschland
Frico Domo	Nederland	Koninkijke-Kaasfabriek Eyssen	Nederland
Nestlé	Switzerland	Foremost Foods Taiwan	Taiwan
Ost Commerz Holding	Switzerland	Mecklenburger Schmelzkaese	Deutschland
Nestlé	Switzerland	Campina Melkunie	Nederland
Henniker-Parker	United Kingdom	Loseley Dairy Products	United Kingdom

1995 Bidder	Country	Target	Target country
Santo Domingo Group	Colombia	La Casera	España
MD Foods	Danmark	Arla	Sverige
Uhrenholt	Danmark	Skodsborg	Danmark
Alfi	France	Sodial	France
Besnier	France	Polenghi Lombardo Cheese Divisione (CPD)	Italia
Bongrain	France	Repcelaki Sajtgyar	Hungary
Danone	France	Mildes	Poland
Danone	France	Wola	Poland
Danone	France	Bonafont Group	Mexico
Hochwald Nahrungsmittel Werke	Deutschland	Eifelperle Milch	Deutschland
Investor Group	Deutschland	Sachsenmilch	Deutschland
Meierei Zentrale	Deutschland	Milchwerck Elsterwerda	Deutschland
Molkereigenossenschaft Radeber	Deutschland	Heinrichstaler	Deutschland
Parmalat	Italia	Leche Cotopaxi Lecocem	Ecuador
Cirio Polenghi De Rica (C&P)	Italia	Palomba Latte	Italia
Parmalat	Italia	Indulac	Venezuela
Parmalat	Italia	CLS/ULB	Colombia
Snow brand Milk Products Company	Japan	Maison Joseph Drouphin 51%	France
ERU	Nederland	Budafok	Hungary
Hoogwegt Groep	Nederland	Warmia Dairy	Poland
Menken - Landbouw	Nederland	France Creme	France
Nutricia	Nederland	Hajdutej Tepary	Hungary
Agros Coop.	Portugal	Proleite - Lacticoop	Portugal
Forlasa	España	Fuente Liviana (San Benedetto)	España
Investor Group	Sverige	Dairy Corp	Uganda
OBI	Switzerland	SIP	France
Lusso (Unilever)	Switzerland	Pierrot Friola (Tonilait)	Switzerland
Nestlè	Switzerland	Pacific Dunlop Interest	Australia
Cricket St Thomas Dairies Ltd	United Kingdom	Northern Food PLC	United Kingdom
Cricket St Thomas Dairies Ltd	United Kingdom	Plymouth Co-Op Diaries	United Kingdom
Dalepack Foods	United Kingdom	Cavaghan & Gray	United Kingdom
Robert Wiesman Diaries	United Kingdom	Mains Farm	United Kingdom
Robert Wiseman Dairies	United Kingdom	Co-operative Whl Society	United Kingdom
Unigate	United Kingdom	Prodipal - Vedial	France
Waterford Foods	United Kingdom	The Cheese Co.	Ireland
Wessex Dairies	United Kingdom	Northern Food - Liquid Milk Business	United Kingdom

Source: Nomisma

Table 10: Dairy products
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.11	1.01
Danmark	2.89	2.24
Deutschland	0.71	0.63
Ellada	0.72	1.50
España	0.85	0.90
France	1.43	1.45
Ireland	4.57	3.38
Italia	0.72	0.90
Luxembourg	N/A	N/A
Nederland	1.65	1.60
Portugal	1.10	1.46
United Kingdom	0.75	0.77

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

German interest has mostly regarded national companies. It is important to point out the acquisition process of Dutch companies that have moved in two different directions. On one side some of the most important German dairy industries have been acquired, on the other side Dutch companies showed a keen interest towards East European dairy industries.

REGIONAL DISTRIBUTION

Specific regional areas of the EU are characterised by a stronger concentration of dairy industries: Lombardia, Veneto and Emilia Romagna for Italy, West Country Shropshire, Cheshire and Lancashire for the UK, Lower Brittany, Normandy and the Loire Valley for France and Bavaria and Württemberg for Germany.

ENVIRONMENT

Main environmental problems regarding the dairy industry are mostly linked to upstream activities related to animal farming and pollution of water beds. In the final part of the distribution chain, concerns are also shown for the great quantity of plastic-based packaging materials used for the final products. Most industries tend to use environmental-friendly and recyclable materials.

REGULATIONS

For the dairy industry, the original EU regulation, operating through subsidies and price interventions, aimed at providing producers with a guaranteed income and at supporting the development of the EU market. The basic regulation 804/68 and its subsequent modifications also provided for a system of import levies and export refunds which has been recently modified in order to comply with commitments deriving from the GATT agreement (i.e. Reg. EC 1250/95 and 1268/95). In 1995, such modifications implied an increase in imports from extra-EU countries and a drop in refunds used by Member States to support their exports.

The 1992 CAP reform strengthened the system of quotas introduced by Reg. 856/84 and 857/84 and abolished the co-responsibility levy, previously used in order to finance promotional activities and the development of new products in this market. As far as quotas are concerned, during 1995, the Council adopted Reg. (EC) 1552/95 which fixes total quantity of milk and milk products the for Italy and Greece.

Agrimonetary arrangements (Reg. EC 3819/92) to have a direct impact on market prices for dairy products: especially for butter and milk powder ACRs (agricultural conversion rates) movements have been closely followed by price movements during 1995.

With respect to hygiene and quality standards, a substantial harmonisation of norms controlling the critical stages of production and distribution has been achieved in this sector with Directives 92/46 and 93/43. Very important effects on this sector are bound to be determined by horizontal norms ruling the attribution of certificates related to specific characters of products (Reg. 2515/94) and designation of their geographical origins (Reg. 2081/92 and 2037/93). In addition, horizontal norms affecting the whole dairy sector have been outlined by Directive 95/2 on food additives which establishes a list of authorised additives and specifies conditions for their use.

OUTLOOK

In general, the increased milk production in extra-EU countries will lead to a stronger competitive pressure for EU dairy producers and traders. The activity of the World Trade Organisation, furthermore, will lower trade barriers to extra-EU dairy imports.

During the last few years, an accelerated concentration process has been observed in the sector. Emphasis has been given on mergers and acquisitions as a form of rationalisation of dairy activities. This has resulted in a restructuring phase which is likely to continue in the near future. As a consequence, there will be a further reduction in the number of smaller producers in the industry.

EU consumption and production rates will increase in future years (1996-99). Net trade forecasts show, nonetheless, imports of extra-EU dairy products increasing at a faster rate than EU exports. Furthermore, the sector will continue to be affected by structural changes which will determine negative employment growth rates.

One important consideration regards the entry of the new EU Member States: this will imply a further adjustment of EU dairy industry structure, to take into account the increase in EU dairy production levels.

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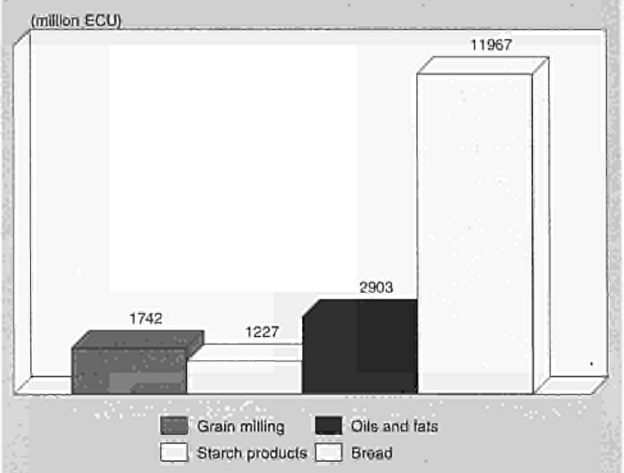
Grain milling
NACE (Revision 1) 15.6

The European grain milling industry, which is self-sufficient in terms of production, has seen production and cereal stocks fall over recent years. The reform of the CAP and bad weather conditions which, in 1994 and in 1995, had negative effects on the quality of world harvests, tended to narrow the gap between EU and world prices for cereals. This situation, given a relatively stable world demand for grain milling products, has generated a considerable rise in world prices compared to those in the EU.
Generally speaking however, the European grain milling industry has not been afflicted by problems as regards the supply of raw materials, neither in terms of quality nor quantity. From a structural viewpoint, the restructuring process continues through the closing down of small mills and the modernisation of others. Salient aspects of the sector are the growing use of ISO certification and attention to quality.

Figure 1: Grain milling
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

The grain milling industry includes milling of cereals, the processing of seeds and grains and the production of starchy products. Among major products are brans, rice, flours and different types of mixes for bread-baking, confectionery and biscuits. This sector does not include the preparation of animal-feed products which are dealt with separately.

The grain milling industry feels directly the effects of the characteristics and dynamics under way in upstream and downstream sectors. On the one hand, therefore, it is linked to the agricultural world which provides the raw materials, and on the other to the second-processing sectors which provide the demand for its output. Among the latter are the pasta manufacturing sector and the bread-making and confectionery industries.

Though distinguished by low value added compared to other manufacturing sectors, in 1994 the EU grain milling industry exceeded 1 700 million ECU. The United Kingdom is the country with the highest value added - 364 million ECU; France and Italy come a close second with 277 and 266 million ECU respectively, while Spain, Germany and the Netherlands touch lower, though significant, value added levels. In 1994, given a European production worth about 11 073 million ECU, apparent consumption was around 10 263 million ECU. That same year showed a positive trade balance (810 million ECU), even though about 10% lower than the previous year. In 1994, the sector employed about 35 900 people. This figure has fallen by 9 000 since 1985. This drop in employment can be attributed to restructuring in the sector involving the modernisation of plants and the introduction of labour-saving technologies.

Recent trends

Over the last decade, production in real terms has shown a moderate growth (0.6% per annum), particularly strong in 1988/89 and in the 1990/92 year period, while in 1993/94, there was a drop of 0.4%. This recent drop appears related in part to production patterns in the cereal sector which have seen a fall in the production of the raw material to be processed. Generally speaking, this drop was due to bad weather conditions, and to the implementation of the CAP reform.

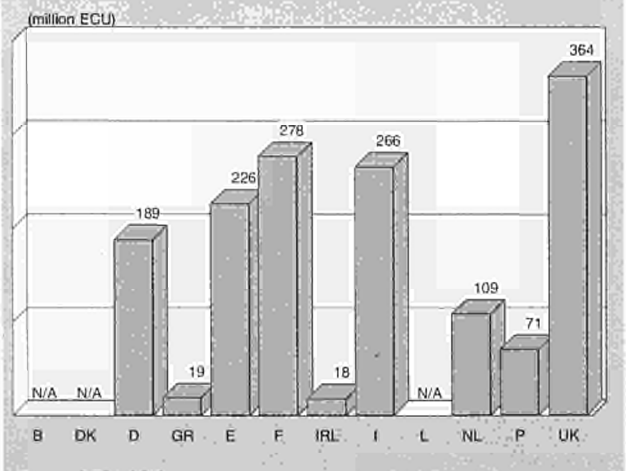
With regard to consumption, 1993-94 presented a growth of 0.4%, a figure in line with the average growth rate for the entire 1985-94 period, but higher than the zero growth of the 1985-90 five-year period. Particularly interesting are the performances of foreign trade indicators. Extra-EU exports have registered an overall drop since 1985, with a most evident fall between 1985 and 1990 (-5.9%). Between 1993 and 1994, there was a steep drop equal to 8.5%. In the same year, extra-EU imports rose by 11%, a reverse trend compared to the strong negative growth rate of the 1985-90 period (-34.9% annum).

With regard to employment figures, these fell throughout the entire period. This laying off process, was stronger than the one in the manufacturing sector above all in the 1985-88 period.

International comparison

In 1994, Japan was the major world producer (at current prices) in the sector, with almost 14 500 million ECU. It was followed by the EU with 11 100 million ECU, while the US was in third position. The EU and the US are the major exporters, with about 900 and 400 million ECU respectively in 1994. Japan in fact has a domestic consumption virtually equivalent

Figure 2: Grain milling
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Grain milling
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	9 757	10 374	10 089	10 466	10 645	10 411	10 263	10 053	11 030	11 090	11 170	11 290
Production	10 536	11 110	10 800	11 206	11 519	11 325	11 073	10 903	11 853	11 920	12 000	12 120
Extra-EU exports (5)	1 324	797	764	790	920	971	877	915	909	890	870	850
Trade balance (5)	778.8	735.8	711.4	739.7	874.0	914.0	810.1	850.1	823.5	830.0	830.0	830.0
Employment (thousands)	44.7	39.8	39.3	39.0	36.9	36.2	35.9	35.3	37.3	40.0	30.0	30.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
(5) A change in trade nomenclature in 1989 makes a comparison of pre-89 and post-89 figures hazardous.
Source: DEBA GEIE, Eurostat

Table 2: Grain milling
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	0.01	0.79	0.36	0.35
Production	0.24	0.95	0.55	-0.42
Extra-EU exports	-5.94	2.90	-2.11	-8.47
Extra-EU imports	-34.94	0.30	-21.13	11.00

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Grain milling
External trade in current prices (1)

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)
Extra-EU exports	1 324	813	640	660	797	764	790	920	971	877	915	909
Extra-EU imports	546	336	225	286	62	52	50	46	57	67	65	86
Trade balance	779	478	415	375	736	711	740	874	914	810	850	824
Ratio exports / imports	2.43	2.42	2.85	2.31	12.94	14.61	15.67	20.05	17.06	13.18	14.05	10.62
Terms of trade index	104.9	100.1	92.6	76.5	93.3	100.0	84.6	87.9	86.9	81.5	N/A	N/A

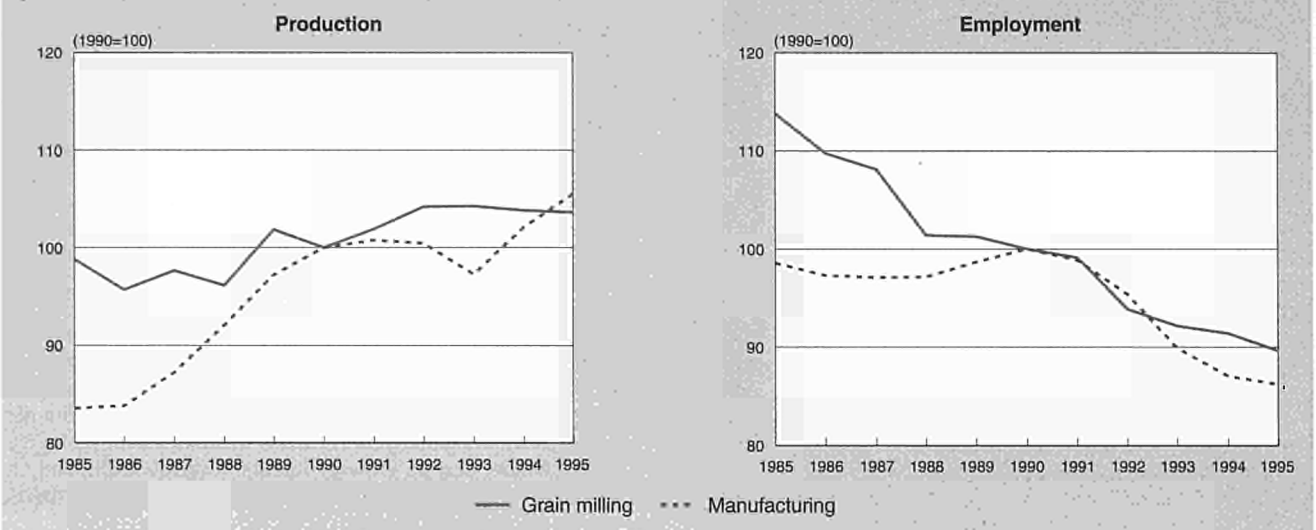
(1) A change in trade nomenclature in 1989 makes a comparison of pre-89 and post-89 figures hazardous.
(2) Eurostat estimates.
(3) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Grain milling
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	86.8	87.2	90.3	94.7	100.6	100.0	102.9	111.0	113.1	113.6
Unit labour costs index (3)	85.5	90.2	90.5	93.4	93.8	100.0	105.0	104.2	102.9	104.6
Total unit costs index (4)	98.1	98.2	97.5	98.5	100.0	100.0	102.3	101.8	100.5	98.4
Gross operating rate (%) (5)	6.3	6.1	6.3	6.5	6.9	7.0	7.0	7.0	6.6	6.6

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Grain milling
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

to production. If, on the other hand, we examine production developments in the three countries in real terms, it appears that Japan has reduced its production while the US and the EU have increased their output in real terms too.

With regard to wheat, world production fell in 1994 compared to the previous year due to a reduction in wheat-growing areas and a contraction of average unit yields because of bad weather. This phenomenon has continued and became particularly serious in 1995. The low levels of production in the face of an always lively demand has caused a drop in cereal stocks in the major exporting countries (United States, Canada, Australia, etc.). Starting in 1994, but above all in 1995, the situation of the wheat market was highly strained and this was reflected on prices which rose strongly. At the same time, world cereal prices reached levels higher than those in the EU; as a consequence, in 1995 the EU temporarily suspended export refunds to third countries. In the case of durum wheat and brans, for the first time for over twenty years, taxes were put on exports.

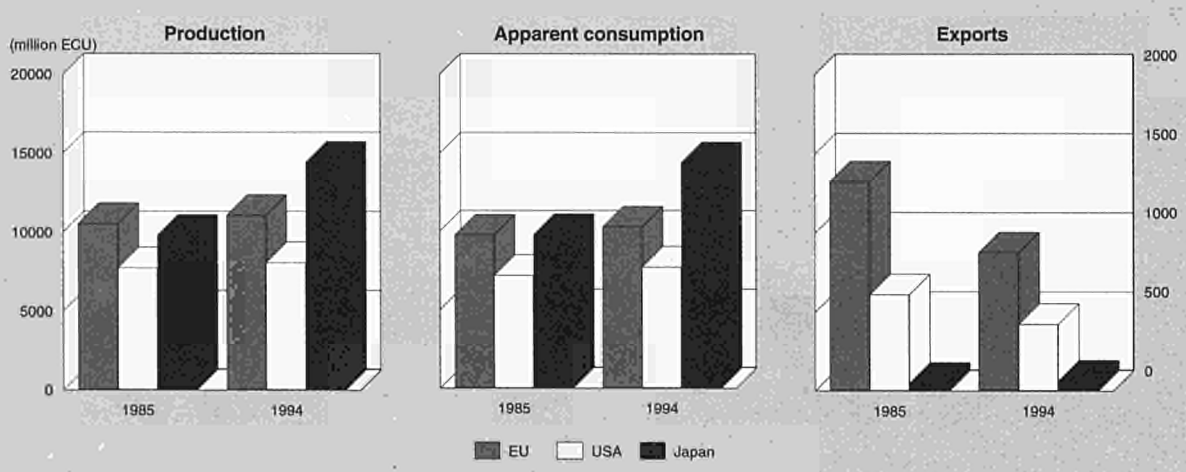
Such a situation pushed the authorities of the world's largest producer countries to implement measures aimed at curbing international trade. These measures on the other hand resulted in the US authorities curbing the granting of export bonuses.

Foreign trade

In 1994, the EU trade balance was positive and reached 810 million ECU, in line with the trend of the past decade. The EU is in fact a net exporter and the level of imports is very small (66 million ECU in 1994). The main producers-exporters within the EU are the countries with the highest productions of raw materials. These include France, Germany and the United Kingdom. In 1985, exports more than doubled imports. This trend strengthened in 1989 when, due to a sudden drop in imports, exports reached a figure nearly 13 times higher than that of imports. In 1994, the export/import ratio was 13.2.

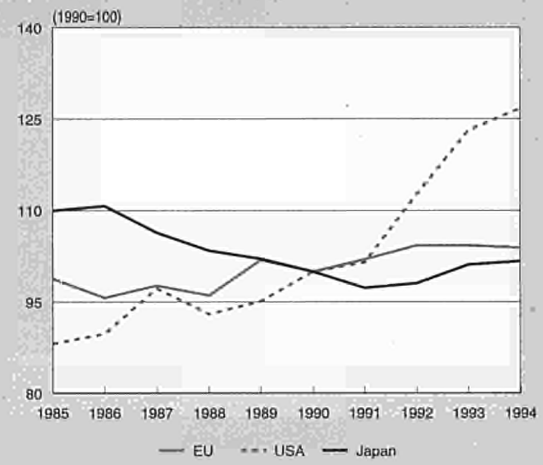
The export intensity ratio, after reaching a peak of 12.6 in 1985, fell to a figure between 8 and 6. The import penetration

Figure 4: Grain milling
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Grain milling
International comparison of production in constant prices



Source: DEBA GEIE

ratio also showed a downward trend. In fact, starting with an incidence of 5.6 in 1985, it underwent a steep drop until 1989. Subsequently, starting this year, it fluctuated between 0.4 and 0.6.

With regard to extra-EU exports, 28% go to Algeria, followed by Libya, Yemen, Sudan and Syria, each with shares between 4 and 7%. Compared to 1984, there was a strong drop in demand from the US which once accounted for 11%. The countries of origin of extra-EU imports, on the other hand, remained more or less the same over the period considered. The main suppliers of the EU are the US (wheat flours but also corn-processing products) and Thailand (above all rice) each with a 28% share, followed by the Dutch Antilles, Australia and Switzerland, each with a share between 7 and 5%.

MARKET FORCES

Demand

The demand for grain milling products is strongly affected, both in terms of quantity and quality by demand from the second cereal processing industry. In fact, the use of household flour is very low in all countries of the EU, except in some countries of Scandinavia (Finland, Sweden and Denmark) and Austria. Families have increasingly less time to prepare meals and this favours a trend towards the use of products with greater service content. Consequently, generally speaking, household flour is undergoing a phase of advanced maturity with little chance of revitalisation.

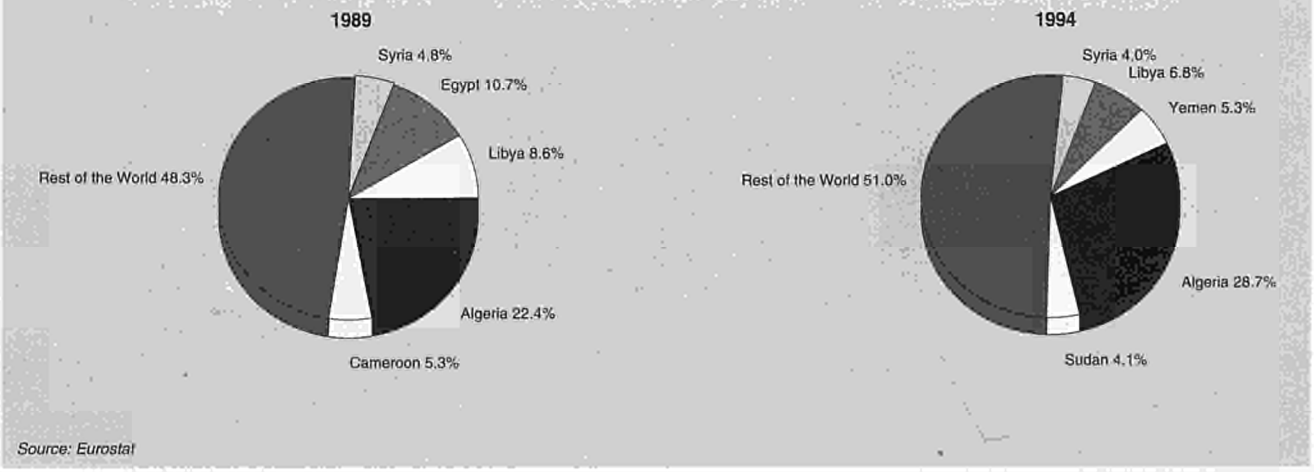
Bakeries are the biggest flour consumers throughout Europe, absorbing a share varying from country to country between 50% to 85% of the usable production. These are followed at some distance in terms of percentage volume by the confectionery industry which makes biscuits, rusk manufacturers and confectioners. It is interesting to stress that while the confectionery industry requires a variety of flour mixes, each one suited to a different type of second-processing product, the pasta industry on the other hand uses a much smaller number of mixes. In this regard, while in Italy the pasta industry is legally obliged to use only durum wheat, in other European countries, especially in those of northern Europe, common wheat is widely employed. A market niche is that of biological flours which, despite growing interest towards health and nature aspects, enjoy low demand and have low growth prospects, above all due to high cost.

Supply and competition

Despite grain milling being distinguished by low labour intensity, much effort is being made to modernise plants and further reduce the number of workers. This phenomenon has also been encouraged by a gradual rise in labour costs. In fact, the unit labour cost index passed from 85.5 in 1985 to 104.6 in 1994, showing an average growth rate considerably above that of total costs. The total unit costs index, moreover, shows only slight fluctuations compared to base year 1990. The labour productivity index also rose - 26 percentage points between 1985 and 1994.

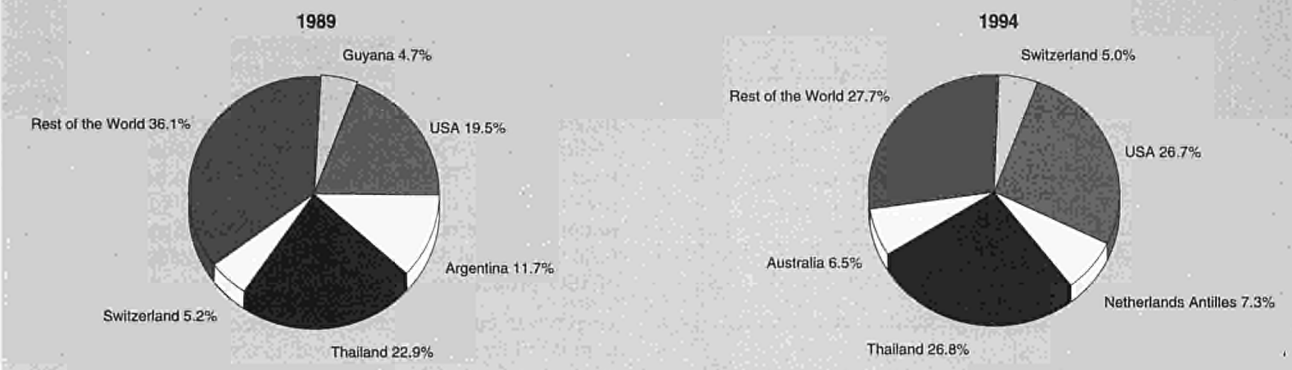
The grain milling industry is generally distinguished by a low value added; besides the cost of raw materials and labour, a major role is played, in a very different way in the single countries, by the cost of energy and the cost of transport, which is higher by road than by rail. The grain milling industry is distinguished by a strong fragmentation of supply and the flour market is fundamentally restricted within national borders. In fact, the transportation and distribution of flour is very expensive and difficult, so preference is given to the raw material, grain rather than flour. Furthermore, the raw material, especially wheat, has greater "flexibility" compared to flour: in fact, wheat offers the possibility of achieving

Figure 6: Grain milling
Destination of EU exports



Source: Eurostat

Figure 7: Grain milling
Origin of EU imports



Source: Eurostat

mixes of grains with different characteristics, thereby obtaining flour more suited to the requirements of demand. Consequently, grain processing traditionally takes place regionally, near large raw material production areas, including those near second-processing industries.

Production process

Over the last few years, the sector has undergone important technological innovation. The modernisation of old plants continues, inter alia, with a wide use of computer technology applied to the production process which results in cost savings and better quality of processed products. Alongside traditional mills which mill cereal mixtures, those which mix flours and not cereals are growing in number. The aim is always to obtain flour mixes with different characteristics able to respond to the specific needs of the second-processing industry.

With regard to the biological product, the major problem area is cost. In particular, those companies which process biological and conventional flours have additional costs relating to obligatory sanitation phases. Other costs concern the physical separation of the biological product from the conventional product while this is in the mill and as far as the sales point (from initial storage, during processing, to final storage and transport).

INDUSTRY STRUCTURE

Companies

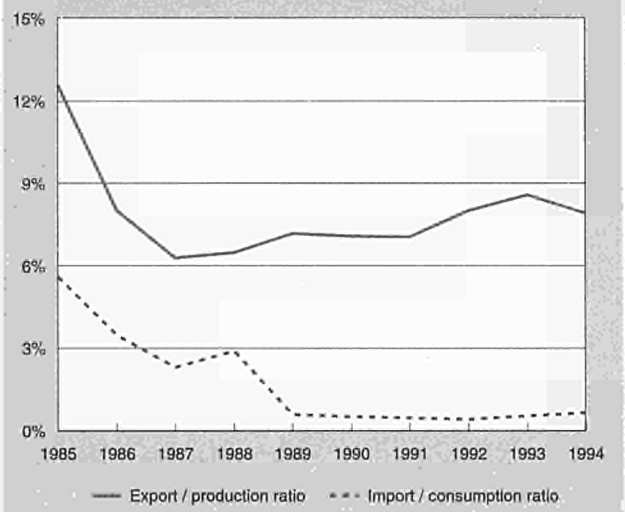
The European grain milling industry has lost a large number of mills over the past decade. The biggest drop occurred in the early 1980s in Germany, France and Italy, and in the 1990s in Belgium and the Netherlands. Despite this drop, in the 15 Member States there are still just under 3 000 mills, with an overall production of about 26 million tonnes. Large differences exist between the different countries as regards the number and average production of the plants. In fact, alongside countries with fragmented industrial structures, there are others distinguished by greater industrial concentration. France, Italy and Germany are, in that order, those with the highest number of mills, though their average unit production is well below 10 000 tonnes. Compared to a European average (EU-15 excluding Greece and Ireland) of 9 000 tonnes per mill, the United Kingdom is the country with the highest average production per mill - 56 000 tonnes - followed in

Table 5: Grain milling
Destination of flour consumed in home country, 1994

(%)	Bakeries	Biscuits and rusk manufacturers, confectioners	Household flour	Other uses
Belgique/België	85.5	9.0	1.5	4.0
Danmark (1)	86.0	N/A	14.0	0.0
Deutschland	73.0	14.0	7.0	6.0
España	79.3	16.4	1.6	2.7
France (2)	65.4	17.7	5.1	11.8
Italia (3)	77.0	23.0	N/A	N/A
Nederland	68.2	14.1	0.2	17.5
Österreich (1)	76.0	N/A	17.0	7.0
Portugal	80.0	5.0	7.0	N/A
Suomi/Finland (1)	50.0	N/A	40.0	10.0
Sverige	73.0	3.0	20.0	4.0
United Kingdom	63.6	16.1	4.5	15.9

(1) Bakeries include biscuits and rusk manufacturers and confectioneries.
(2) Other uses includes flours for mixtures sold principally in the other categories.
(3) Biscuits and rusk manufacturers and confectioners include household flour and other uses; provisional estimates.
Source: National Milling Associations

Figure 8: Grain milling
Trade intensities



Source: DEBA GEIE, Eurostat

order of importance by the Netherlands, Denmark, Sweden and Belgium respectively with 37, 25, 24 and 23 thousand tonnes.

Greece and Portugal, though not among the major EU flour producing countries, have the highest levels of national production specialisation (respectively 4.2 and 2.7). Third comes Spain (2.2), followed at a distance by Italy and the Netherlands which, with values only just above the unit, show a degree of production specialisation greater than the Community average. Compared to 1985, always looking at this index, there have been no significant changes; the only exception is a drop in production specialisation in Portugal and Ireland.

The major milling companies per country are: for Belgium, Ceres-Bruxelles-Gent N.V. and Molens van Deinze; for Germany, Kampffmeyer Muhlen GmbH Hamburg, Wehrhahn-Muhlen OGH Dusseldorf and BM Bakermuhlen AG Mannheim; for France, Moulins Soufflet, Grands Moulins de Paris (GMP) and Euromill; for Luxembourg, Muller Frères and Nonnemillen; for the Netherlands, Meneba and Ranks Meel B.V.; for Portugal, National Companhia Industrial de Transformacao de Cereais and Germen, Moagem de Cereais; and finally, for the United Kingdom, Allied Mills Ltd. Rank Hovis Ltd and Spillers Milling Ltd.

Strategies

The grain milling industry acts as a link between the agricultural world and the downstream sectors, i.e. second-processing industry (confectionery, pasta-making, bread-making, etc.). In order to meet demand requirements, the grain milling industry focuses on quality control which affects all stages of the production process, from purchasing to actual processing and marketing. With regard to raw materials, besides attention towards quality characteristics and uniformity of batches, also important are product guarantees in terms of preservation procedures. Linked to quality aspects is the gradual propagation of ISO production process certification.

To recover competitiveness, the grain milling industry, distinguished by a low value added, is also careful to keep down production costs as much as possible. The result is a tendency to dismantle obsolete and small plants and, at the same time, to develop policies of industrial concentration.

Over the past two-year period, 1994-95, acquisition and merger processes have continued. These have involved the main flour producing countries of the EU. Most operations have occurred between French companies which have strengthened their presence within the country. The other countries involved are the United Kingdom, Belgium and, among target countries, Spain, Germany and Argentina.

This sector is also marked by policies of vertical integration with the second-processing industry. This phenomenon involves above all the pasta industry and consequently durum wheat milling. In Italy, where about 70% of total EU pasta production is concentrated, 35-40% of durum wheat mills are integrated with the pasta industry. In this manner, the latter, besides being able to better ensure final product quality standards, can also achieve advantages as regards purchasing policies. Vertical integration is less widespread in the case of common wheat flours, also because the demand from the second-processing industry requires a high number of flour mixes. This situation discourages direct production, yet favours continuing supply relations between specific mills and the user industry.

Table 6: Grain Milling
Number of mills and total flour production (soft wheat and rye), 1994

(thousand tonnes)	Total flour production	Number of mills (units)	Average production per mill
EUR15 (1)	26 113	2 892	9.0
Belgique/België	1 304	56	23.3
Danmark	330	13	25.4
Deutschland	5 454	601	9.1
España	2 255	392	5.8
France	5 210	828	6.3
Italia	4 580	666	6.9
Luxembourg	40	4	10.0
Nederland	1 269	34	37.3
Österreich	468	152	3.1
Portugal	613	36	17.0
Suomi/Finland	N/A	15	N/A
Sverige	560	23	24.3
United Kingdom	4 030	72	56.0

(1) Excluding Greece and Ireland.
Source: National Milling Associations

Table 7: Grain milling

Acquisitions
1994

Bidder	Country	Target	Target country
Vamo Mills (Vandemoortele)	Belgique/België	Comexol (Koninklijke Bunge)	France
Greencore Group/Carr's Milling Industries	Ireland	Robertson-Carr' Milling	United Kingdom
Danone Group	France	Bagley	Argentina
Soufflet	France	Societe Meuniere de Gestion et Participation	France
Toulousaine de Cereals	France	Vitaflor (in receivership)	France
Syria	Syria	Deutschland Flour Mills	Deutschland
Golsin Investment	United Kingdom	Maria Mayor Gil	España

1995

Bidder	Country	Target	Target country
Champagne Cereals	France	Moulins de Braine	France
Gheerbrandt/Leforest/Ste des Moulins de Courteuil	France	Moulin du Nord et de la Picardie	France
Scael	France	Val Beauce	France
Carr's Milling Industries	United Kingdom	NWF	United Kingdom

Source: Nomisma

REGIONAL DISTRIBUTION

France is the top producer of common wheat, milled in mills located mainly in the Loire regions, Brittany, the Midi-Pyrènèes and Rhone Alpes, while the largest plants are in Ile de France. In Germany, where top quality wheat is grown, the main flour producing regions are near to the centres of consumption: Nordrhein-Westfalen and Niedersachsen/Bremen in the west, and Berlin and Brandenburg in the east. In the United Kingdom, the port areas of have the largest concentration of mills. In Belgium, the region with the biggest concentration is Flanders. In Italy, the central and southern regions are those which grow most of the durum wheat while large quantities of common wheat are grown in the Po valley. The wheat processing plants are consequently located throughout the whole country. Rice processing is mainly restricted to Piedmont while that of corn occurs throughout the north. In Spain, the major flour producing regions are Castilla y Leon, Andalusia, Murcia, La Rioja, Castilla-La Mancha, Extremadura and Navarra. In Portugal, the big mills are located near the centres of consumption and near the coast, whereas common and durum wheat are produced in the interior.

ENVIRONMENT

Grain milling is not affected by major environmental impact problems.

In recent years, the adoption of cereal dry cleaning systems has eliminated the problems linked to waste water draining.

Two main problems persist: the one related to volatile compounds, generated during the discharge of cereals, which can cause health troubles (particularly allergies) among workers. The second problem is linked to the disposal of ordinary (i.e. packaging) and special wastes (i.e. exhausted fuels), which is common to all manufacturing.

REGULATIONS

The organisation of the cereal sector is based on Reg. (EEC) 1765/92 and 1766/92, which introduced a set of measures oriented to achieve a substantial reduction in the price of cereals offset by compensatory payments. To get such refunds, farmers are requested to set aside a certain percentage of the land cultivated with arable crops.

As part of the progressive implementation of the CAP reform over three marketing years from 1993/1994, the single intervention price for cereals was adjusted for the last time in respect of 1995 harvest.

Even before the CAP reform, the reduction of surplus in production in this sector has been enhanced by subsidising non food use of grain (Regulation 2176/90). More recently, measures have come into force bringing about a certain enlargement of lands cultivated with durum wheat by the reduction from 15% to 12% on compulsory set-aside (Regulation 2990/94). Taking into account cereal stock trends in the Community, the Council further reduced the compulsory set-aside rate to 10% for all cereals, with Reg. (EC) 2336/95 (effective from 1996 harvest).

Regarding cereals and processed products, a significant change has been introduced with the horizontal Directive 94/54 which provides for the compulsory indication of the use of packaging gases, where these gases have been used to extend the durability of the product concerned.

The harmonisation of additive legislation, representing an internal barrier, was considered the main priority for this sector. Therefore, particular importance is attributed to Directives 94/35, 94/36 and 95/2 which have introduced a substantial standardisation between EU countries regarding the use of colourings, sweetenings and additives in the production of certain foodstuff.

Commitments deriving from GATT have led to the introduction of substantial developments in import/export legislation: general principles stated by Reg. (EEC) 1766/92 have been therefore integrated by Reg. (EC) 3290/94 which mainly apply to taxes on wheat imported from non EU countries and export subsidies for cereals and processed products. Finally, in order to step up the common organisation of cereal market, the convention on wheat was extended to all cereals by means of the International Grains Agreement which came into force on 1 July 1995.

OUTLOOK

With regard to grain milling demand, no significant changes of current levels are expected. In fact, in Europe consumption levels of products of grain-milling industry's downstream sectors (cakes, bread, pasta, etc.) show a virtually zero growth

Table 8: Grain milling
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	N/A	N/A
Deutschland	0.44	0.39
Ellada	4.06	4.21
España	2.46	2.24
France	0.81	0.93
Ireland	1.45	0.91
Italia	1.42	1.23
Luxembourg	N/A	N/A
Nederland	0.66	1.23
Portugal	4.35	2.72
United Kingdom	0.91	1.05

(1) Ratio of production in the sector compared to manufacturing industry for the country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

rate. As regards markets outside the EU, possibilities for the EU grain milling industry depend on the one hand on international trade agreements and, on the other, on quality/quantity dynamics (stock levels, prices, surpluses, quality, etc.) of raw materials at global level. So far as supply goes, the gradual tightening of hygienic-health regulations within the community favours production plant modernisation processes. Finally, the fact that Austria, Finland and Sweden have joined the EU will have a limited effect on the supply and demand situation within the EU.

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Prepared animal feed
NACE (Revision 1) 15.7

In 1994 the production and consumption of prepared animal feed settled just below the levelwhich was reached in 1993, while exports registered a significant increase.
Above all in the animal-breeding feed sector, companies are increasingly concentrating to respond to the heavy pressure both on the raw material side and the end-product markets. The pet food sector is dominated by the presence of multinationals operating in other sectors of the food industry: although contributing only 20% of total turnover, the pet food segment looks likely to considerably increase its weight in the coming years thanks to steady growth rates.

INDUSTRY PROFILE

Description of the sector

The prepared animal feed industry includes the manufacturing of both products for feeding and/or breeding livestock and products for domestic animals. The latter are divided into wet and dry products, depending on a water content of more than 80%, or equal to a compressed percentage of between 10 and 15%.

Prepared animal feed for breeding livestock includes completely prepared feed and supplementary feed. The first constitutes a complete ration and is obtained by mixing of basic feed appropriately treated - such as cereals, flours of various origin, feeding cake and other residues of oil seed processing, by-products of the food industry and slaughtering industries - with added mineral salts and other integrators. It is common, moreover, to differentiate the end product according to the type of animal for which the product is destined: cattle, pigs, poultry, sheep, goats and others.

Supplementary animal feed is characterised by a high content of certain substances like mineral salts, sugars, protein, etc. which does not ensure, on its own, a daily ration.

In 1994, production of the EU animal feed industry reached 29 500 million ECU, with an added value of 4 800 million. France, the United Kingdom and Germany are (in this order) the countries with the highest added value, accounting together for over 55% of the total.

Currently the pet-food sector contributes for over 20% of the total production of the sector, reaching 6 000 million ECU in 1994. In 1995, 4.5 million tonnes of pet food were sold for the estimated 244 million domestic animals in Europe. In 1994, 54 million families in Europe had at least one domestic animal, that is 4 million more than in 1990.

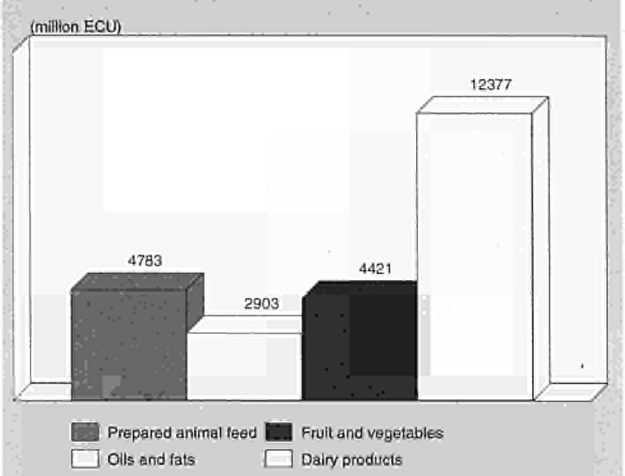
Recent trends

From 1985 to 1994 production and consumption increased, in real terms, at an average annual growth rate of 2.9 and 2.8% respectively, with higher growth rates in the period 1985-90 (production +3.8% and consumption +4.1%) with respect to the period 1990-94 (+1.3% and 1.6%). The existing gap between the nominal and actual growth rates shows a decrease in prices for both production and consumption.

The same is not true for exports which increased more in nominal terms than in actual terms (5.2 against 3.9% between 1985 and 1991), probably as a consequence of an increase in price of the products on the international market.

Employment in the sector, after reaching its peak of 91 700 units in 1990, decreased steadily until 1994 when, with 88 200 units, it returned to its 1985 levels. On the other hand, employment is on the increase in the pet-food segment, reaching 22 000 units in 1994, that is 2 000 more than in 1990.

Figure 1: Prepared animal feed
Value added in comparison with related industries, 1994



Source: DEBA GEIE

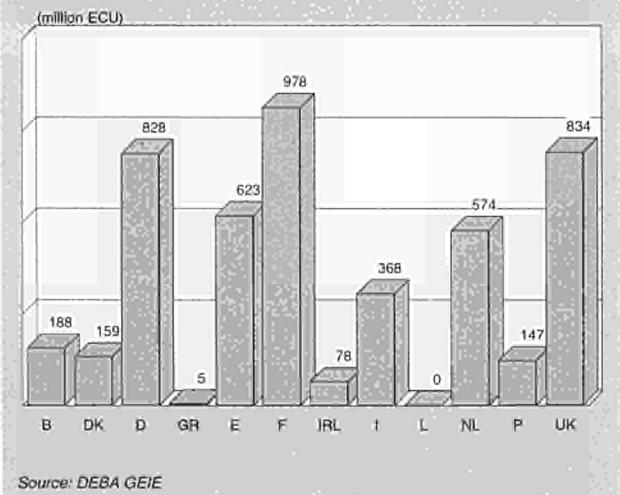
In the period 1985-90, production growth in the animal-feed industry was in line with that of the manufacturing industry as a whole; subsequently, in the years 1990 to 1994, growth was sustained at an average annual rate of 1.6% compared with 0.5% registered for the overall manufacturing industry.

As for employment, the animal feed industry evolved substantially in line with the trend for the overall manufacturing industry from 1988 to 1991 with annual differences never exceeding 1%; from 1992 to 1994, while employment in the manufacturing industry fell at an average annual rate of 3.4%, the animal feed sector registered a smaller drop in units employed (-1%).

International comparison

In 1994, the main animal feed producing countries were the EU with a production of 29 460 million ECU, followed by the USA with 20 784 million ECU and Japan with 8 144

Figure 2: Prepared animal feed
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Prepared animal feed
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	24 520	28 669	28 045	28 099	29 082	29 072	28 993	29 176	30 648	31 260	31 950	32 750
Production	24 819	28 832	28 162	28 327	29 405	29 571	29 460	29 789	31 095	31 750	32 480	33 320
Extra-EU exports	797.1	824.0	749.4	864.5	1 047.6	1 176.8	1 259.9	1 387.0	1 249.7	1 320.0	1 410.0	1 490.0
Trade balance	299.0	162.6	117.4	228.1	322.3	498.9	467.6	612.9	447.1	490.0	530.0	570.0
Employment (thousands)	88.1	90.4	91.7	90.9	90.5	90.1	88.2	87.2	89.1	90.0	90.0	90.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Pet food industry
Main indicators in current prices (1)

(million ECU)	1990	1992	1994
Sales value	5 000	6 000	6 000
Sales volume (thousand tonnes)	4 000	4 500	4 500
Number of pet food companies (units)	444	456	456
Total employment (thousands)	20.0	21.0	22.0
Number of households with pets (millions)	52.3	54.0	54.0
Population of pet animals (millions)	204.0	244.0	244.0

(1) Excluding Portugal, Greece and Luxembourg. The figures have been estimated.
Source: FEDIAF

Table 3: Prepared animal feed
Main indicators of dehydrated fodder by country in marketing year 1994/1995(1)

(thousand tonnes)	B	DK	D	E	F	I	NL	UK	EUR12 (2)
Apparent Consumption	157.1	186.7	698.1	1 276.0	925.0	520.0	279.3	136.4	4 179
Total production	7.5	305.0	418.9	1 396.0	1 321.0	605.0	243.5	96.0	4 297
Exports	8.6	120.0	36.5	150.0	399.0	115.0	18.0	0.6	847
Trade balance	-149.6	118.3	-279.2	120.0	396.0	85.0	-35.8	-40.4	255

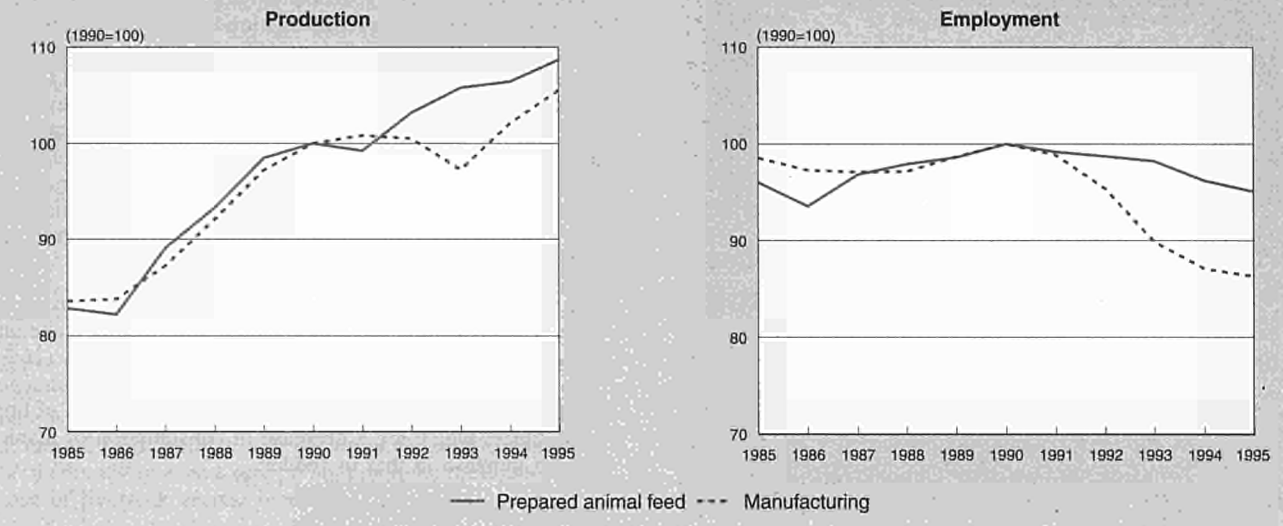
(1) Starting April 1 and ending March 31.
(2) Excluding Greece, Ireland, Luxembourg and Portugal.
Source: CIDE

Table 4: Prepared animal feed
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.08	1.35	2.86	0.92
Production	3.83	1.57	2.82	0.65
Extra-EU exports	-1.52	11.14	3.91	2.89
Extra-EU imports	7.44	4.55	6.14	16.98

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Figure 3: Prepared animal feed
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

million ECU. Compared with 1985, the EU increased its production value by almost 19%, the USA by 2.6% while Japan registered a slight fall of -1%.

As far as consumption is concerned, while in 1985 all three countries were self-sufficient, in 1994 Japan showed a negative trade balance as a consequence of the above mentioned decrease in production accompanied by an increase in consumption (7%).

The EU is also the largest exporter (1 260 million ECU), followed by the USA, which in 1994 exported animal feed products worth 940 million ECU.

In real terms, the USA shows the best performance: in the period 1985-94, production increased by 33.3% followed by the EU with 28.3%, while the negative performance of Japan is all the more evident, with a decrease of 37 percentage points.

Foreign trade

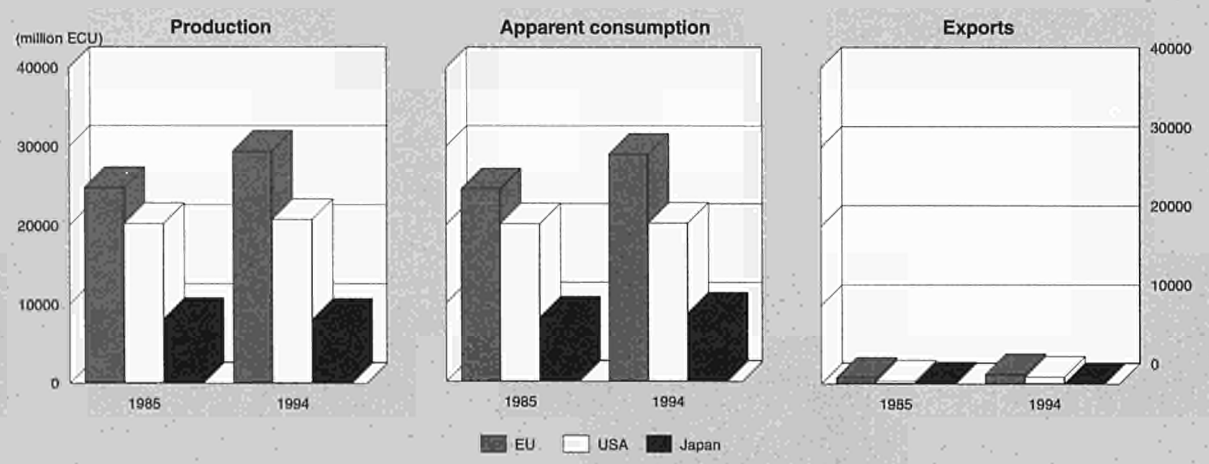
Following the drop in 1986-87, extra-EU exports of animal feed products grew on a continuous basis (with the exception of 1990) at an average annual growth rate of 10.7% in value terms, reaching 1 260 million ECU in 1995.

Albeit in quite a volatile manner, extra-EU imports also rose at an annual rate of 5.3% from 1985 to 1994. In 1994 they amounted to 792 million ECU.

As a result, the export/import ratio passed from 1.19 in 1990 to 1.74 in 1993, to stand at 1.59 in 1994. , Although being a net exporter, in 1994 the EU sold only 4.3% of its production in non-EU markets, a value which, on the other hand, is the highest in absolute terms since 1985. As for imports, the import penetration is even lower at a level of around 2.5%.

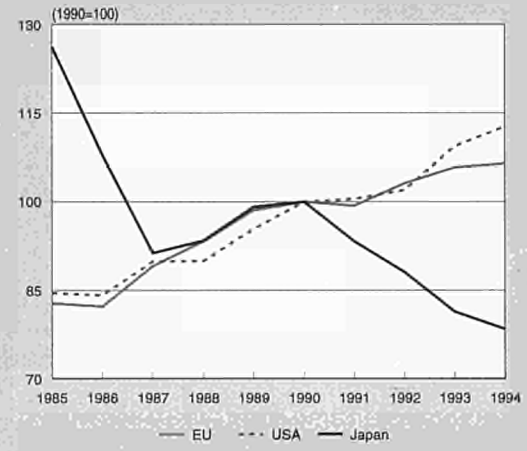
The main countries of destination for EU animal feed product were the EFTA countries which increased in absolute terms, however, imports from the EU, saw their weight in percentage

Figure 4: Prepared animal feed
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Prepared animal feed
International comparison of production in constant prices



Source: DEBA GEIE

decrease (from 39% in 1989 to 29% in 1994) followed at some distance by Poland (6.7%), the USA and Libya (both with 5.3%).

Turning to extra-EU imports, in 1994 Chile lost its leading position among the main suppliers of the EU, taking fourth place with 12.2% behind the USA (29%), Peru (22%) and EFTA countries (21%).

MARKET FORCES

Demand

The overall demand for breeding animal feed products on the EU market has been decreasing for some years: against the stability of demand for products for the poultry- and pig-breeding sector, there has been a decrease in feed for cattle and, in particular, for milk-cows as a consequence of the regime of milk production quotas.

Also, the production quotas introduced by the CAP for beef and pork, and a persistent decrease in red meat consumption in the diet of the European consumer (recently reinforced by the mad-cow scare) are the main factors which explain the negative development of the demand for prepared animal feed.

The pet-food market, on the other hand, is in a peak phase of development. In the EU, pre-packed animal feed covers on average around 48% of the caloric requirements of domestic animals (the rest being accounted for by other home-made nutrition). Nevertheless, consumption levels are very different in the various countries. Taking 100 as the average per capita expense for pet food in Europe, Finland, Portugal and Greece classify at the bottom of the scale with values of less than 20. In mid-low position (with values between 30 and 80% of the European average) are Ireland, Italy and Spain; with values oscillating by ± 20% with respect to the average are the Netherlands, Germany, Austria and Denmark. Finally, in first position are France, Sweden, the United Kingdom and Belgium/Luxembourg.

The main raw materials used by the animal-feed industry are cereals, representing 31% of consumption, feeding cake and flours (25%) and the by-products of the food industry (16%). The weight of the various raw materials has not changed substantially during recent years with two exceptions of little importance, which are a decrease in consumption of manioc and an increase in that of fodder.

Supply and competition

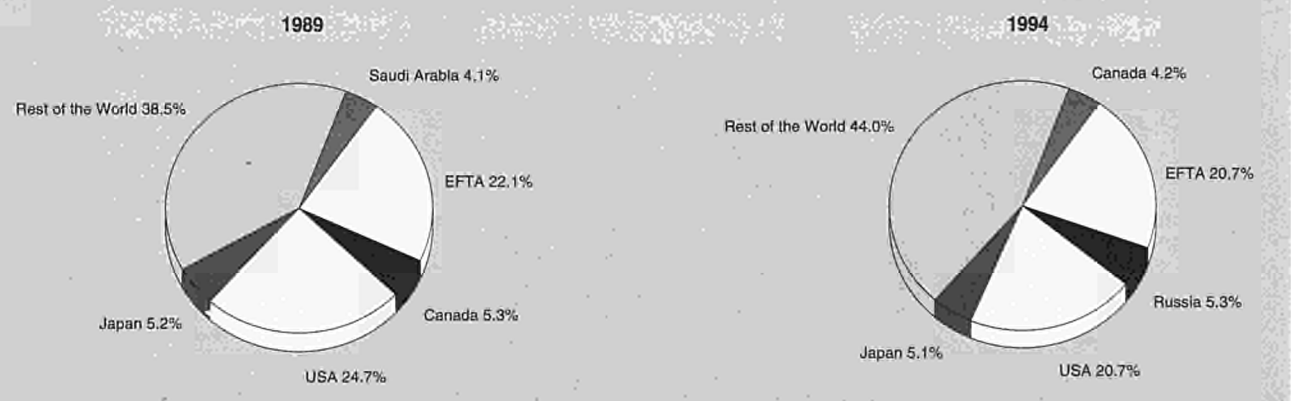
In 1994, the EU produced 117 269 million tons of prepared animal feed, 34.5% of which for pig feeding, 30% for cattle and 28% for poultry; the remaining 7.5% accounts for animal feed for the category "other animals", i.e. horses, rabbits, fish, sheep and goats, and for pet food (4.5 million tonnes alone).

France heads the ranking of EU producers with over 21 million tons followed by, in order of importance, Germany (19 million tons), the Netherlands (16.8), Spain (14.8), Italy and the United Kingdom, both in fifth position with around 12 million tons.

The countries mainly specialised in the production of prepared animal feed are the Netherlands and Portugal, where the specialisation index of the animal feed industry in 1994 reached 2.91 and 2.70, respectively, followed by Spain with 2.05 and then, in order of importance, Ireland, Belgium and France. With respect to 1985, a relative drop in specialisation is recorded for the Netherlands and Portugal with Spain approaching the top positions.

Between 1985 and 1994 the competitiveness of the EU industry increased, measured in terms of production unit costs: the total unit cost, although with alternate developments, decreased by almost 8%.

Figure 6: Prepared animal feed
Destination of EU exports



Source: Eurostat

Since the main factor determining the production price of animal feed is the price of raw materials, this result is due, firstly, to the decreasing trend in the price of cereals on the domestic market, which in the 1993-94 season alone dropped by 16%, and secondly, the fact that between 1985 and 1994 labour productivity registered annual growth rates above those of the cost of labour.

INDUSTRY STRUCTURE

Companies

The breeding-animal feed industry is characterised by the presence of some large multinationals, leaders in the European market, and many medium to large national companies. Above all for those products intended for breeding livestock, the high costs of transport connected with the volume of products induces many companies to locate their factories in the proximity of the agricultural enterprises and distribution centres. There is a frequent existence of a direct relationship between the animal feed industry and the users, without recourse to intermediaries, or even a vertical integration of the downstream phase of livestock animal breeding.

Italy is the country with the largest number of companies (900 production units) followed by Germany with 640 companies and France (404), the Netherlands (322) and Spain (218). In the EU, the only countries showing a high concentration in production capacity are the Scandinavian countries: in Sweden and Finland only two factories cover almost the entire national production.

The competitive scenario of pet food is even more concentrated: there are 456 companies in the whole EU, dominated by the presence of a few giants: Mars (US), present in the sector with the trademark Dolma, Nestlé (CH), Quaker Chiari & Forti (UK), and the British Spiller Foods (UK), petfood division of Dalgety (UK).

In particular, multinationals are dominant in the wet pet food sector. Large distribution channels are privileged because of the synergies with the marketing of other food products.

Strategies

Animal feed for livestock breeding is a commodity product currently in a market maturity phase. Competition amongst producers is therefore very keen, being essentially played on the price variable with consequent pressure on the profit margin.

Product innovation and constant attention to quality are two imperatives both for large and medium-sized companies.

The strategies applied by the main players are essentially twofold.

First, in order to reduce the adverse consequences of fierce price competition, companies try to improve the product quality and, more in general, the relationship with the final user which is understood in terms of ability to offer a series of services which go from granting extension of payment to better sales assistance to veterinary and technical consultancy.

Second, companies tend to diversify into more profitable sectors, such as feed integrators, pre-mixes, and in recent years, dry pet food.

The animal breeding feed producers are promoting a vertical integration process of the downstream phases of breeding, slaughtering, processing and commercialisation of meats.

Pet food, on the contrary, is a product which can easily be differentiated and is in a peak phase of development.

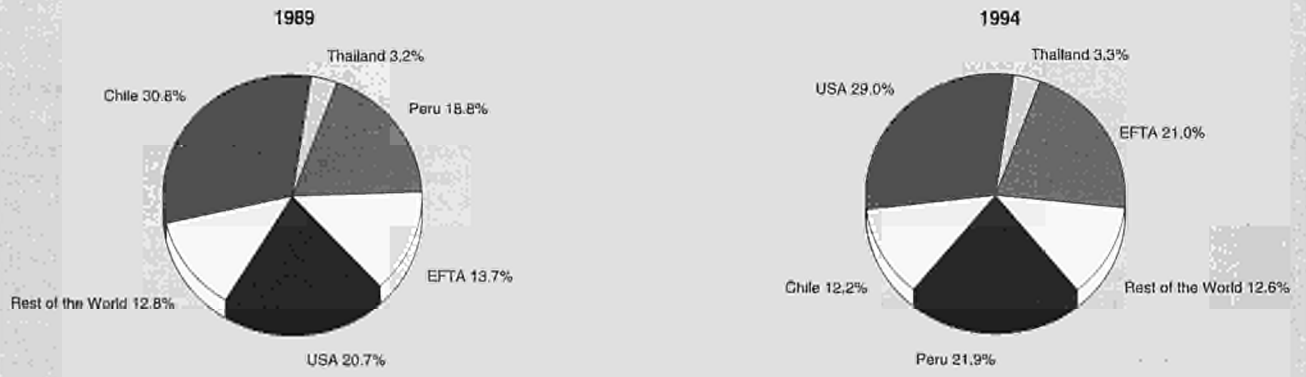
In the wet-food sector, competition consists mainly of the continuous innovation of products and in a careful policy of communication which transforms the high cost of advertising and promotion into important entry barriers. In the dry-food sector, competition lies mainly in the know-how of the company and in the quality of the products.

A growing number of acquisition and merger operations (7 in 1994 and 9 in 1995) is leading to a further concentration of the market. The acquiring companies have in all cases been European with a net preference for the acquisition of continental companies.

ENVIRONMENT

The production of animal feed is an activity with a low impact on the environment, contributing to its protection through re-utilisation of processing waste of other food industries, which otherwise would require specific waste disposal processes.

Figure 7: Prepared animal feed
Origin of EU imports



Source: Eurostat

Table 5: Prepared animal feed
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	797	718	620	733	824	749	865	1 048	1 177	1 260	1 387	1 250
Extra-EU imports	498	520	509	580	661	632	636	725	678	792	774	803
Trade balance	299	198	111	153	163	117	228	322	499	468	613	447
Ratio exports / imports	1.60	1.38	1.22	1.26	1.25	1.19	1.36	1.44	1.74	1.59	1.79	1.56
Terms of trade index	87.3	94.1	94.6	86.1	89.3	100.0	96.1	96.9	100.9	105.1	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

REGULATIONS

As for prepared animal feed, the EU legislation follows the principle that absolute priority must be accorded to health concerns. The first attempt to regulate the use of additives in livestock feeding stuffs dates back to 1970, with Directive 70/524. Since that date only those substances authorised under this Directive may be incorporated in feeding stuffs.

In order to follow continuous improvements in scientific and technical knowledge in this particular field, the Council entrusted the Commission to bring about the necessary amendments to this Directive. The Commission set up in 1976 the Scientific Committee on Animal Nutrition, which it consults on any proposals for measures which might have repercussions on animal health and consequently upon human health. Great importance is usually attached to the opinions of the Scientific Committee. During 1995, as a consequence of a favourable opinion of that Committee, the use of Avoparcine in feed for dairy cattle has been definitively authorised throughout the Community.

Another important piece of legislation is Council Directive 91/681 implementing Directive 90/44 fixed conditions on the marketing of compound feeding stuffs.

Compound feeding stuffs may be marketed only if they display visibly, clearly and indelibly certain particulars, including: the species of animal for which they are intended and their precise purpose as well as directions for use, the minimum storage life and their ingredients.

Hygiene standards and nutritional requirements are two other important aspects subject to a particular regulation (Directives 92/117 and 93/74). In addition, Reg. (EEC) 2377/90 requires the Commission to adopt legally binding maximum limits for residues of veterinary medicinal products in foodstuffs of animal origin. These maximum residue limits (MRL) are established through the regulatory committee procedure following scientific evaluation by the Committee for Veterinary Medical Products.

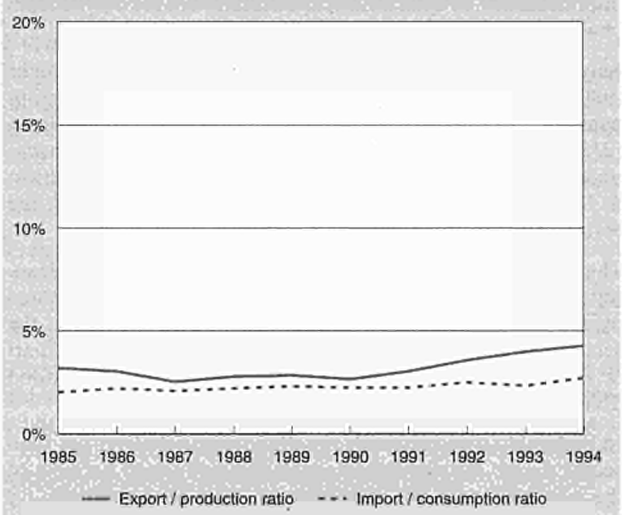
OUTLOOK

EU production and consumption of animal feed will increase in the next years as a consequence of the entry of Austria, Sweden and Finland.

On the other hand, the sector will continue to feel the negative effects, on the domestic as well as the international market, of the heavy pressure existing on both the raw materials market (wheat, maize, etc.) and in zootechnic production (meat and milk).

The pet food sector shows more positive growth prospects, thanks to the increase in the number of domestic animals, the increased availability of processing waste from the food industry, etc. At level of subsector, wet foods for cats will continue to be the leading sector, while product differentiation will be increasingly pronounced.

Figure 8: Prepared animal feed
Trade intensities



Source: DEBA GEIE, Eurostat

Written by: NOMISMA The industry is represented at the EU level by: European Feed Manufacturers Federation (FEFAC). Address: Rue de la Loi 223, B-1040 Brussels, Belgium; Tel: (32 2) 230 8715; Fax: (32 2) 230 5722; and European Renderers Association (EURA). Address: PO Box 202, NL-3000 AE Rotterdam; Tel: (31 10) 467 3188; Fax: (31 10) 467 8761.

Industrial baking
NACE (Revision 1) 15.81, 15.82

The EU is largely self-sufficient in the industrial baking sector, with negligible import and export trade with non-EU countries. Although internal demand is generally stationary, there are differences from segment to segment. Product innovation and the adoption of marketing policies capable of stimulating consumption are of primary importance in this sector. With regard to the structure of the industry, the process of concentration is continuing, moving beyond national boundaries and involving the EU as a whole. However, particularly in some countries, craft bakeries producing bread and fresh confectionery still play an important role. Although there are considerable differences from country to country and product to product, the overall trend is for large distribution to win increasingly larger market share from traditional retailers.

INDUSTRY PROFILE

Description of the sector

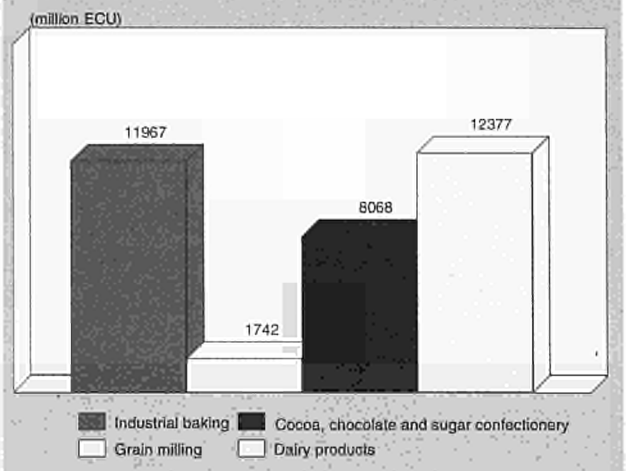
The industrial baking sector includes the manufacturing of fresh and preserved bread, confectionery and biscuit products. The main products include bread, rolls, cakes, buns, biscuits and sweet and savoury snacks. These products differ widely, but can often replace each other, with a high degree of cross-over substitutability. These products may be eaten during main meals, for breakfast, during breaks in work or study, and during parties. This explains the diversification within the sector, whereby the wide range of products on offer is a response to varying consumers' requirements in terms of consumption occasions, eating habits, tastes, income, etc. The value added of the industrial baking sector reached a little less than 12 000 million ECU in 1994, reflecting this sector's considerable economic within the European industry. Germany and the United Kingdom are the EU countries with the highest added value levels in the sector: these two countries, together with Spain, cover over half (52%) of the EU's total value added. They are followed at some distance by France, Italy and the Netherlands.

During the last decade, the sectors' main indicators expressed in current prices have shown a gradual growth, and this trend was confirmed in 1993-94, which saw a rise of 2.9% in output and of 23.6% in trade balance. Moreover, in 1994 EU apparent consumption reached 27 467 million ECU, compared to an output worth 28 269 million ECU, giving a positive trade balance of 801 million ECU. During the same year, there was also a slight growth in employment, with total workforce rising to 462 000 in 1994, a small but significant increase of 0.1% compared to the previous year.

Recent trends

The average real annual growth rates of the sectors' main indicators are positive overall. From 1985 to 1990, industrial baking experienced rapid growth, which was followed by a period of greater stability. During the 1985-94 period, consumption and output grew at the same average annual rate (3.1%). In 1990-94, extra-EU exports showed a much higher average annual growth rate (11.3%) than during 1985-90 (1.8%). The trend in imports followed the opposite path, with an annual growth rate of 11.5% during 1985-90, compared to 6.9% during 1990-94. Comparing the trend of total manufacturing output with that of industrial baking, the latter shows a higher rate of growth than the former throughout 1988-92. Subsequently, this trend reversed, with lower annual growth rates for industrial baking production than for manufacturing output. Turning to employment, compared with a gradual loss

Figure 1: Industrial baking
Value added in comparison with related industries, 1994

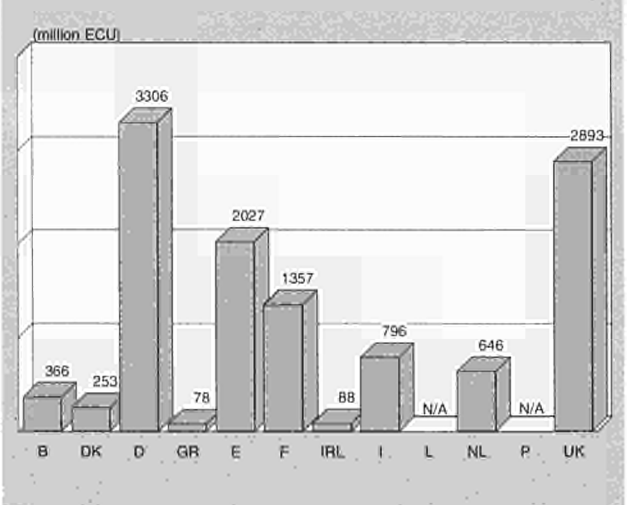


Source: DEBA GEIE

of jobs (particularly marked from 1991 onwards) in total manufacturing, industrial baking showed the opposite trend. In fact, for the last decade the number of jobs in this sector has grown, with higher rates of increase during 1986-89 and 1990-91. After the slight drop (-0.1%) of 1992-93, during the next year job numbers grew again, although at a very low rate (+0.1%). In 1995, the EU country with the largest number of people employed in the sector was Germany (36 000 jobs), followed by the United Kingdom (25 000 jobs) and France (20 000 jobs). In 1995 the EU countries with the highest turnover were, in this order, Germany (5 400 million ECU), the United Kingdom (2 200 million ECU), Spain (2 180 million ECU) and France (1 856 million ECU).

As far as the price of bread is concerned, mainly as a consequence of government's price regulation, bread prices grew below the general rate of inflation, thereby inhibiting growth in market value. The situation for biscuits, confectionery and sweets in general has been very different, since in this segment prices are free to respond to the market dynamics and to the strategies of individual companies.

Figure 2: Industrial baking



Source: DEBA GEIE

Table 1: Industrial baking
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	16581	21931	23393	25883	26804	26815	27467	27885	30081	31490	33040	34760
Production	17043	22359	23858	26437	27372	27464	28269	28813	30976	32470	34100	N/A
Extra-EU exports	563.6	611.3	653.7	752.4	779.8	876.4	1 037.2	1 153.2	1 030.2	1 120.0	1 220.0	1 330.0
Trade balance	462.6	427.7	465.7	553.5	567.9	648.5	801.5	927.6	894.7	980.0	1 060.0	1 150.0
Employment (thousands)	402.6	455.2	456.6	462.2	466.5	462.0	462.6	455.6	486.2	490.0	490.0	490.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Industrial baking
Turnover and employment

(million ECU)	Turnover			Employment (units)		
	1993	1994	1995	1993	1994	1995
Belgique/België	N/A	N/A	N/A	5 261	4 990	2 500
Danmark	238	238	243	2 200	2 200	2 200
Deutschland	2 710	4 873	5 400	N/A	36 000	36 000
España	N/A	3 120	2 180	N/A	N/A	N/A
France	1 430	1 527	1 856	18 000	18 000	20 000
Ireland	203	203	198	9 300	N/A	N/A
Italy	N/A	417	205	N/A	2 500	3 000
Österreich	256	296	287	3 019	3 169	4 061
Nederland (1)	515	533	534	40 000	40 300	37 000
United Kingdom	2 566	2 502	2 200	30 000	30 000	25 000

(1) Including craft bakeries for employment.
Source: AIBI

Table 3: Industrial baking
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.35	1.47	3.06	0.85
Production	4.23	1.75	3.12	1.44
Extra-EU exports	1.76	11.33	5.91	18.24
Extra-EU imports	11.46	4.59	8.35	0.47

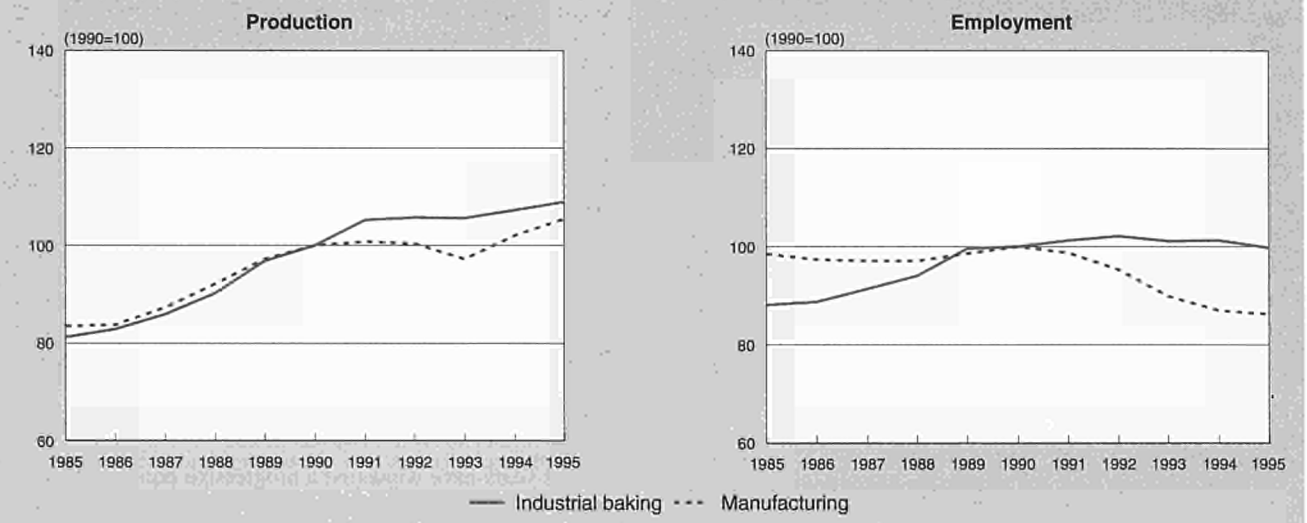
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Industrial baking
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	563.6	542.0	510.1	505.7	611.3	653.7	752.4	779.8	876.4	1 037.2	1 153.2	1 030.2
Extra-EU imports	101.0	128.9	147.2	159.7	183.6	188.0	198.9	211.9	227.9	235.8	225.6	135.5
Trade balance	462.6	413.1	362.9	346.0	427.7	465.7	553.5	567.9	648.5	801.5	927.6	894.7
Ratio exports / imports	5.6	4.2	3.5	3.2	3.3	3.5	3.8	3.7	3.8	4.4	5.1	7.6
Terms of trade index	101.8	95.3	96.4	95.8	96.9	100.0	99.0	100.8	101.4	98.6	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Industrial baking
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

International comparison

In 1994, the world's leading producer of industrial baking products was the USA with 35 634 million ECU, followed by the EU with 28 267 million ECU and Japan with 24 495 million ECU. It is interesting to note that, compared to 1985, the USA has maintained its output at more or less the same value (in current prices). The EU has the highest level of exports (1 037 million ECU), while US exports are much lower (373 million ECU). Japan's exports are of virtually no significance (75 million ECU).

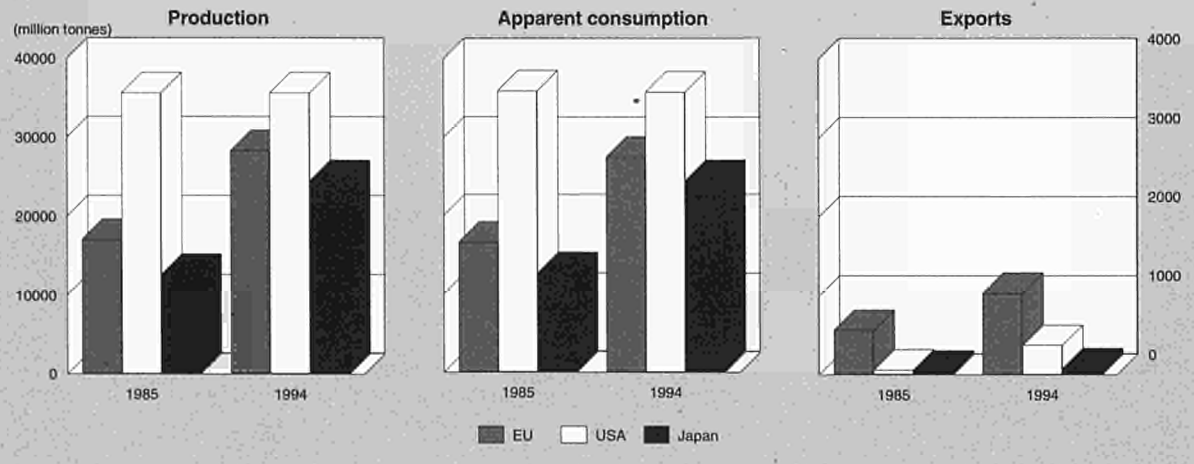
Although the highest in relative terms, the value of the EU's exports is still of little significance in absolute terms. Trade in the industrial baking sector is mainly between Member States, and only to a very limited extent with non-EU countries. Naturally, trade outside the EU does not involve low value added products and/or those with very short shelf life, such as bread or fresh confectionery. On the other hand, the presence of multinationals working in the industrial baking sector favours distribution of their wide range of products in many countries. Compared to 1985, the three major trading blocks considered have increased their output in both current and constant prices. During 1985-94, the EU's output showed higher overall growth, in real terms, than that of either Japan or the USA.

Foreign trade

After the gradual reduction between 1985 and 1988, from 1989 onwards extra-EU exports in current prices showed an upward trend. However, imports grew constantly throughout 1985-94, reaching their highest value (236 million ECU) in 1994. Although the trade balance was always in the black, its growth trend was negative from 1985 to 1988. Subsequently, the balance grew to reach its highest value of 801 million ECU in 1994. In the same year, exports were about four times greater than imports.

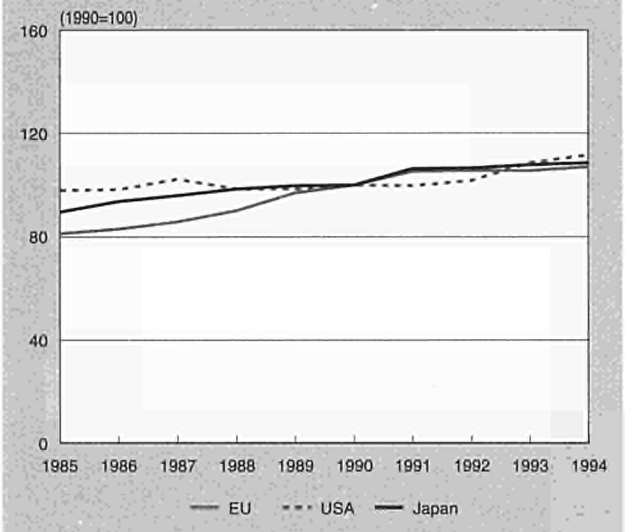
Although the trade balance is positive, it is interesting to note that the quantities traded overall are very limited. In 1994, the incidence of exports in relation to output was only 3.7%. Moreover, this value is the highest in absolute terms since 1985. The level of exports in the industrial baking sector is typically low, and at the same time Europe is largely self-sufficient in its products. In 1994, imports were only 0.9%

Figure 4: Industrial baking
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Industrial baking
International comparison of production in constant prices



Source: DEBA GEIE

of consumption. This is the highest value of the period 1985-94; in previous years, the level was between 0.6 and 0.8%.

In 1994 the main destinations of EU exports were EFTA (27.1%) and the USA (15%), followed at some distance by Russia (10.1%), Canada (4.2%) and the Canary Islands (4.0%). Compared to 1989, the absence of Russia and the drop in the importance of Saudi Arabia should be noted.

As well as being the main destination of EU exports, EFTA (i.e. practically Switzerland and Norway) is also the area of origin of the majority (70.6%) of the Community's imports. It is followed at a considerable distance by the USA (9.8%), Japan (3.6%), Israel (3.2%) and Thailand (2.2%). In this area, there were no significant changes compared to 1989.

MARKET FORCES

Demand

In 1994, per capita consumption of biscuits and baked goods in the EU fluctuated between 4.1 kg/year in Portugal and 19.2 kg in the Netherlands. Apart from these extreme examples, average consumption in the other European countries was between 11 and 13 kg/year. Along with Portugal, Greece also shows very low average baked goods consumption (4.9 kg/year). Compared with 1990, there have not been any major changes in amounts consumed. Indeed, the market seems to have levelled out with only a few slight positive and/or negative fluctuations in the average per capita consumption of the individual countries.

The recent economic recession has effected all the European countries, caused a drop in spending for such non-essential products as biscuits, cakes and pastries.

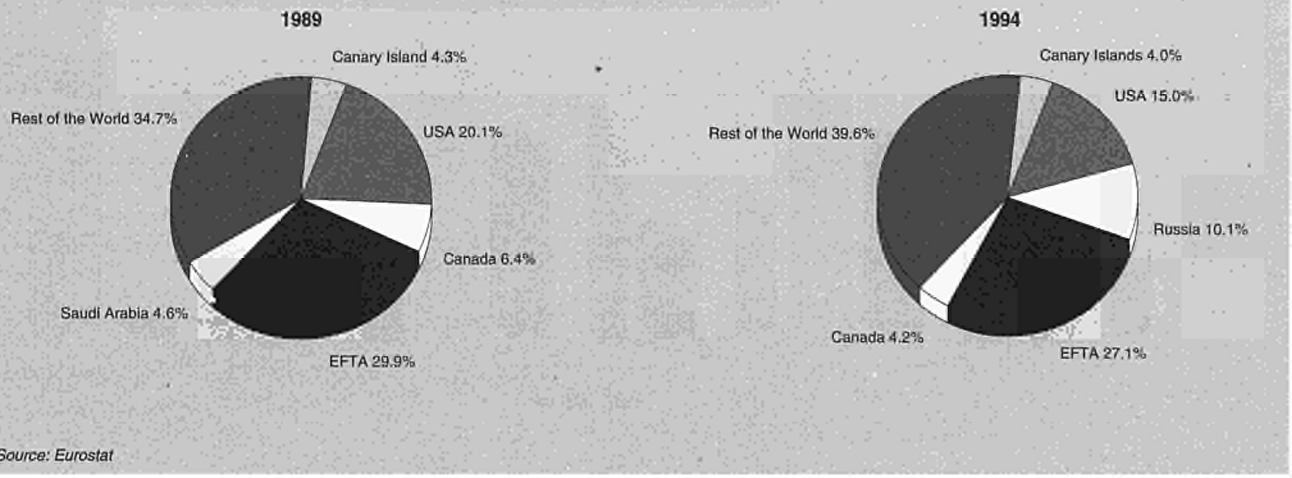
On the other hand, modern lifestyles require less formal eating occasions and both sweet and savoury biscuits offer opportunities for a quick but nutritious snack. In general, confectionery products are going through a levelling out phase. However, updating the product, even just the packaging, often helps invigorate the industry and stimulate sales. This is further confirmed by the fact that an estimated 30% to 40% of biscuit purchases are made on impulse.

Recent years have witnessed a progressive polarisation in demand between cheaper and premium added-value products. Pressure on disposable income has resulted in lower prices, with cheaper value-for-money lines and own-labels gaining market share. At the other extreme, health and self-indulgence are the factors sustaining premium sales. A very interesting niche is represented by low-fat, low-salt and added-fibre products that aim to satisfy consumer groups that are most receptive to health considerations when shopping for groceries.

The bread market is almost saturated and its importance as a staple has been diminishing in recent years due to the competition from other foods. The trend toward light breakfasts and less frequent, heavy midday meals have also contributed to the drop in demand. To evaluate the importance of bread in the industrial baking sector, one can examine the 1993 Euromonitor figures. This source reveals that per capita consumption of bread and bread rolls is 77 kg/year in Italy, 65.2 kg/year in Spain, 58.6 kg/year in Germany, 57.3 kg/year in France and 49.8 kg/year in the United Kingdom. The countries that show the highest bread consumption figures are those in which bread is routinely served with meals.

Demand is broken down into two major categories: fresh bread and packaged bread, which lasts longer and is more convenient. The trend toward more concentrated, less frequent weekly shopping trips and changing eating habits and meal patterns, brought about by the increased numbers of working women, have contributed to greater sales of packaged bakery products.

Figure 6: Industrial baking
Destination of EU exports



Source: Eurostat

Table 5: Industrial baking
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	92.2	93.4	94.0	95.9	97.1	100.0	104.0	103.5	104.4	105.8
Unit labour costs index (3)	86.0	85.9	87.4	91.0	95.9	100.0	104.2	109.3	111.1	111.9
Total unit costs index (4)	89.6	88.8	89.1	93.0	97.2	100.0	104.3	108.3	108.8	110.0
Gross operating rate (%) (5)	10.8	11.4	12.1	12.6	12.2	12.4	13.2	12.6	12.7	13.0

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

At the same time, the growing concern with healthy foods is creating a growing demand for wholemeal and multi-grain bread varieties.

Supply and competition

The labour productivity index shows a general growth trend for the entire period 1985-94. The only exception is the slight drop in 1991-92 (-0.5%), after a peak (4.0%) the previous year. Between 1987 and 1992, unit labour costs posted very high rates of increase (between 4.1% and 5.4% annually) and considerably greater than labour productivity. In particular, in 1991-92, despite a 0.5% drop in labour productivity, the unit labour cost rose fully 4.9%.

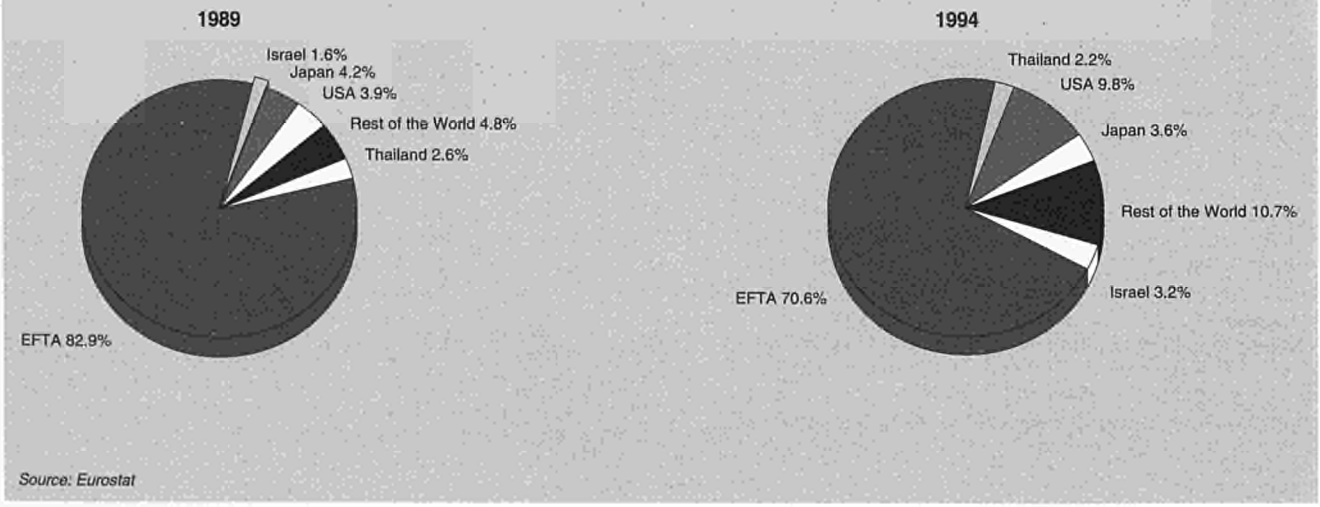
The unit labour costs index and the total cost index are both on the rise, with the highest rate of growth between 1987 and 1992. This trend reflects a common trend in all areas of manufacturing. Over the next few years, 1992-94, both of these indexes posted lower figures, although still positive ones.

The United Kingdom is Europe's major producer of industrial baking goods. In 1994, the United Kingdom produced 794.2 thousand tonnes of bakery products, excluding cakes, pastries and other baked goods. Next come, in order of importance, Italy, Germany, France and Spain, each one producing over 500 thousand tonnes. A high level of production, especially in relation to their respective populations, was also achieved by the Netherlands (399.5 thousand tonnes), Belgium (212 thousand tonnes) and Denmark (136 thousand tonnes). Compared to 1990, the countries that display the most significant change are Germany and Denmark, both on the upswing.

It is important to emphasise that this industry, especially when it comes to fresh and highly perishable items, is distinguished by a high degree of national autonomy. The situation is different for typically industrial products, whereby increased uniformity in consumer behaviour habits and the internationalisation of the business (above all, due to the activity of big multinationals) encourage greater trade among the various European countries.

Regarding retail distribution of fresh bread, bakeries still dominate in many countries: Italy, Spain, France and Germany, etc. The situation is quite different in the United Kingdom, though, where the grocery chains sell more than 3/4 of all the fresh bread; consumer pressure, however, is prompting the grocery chains develop in-store bakeries. When it comes to industrial bakery products that have longer shelf lives, however, the large distributors play a very significant role in all European countries. For many other industrially produced items such as biscuits and snacks, the hypermarkets and supermarkets play a dominant role. Despite this general tendency, in countries with less modernised distribution channels (such as Greece, Spain and Italy), the traditional grocers still get the lion's share of business in these products. Moreover, it

Figure 7: Industrial baking
Origin of EU imports



Source: Eurostat

Table 6: Industrial baking
Total production of biscuits and baked goods

(thousand tonnes)	1990	1991	1992	1993	1994
Belgique/België	217.5	219.3	208.7	211.6	212.1
Danmark	106.8	121.9	119.2	134.3	136.0
Deutschland (1)	574.0	635.7	622.9	643.5	657.1
Ellada	42.0	43.0	44.0	45.0	46.0
España	455.0	460.0	470.0	479.0	519.8
France	613.9	631.2	655.5	655.0	664.8
Ireland	22.5	23.7	22.8	22.6	22.0
Italia	669.9	690.4	705.9	715.4	718.9
Nederland	380.1	409.6	405.7	397.0	399.5
Österreich	63.9	66.8	64.8	60.3	63.3
Portugal (2)	24.0	24.0	24.0	24.1	25.0
Suomi/Finland (2)	89.8	88.9	89.0	89.0	89.0
Sverige	92.7	94.0	98.7	99.0	99.5
United Kingdom (1)	919.3	949.3	955.0	803.0	794.2

(1) 1993-1994: cakes, pastries, meringues and other baked goods are not included.
(2) Estimated.
Source: Caobisco

is interesting to note that in Germany, discounters account for almost 50% of biscuit sales volumes.

Production process

Generally speaking, industrial baking is distinguished by highly automated production plants. In addition to increasing production flexibility and efficiency, this allows it to maintain consistent standards of quality. Of course, the situation is quite different in the smaller bakeries that specialise in pastry products and fresh bread.

The substantial product innovation adopted by the industrial baking firms is, however, requiring modifications of the production process. The development and upgrading of packaging is widespread. By using special wrapping materials, it is possible to enhance products in terms of both quality and shelf life. An important new technique for conserving bakery products is modified atmosphere, widely used for bread.

INDUSTRY STRUCTURE

Companies

Of all European countries, Spain has the highest levels of production specialisation (2.1), followed by the United Kingdom, Greece, the Netherlands and Denmark, all of which have an above average degree of production specialisation compared to other EU countries. There have not been any major developments since 1985 in this index. The only exceptions are the increased production specialisation in Greece and the drop in Ireland.

As for the actual plant facilities, there are major differences depending on the field of activity (bread baking, confectionery, etc.). Bread baking is still a small scale operation in many European countries. Moreover, the product range tends to reflect the regional and national traditions of each particular country. Nevertheless, along with the smaller bake-shop op-

Table 7: Industrial baking
Per capita consumption of biscuits and baked goods

(kg/year)	1990	1991	1992	1993	1994
Belgique/België	15.4	15.0	14.1	14.3	14.7
Danmark	10.9	10.6	10.3	14.1	12.7
Deutschland (1)	7.0	7.8	7.7	7.7	7.8
Ellada	4.6	4.6	4.7	4.8	4.9
España (2)	10.6	10.7	11.2	12.3	13.2
France	12.7	13.0	13.2	12.8	12.7
Ireland	12.7	13.7	12.2	13.6	13.1
Italia	11.4	11.7	11.9	11.5	11.2
Nederland	18.9	19.3	19.4	19.1	19.2
Österreich	7.9	8.4	8.2	7.7	8.4
Portugal (3)	3.5	3.5	3.6	3.7	4.1
Suomi/Finland (3)	18.0	17.8	17.9	17.8	17.9
Sverige	10.9	11.1	11.6	12.0	11.8
United Kingdom (1)	14.9	15.5	15.3	12.3	12.1

(1) 1993-1994: cakes, pastries, meringues and other baked goods are not included.
(2) 1990, 1991 and 1992 are estimated.
(3) Estimated.
Source: Caobisco

Table 8: Industrial baking Acquisitions

1994 Bidder	Country	Target	Target country
Veno	Danmark	Laegaard Kager	Danmark
Brioche Pasquier	France	Beignet Heunet	France
Danone	France	Bagley	Argentina
Grands Moulins de Paris	France	Grands Moulins de la Brie	France
Barilla	Italia	Filizgida	Turkey
Vicenzi	Italia	Crippa & Berger	Italia
Koniklijke Bols Wessanen	Nederland	H & C Cereales	France
Allied-Lyons	United Kingdom	N/A	USA
Grand Metropolitan PLC	United Kingdom	Rudi Foods Inc	USA
IMC Industries	United Kingdom	Red Mill Snack Food	United Kingdom
United Biscuits	United Kingdom	Dalgety PLC (Dutch Savoury Snacks Bus.)	Nederland
United Biscuits	United Kingdom	ZPC San	Poland
United Biscuits	United Kingdom	Fazer Biscuits Ltd	Suomi/Finland
Unilever	United Kingdom/Nederland	Menissez	France
Unilever	United Kingdom/Nederland	Touflet SA Unbaked bread and pastisseries operations	France

1995 Bidder	Country	Target	Target country
Goodman Fielder	Australia	Albro Bakkerijen Zwanenburg BV	Danmark
Artal	Belgique/België-Nederland	Turner	France
Bon Bon	Danmark	Marcipanfabrikken	Danmark
Kelsen International Bakery	Danmark	Scandia Kaker (Dan Cake)	Norway
Kohlberg Rugbrod	Danmark	Trianom Bagery	Danmark
Danone	France	Bolshevik	Russia
Danone Group	France	Jiangmen Biscuit Factory	China
Limagrain Group	France	Jacquet Biscotte	France
Harry Brot	Deutschland	Brotfabrik Rugenberger	Deutschland
Brinkers Holding	Nederland	Banketbakkereij Holleman	Nederland
Quality Bakers Europe (Meneba)	Nederland	Albro (Koninklijke Ahold)	Nederland
Galletas Siro (Danone)	España	United Biscuits - Spanish Snack Business	España
Investors Costafreda - Rivera	España	Panrico (Allied Domecq)	España
Nutrexpa	España	Bimbo	España
Hillsdown Holdings	United Kingdom	Lyons Bisquits	United Kingdom
Stateside Holding	United Kingdom	Fiesta Fine Food	United Kingdom
Sweet 'N' Savoury Froze Foods	United Kingdom	Lyons Patisserie (Allied)	United Kingdom
Tomkins	United Kingdom	Lyons Cakes (Allied Domecq)	United Kingdom
Unilever	United Kingdom/Nederland	Archer Daniel Midland	United Kingdom

Source: Nomisma

erations, each country has large companies producing bread on an industrial level.

Multinationals do operate in the bakery market, although they tend to be food conglomerates and there are no international bread brands. In France the major manufacturer of packaged bread is Harry's, followed by Jacquet/Duroi, the own-labels and Turner. In Italy the three major manufacturers of sliced bread are Mulino Bianco, San Carlo and Delgrossi. In Spain, Bimbo, Panrico and Ariete have the wrapped bread market almost completely cornered. And lastly, in Germany the principal bread manufacturers are B. Wendeln, Wilhelm Weber and Rugenberger Grossbackereien, each with only a thin slice of the overall national market. The bakery products situation is very different in England, where, along with such giants as Ranks Hovis, McDougall and Associated British Foods, the in-store bakeries also play an important role.

As for biscuits, snacks and similar products, the market is largely dominated by major multinationals, although there are also some smaller firms involved operating at a regional and/or national level. In continental Europe, the market leaders are Bahlsen (D), Danone (F), General Biscuit (UK), Barilla (I) and Nestlé (CH). The United Kingdom market is dominated by the multinational, UB/McVitie's, not to mention the considerable market share enjoyed by the own-labels.

Strategies

The situation in this industry (sluggish growth, concentration of the distribution, etc.) is forcing companies to adopt strategies based primarily on marketing (innovations, labels, etc.) and external expansion. This latter tactic makes it possible to acquire a label (and thereby the manufacturing capacity, markets, share and skills) much more quickly than through internal development.

A succession of mergers and acquisitions continued throughout the European baking industry during 1994 and 1995. In 1995, the majority of deals took place among companies that reinforced their positions domestically. There were also many cases, however, especially in 1994, in which the objective was to shore up one's position throughout the EU market and beyond. In particular, the biscuit multinationals see their major new market opportunities arising out of the newly industrialised economies where growth rates in consumer expenditure are highest.

Table 9: Industrial baking
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.88	0.82
Danmark	1.11	1.10
Deutschland	0.64	0.80
Ellada	0.61	1.28
España	2.10	2.09
France	0.66	0.76
Ireland	1.51	0.70
Italia	0.72	0.64
Luxembourg	0.54	0.56
Nederland	1.18	1.21
Portugal	1.77	N/A
United Kingdom	1.71	1.53

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Companies involved in industrial baking are also dealing with market saturation by introducing new products or simply sprucing up package design. An example of this last strategy is given by single item packaging formats that, in addition to guaranteeing enhanced product freshness, increase the number of sales opportunities, and at the same time bring biscuits and snacks into close competition with counter lines.

Businesses continue to be concerned with the so-called "light" (low-fat and low-sugar, etc.) and health products (organic, whole grain, etc.). Even in the cake sector, the trend is toward product diversification aimed at overcoming the seasonal nature of this sector.

Although the bread segment features its own particular set of rules and characteristics, different from the rest of the bakery industry, diversification appears to be a key strategy here as well, as it strives to develop new varieties of bread to cater to a wider range of tastes. Along with traditional bread, the companies are expanding the range to include products felt to be more healthy, such as whole grain breads. In order to more successfully appeal to the giant distributors, companies are tending to increase production of packaged-wrapped breads. These products offer convenience and time saving benefits to busy consumers or people who only shop once a week. The trend to eating out has also influenced bakery product consumption. Indeed, there is a growing demand for bread suitable for sandwich making and for making home-made hamburgers.

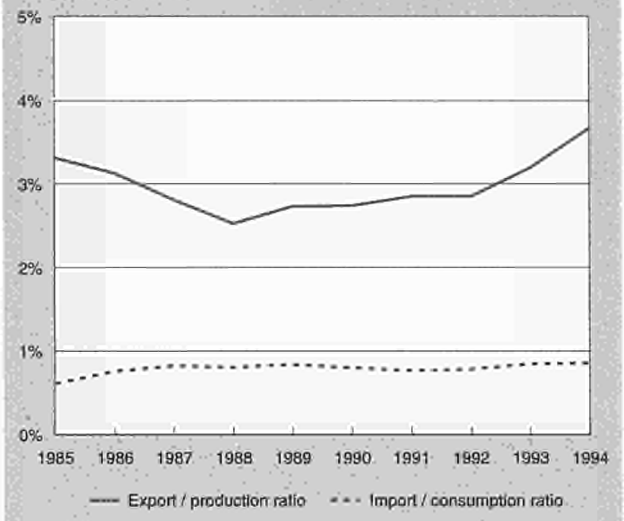
ENVIRONMENT

Environmental problems associated with the industrial baking sector are minimal and mainly concern the disposal of common waste materials derived primarily from the extensive use of various wrapping and packaging materials.

REGULATIONS

The sector is considerably influenced by labelling and packaging measures as well as directives related to environment and consumer protection. Among the legislation with most significance for EU manufacturers is the Quantity Ingredient Declaration, which requires food manufacturers to indicate on packaging the relative quantities of the contents. Directives 94/35, 94/36 and 95/2, laying down rules on the use of colourings, sweetenings and additives in foodstuff, are to be considered relevant for the industrial baking sector.

Figure 8: Industrial baking
Trade intensities



Source: DEBA GEIE, Eurostat

OUTLOOK

The industrial baking sector is characterised by an almost completely flat demand and near saturation. Consequently, the market environment will become increasingly competitive. Manufacturers will continue efforts to expand overall sales (through acquisition and joint ventures), and to increase their domestic market shares through the rationalisation of lines. Imaginative new products, designed to stimulate impulse buying and satisfy the health and "light" markets are of great strategic importance. In addition to their attractive pricing, the own-label/private label products will continue to improve in quality and sophistication and this will underpin further sales in this sector. As for bread producers, it is expected that the process of concentration in the bakery business will accelerate as plant reinvestment becomes necessary and branding becomes more prevalent.

Written by: NOMISMA
The industry is represented at the EU level by: Association Internationale de la Boulangerie Industrielle (AIBI). Address: In den Diken 33, D-4000 Düsseldorf; tel: (49 211) 65 30 86/88; fax: (49 211) 65 30 88; and Association des Industries de la Chocolaterie, Bisculterie et Confiserie de la CEE (Caobisco). Address: Rue Defacqz, Bte 7, B-1050 Brussels; tel: (32 2) 539 1800; fax: (32 2) 539 1575.

Sugar
NACE (Revision 1) 15.83

Sugar production in Europe amounts to around 15% of world production. A fall in production was recorded for the 1994/95 season with respect to the two preceding seasons. The number of sugar refineries in Europe has decreased by 30% during the course of the last decade. France, Germany and Italy remain the major producing countries. The European sugar sector has been affected by the new EU regulations, following the approval of the GATT agreement and the new global organisation of the sugar market. This will lead to a partial modification of trade relations with non-EU countries.

INDUSTRY PROFILE

Description of the sector

The sugar production sector includes the production of sugar (saccharose), syrup and sugar surrogates based on sugar cane, sugar beet, maple, palm, etc. Other segments considered in this sector are sugar refining and molasses production, excluding the production of glucose and glucose and maltose syrup, which form part of the starch product sector.

The main indicators of the sector point to substantially stable demand and production, with periods of slight growth alternating with periods of temporary downward trends. In recent times, the increase in production has been mainly connected to political developments (German reunification and entry of new member states); in general, production is affected by the favourable or adverse atmospheric conditions during the season, which have a direct impact on the yield of sugar beet. Moreover, the production quota restrictions applied on the sector force producers to maintain their reserve volumes unchanged, and when the permitted levels are exceeded, producers are obliged to reduce the beet cultivation area.

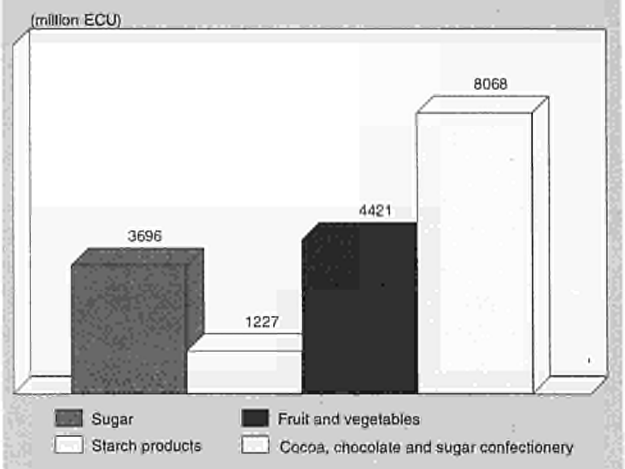
European production of white sugar reached the maximum production level during the course of the 1992/93 and 1993/94 seasons, exceeding 16 million tonnes, an output more than sufficient to satisfy domestic demand. This allows a quota to be exported, which during the course of the last 30 years amounted to around 18% of production. Exports to third countries rose over the decade 1985-95, with the exception of the last year and the period 1988-90 which witnessed a slump.

In value added terms, the largest share is that of France and Italy, each with over 900 million ECU, followed by Germany and the United Kingdom.

Recent trends

During the past decade the average area used in the EU-12 for the cultivation of sugar beet has remained substantially stable apart from two peaks during the 82/83 and 90/91 seasons when more than 2 million hectares were cultivated. Nevertheless, during the nineties, a drop in cultivation area with an increase in sugar production was recorded. This phenomenon was essentially due to constant technological innovation in the sector in presence of a production quota system. The decrease in terms of cultivated area is particularly evident in Belgium, Spain, France, the United Kingdom and the Netherlands, while remaining substantially unchanged for the other countries. With the entry of three new countries, Austria, Finland and Sweden on 1 January 1995 an increase in area from 1.8 million hectares (EU-12) to 2 million hectares (EU-15) was registered for the 1994/95 season. The entry of these three countries has also increased sugar production by around 1 million tonnes.

Figure 1: Sugar
Value added in comparison with related industries, 1994



Source: DEBA GEIE

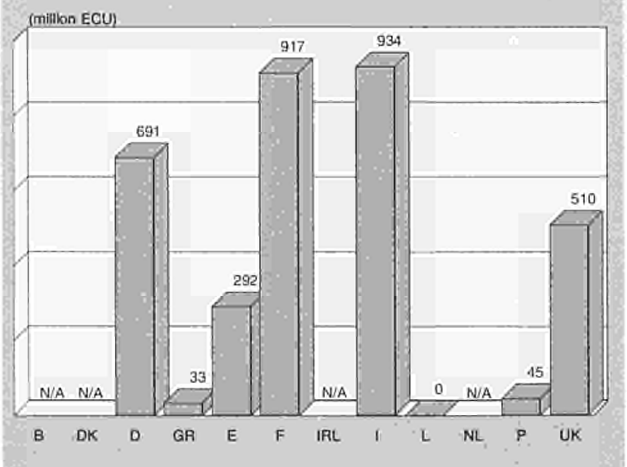
Overall, the EU-12 accounted for about 15% of world sugar production during the past ten years. The main producing countries are France, Germany and Italy. In particular, a comparison between these three countries demonstrates that the relation between harvested land and sugar production is particularly favourable for France with respect to the others. The particular efficiency of French beet-growing is evident, able to obtain a quantity of sugar per hectare of land larger than that of all the other EU countries.

During the course of the decade the production index for the sector remained substantially constant around the base year 1990, while that of total manufacturing showed a slight upwards trend. Vice versa, a sharp drop in employment was recorded for the sector, particularly during the years 1985-90, at a higher rate than in total manufacturing.

International comparison

Based on data supplied by the FAO, world production of centrifuged sugar in the 1993-94 season reached 110.2 million tonnes, of which 70.8 million tonnes obtained from sugar cane and 39.4 million tonnes from sugar beet. Furthermore,

Figure 2: Sugar
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Sugar
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	14 203	14 792	15 405	15 885	16 046	16 342	16 255	17 291	17 800	18 370	19 010
Production	14 221	15 235	15 431	15 781	16 222	16 622	16 455	17 466	17 970	18 530	19 160
Extra-EU exports	1 055	1 637	1 279	1 213	1 424	1 589	1 572	1 583	1 560	1 540	1 520
Trade balance	18.2	442.9	26.1	-104.1	175.8	280.2	200.2	174.7	170.0	160.0	150.0
Employment (thousands)	85.5	63.6	61.0	60.9	59.9	58.3	57.5	60.7	60.0	60.0	60.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.

Table 2: Sugar
Main indicators in volume - White sugar (1)

(thousand tonnes)	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	92/93	93/94(2)	94/95(2)
Apparent consumpt.	10 791	11 068	10 859	10 831	11 231	11 700	11 972	11 703	11 518	11 584
Production	13 546	14 123	13 210	13 942	14 375	15 872	14 690	16 037	16 114	14 479
Exports (3)	2 982	3 194	3 462	3 158	2 565	2 742	2 807	2 914	3 430	3 254

(1) Year runs from October 1 to September 30.
(2) Eurostat estimates for apparent consumption and exports.
(3) Quota A & B.
Source: CEFS, EU Commission DG VI

Table 3: Sugar
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	74.7	79.9	83.0	85.0	91.9	100.0	102.7	104.4	110.0	114.4
Unit labour costs index (3)	100.3	99.0	99.4	101.6	101.9	100.0	104.4	105.5	100.0	98.4
Total unit costs index (4)	92.5	94.2	94.9	94.9	95.9	100.0	103.1	103.6	103.1	103.5
Gross operating rate (%) (5)	7.9	9.1	10.1	10.0	9.7	10.2	9.6	9.5	9.4	9.6

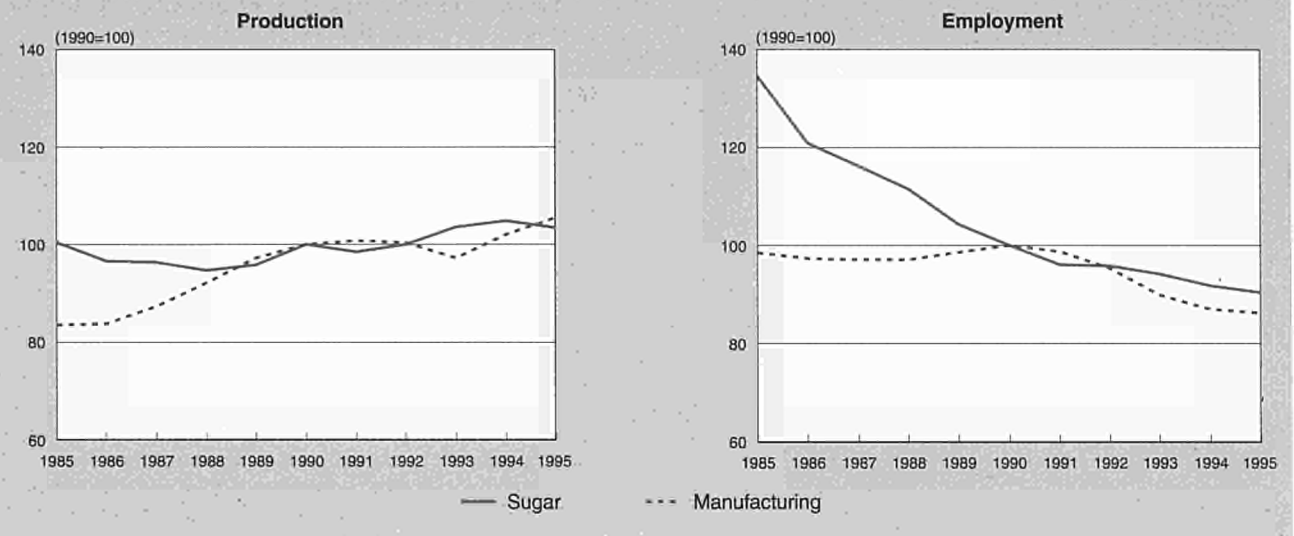
(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total cosis (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 4: Sugar
Total sugar consumption (1)

(thousand tonnes)	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
EUR15 (2)	N/A	12 013	11 817	11 812	12 201	12 710	12 994	12727.9	12 567	N/A
EUR12 (2)	10 791	11 068	10 859	10 831	11 231	11 700	11 972	11703	11 518	N/A
Belgique/België	392	378	385	386	434	433	479	490	480	N/A
Danmark	204	194	198	202	198	212	218	223	226	N/A
Deutschland (3)	2 148	2 155	2 168	2 152	2 254	2 788	2 800	2 719	2 589	2 700
Ellada	316	305	320	323	326	314	314	315	320	N/A
España	1 002	1 013	1 052	1 049	1 116	1 132	1 147	1 138	1 123	1 185
France	1 892	2 074	1 996	1 995	1 993	1 956	2 082	1 980	2 086	2 085
Ireland	137	134	138	134	133	134	134	134	147	138
Italia	1 534	1 528	1 494	1 539	1 584	1 627	1 641	1 639	1 463	1 486
Nederland	569	576	555	539	556	591	582	591	585	N/A
Österreich (4)	N/A	361.4	363	384.8	391	415.2	422	415.5	420	389
Portugal	304	313	301	314	308	301	299	289	289	285
Suomi/Finland (4)	N/A	210	215	218	198	213.6	216	231.1	235	236
Sverige (4)	N/A	373	380	378.3	381	381.1	384	378.3	395	421
United Kingdom	2 293	2 398	2 252	2 198	2 329	2 212	2 276	2 185	2212(5)	2 181 5)
Share of world consumption (%)	11	11	10	10	10	11	11	10	11	N/A

(1) White sugar equivalent.
(2) Excluding Luxembourg and including former East Germany from 1990/91 onwards.
(3) Including former East Germany from 1990/91 onwards.
(4) F.O. Licht estimates.
(5) Based on F.O. Licht estimates.
Source: CEFS, F.O. Licht

Figure 3: Sugar
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

with respect to the previous season, there was a reduction in the world quota of sugar obtained from sugar cane (-2.8 m tonnes) in favour of that obtained from sugar beet (+1.3 m tonnes), mainly cultivated in Europe, the United States, China and the ex-Soviet Union.

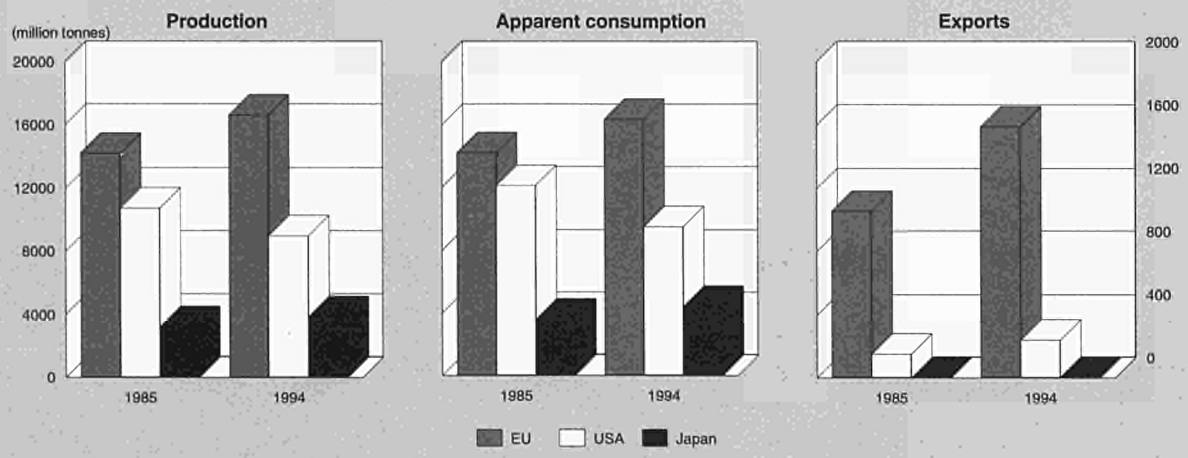
According to F.O. Licht data, during the last decade world sugar consumption increased from 98.2 million tonnes in 1984-85 to 113 million tonnes in 1993-94. World sugar production grew until 1991-92 and started to fall in following years. However, the stock/consumption ratio still amounts to 30%, a level which is generally accepted as safe.

Around a third of the world sugar production and consumption is located in Asia, followed by Europe, which, however, takes first place in exports, with a share equal to a quarter of world exports. Around 10% of sugar exports originates in Central America, South America and India, respectively. The major exporting regions, after Asia and Europe, are Central-South America, Cuba, Brazil and Oceania. Mexico and the ex-Soviet Union are, on the other hand, net importers of sugar.

Based on FAO estimates, the countries with a forecast of growth in production during the 1994/95 season with respect to the previous year were: India (+23%), Thailand (+ 18%), Australia (+12%), Brazil and the USA (+6%). A fall in production was expected in Russia (-26%), Cuba (-20%) and the EU (-12%). In the case of Russia, the reason for this fall is linked to the sharp decrease in cultivation area due to the sluggish implementation of government restructuring plan for the sugar industry and the high costs of production input. For Cuba, the factors which have determined this fall are connected with the general economic crisis of the country which generates a series of inefficiencies both at the time of sowing (poor quality of cane seeds) and in the cultivation phases, where the scarce supply of fuel, fertilizer and chemical products generate poor harvesting conditions.

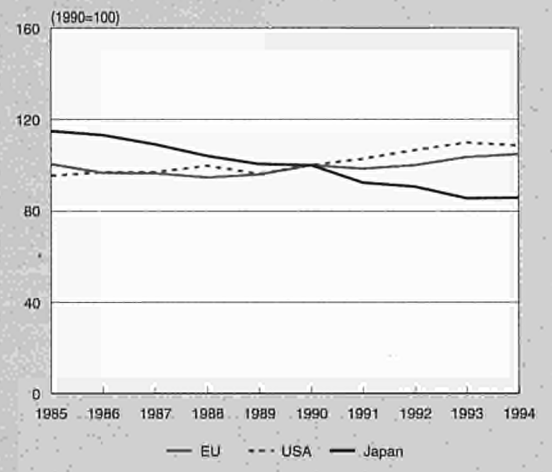
Finally, the recent drop in production within the EU may be attributed to bad weather conditions, particularly evident in the major producing countries, France and Germany.

Figure 4: Sugar
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Sugar
International comparison of production in constant prices



Source: DEBA GEIE

Foreign trade

The EU balance of trade at current prices was slightly positive during the course of the nineties, except for 1992 where imports exceed exports. During the same period, the terms of trade index presented strong annual fluctuations while the export/import ratio remained substantially unchanged, oscillating around the unitary value.

During the course of 1994 the major destination countries for EU sugar were: Algeria (11%), EFTA (8%), Israel and the Arab Emirates (6%). A share of around 5% was absorbed by Saudi Arabia while the remaining 65% is absorbed by the other countries in the world. With respect to 1989, the absence of the USA among the first five importing countries is noteworthy, which in 1989 imported 7% of EU exports, while exports to Algeria increased by about 40%.

The EU imports 1.3 million tonnes per annum from the African, Caribbean and Pacific countries; in 1994, imports from the Island of Mauritius totalled 21%, against 6-8% for the other major exporting countries (Pakistan, Fiji, Réunion and Guyana). About half of the sugar imported originates from other countries in the rest of the world. With respect to 1989, there is no evident change in the imports from the five largest origin countries, except for Swaziland which in 1994 does not appear any longer among the main exporters, replaced by Pakistan. Finally, the degree of import penetration stood at around 8% during the course of the decade.

MARKET FORCES

Demand

Sugar is mainly used by the food industry and the zootechnic, chemical and pharmaceutical industries.

In the food industry sugar is used in the tinned-food, fruit juice, confectionery and bakery, syrups and beverage sectors. The by-products of the sugar industry, beet pulp and molasses, are used for animal fodder. Molasses is also used in distillation and in the production of citric acid, ethyl alcohol and brewer's grains. In recent years, there has been a slight fall in the demand for ethyl alcohol produced from sugar beet, following the reduced demand from the East European countries, and the larger supply of alcohol from wine distillation. The increase in demand for brewer's grains for use as fertilizer is also justified by the improved technical characteristics of this by-product.

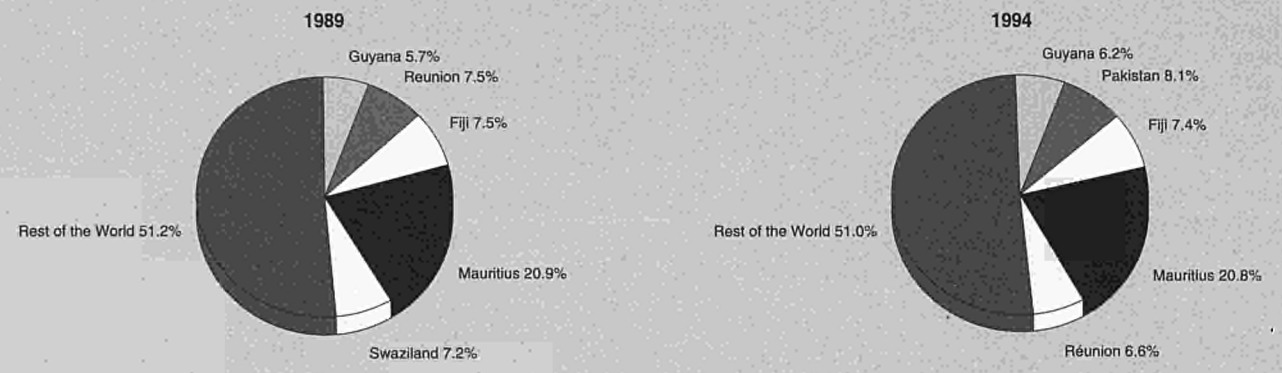
During recent years, sugar consumption in the EU-15 amounted to around 12.7 million tonnes per annum, corresponding to 17.3% of world consumption. The per capita rate of consumption in the countries is generally low in Southern Europe: in particular, Italy (25.6 kg), Spain (28.3 kg) and Portugal (29.5 kg) show a per capita consumption of less than 30 kg per annum, while the average EU per capita consumption amounts to about 33-34 kilos. The largest per capita consumption is recorded in Belgium (46.3 kg), Austria (44.5 kg), Denmark (43.4 kg), Ireland (41.6 kg) and Sweden (41.4 kg).

Within the individual countries, almost all the sugar is used for human nutrition and a very small part is consumed by the chemical or zootechnic industry (about 3-4%). On average, between 60% and 75% of the sugar for human nutrition is used by the food industry, while the remaining part is consumed directly. By way of example, in the Netherlands, taking 100 as per capita consumption for human nutrition, 16% is consumed directly while the remaining 84% goes into industrial production. In other countries like Germany and Denmark, the share of direct consumption is around 22%, while on the contrary it reaches 40% in Portugal, Italy and Finland.

Figure 6: Sugar
Destination of EU exports

Source: Eurostat

Figure 7: Sugar
Origin of EU imports



Source: Eurostat

Supply and competition

Labour productivity showed positive annual growth rates during the past decade. The largest increase was recorded for the two-year period 1988-90, reaching 8%. The annual growth rate in the cost of labour has substantially remained stable during the decade, with the exception of the period 1989-91 where a general increase occurred in all manufacturing industries. The total cost of production grew at rates of around 1% up to 1989, reached its peak of 3% during the two-year period 1990/91, to then settle at around 0.5%. Finally, the gross operating margin did not show strong fluctuations during the course of the decade and remained at around 10% per annum.

Production process

Sugar is obtained from the processing of sugar beet. The production process is divided into three phases: extraction of beet juice, purification and crystallisation. The production process is seasonal and is concentrated in a period of about 90 days from August to October in the countries of the Mediterranean area and from September to November for the continental European countries.

The sector benefits from significant economies of scale both in the production and the distribution phase. In fact, the number of refineries has decreased by approximately 30% during the course of the last ten years, while production has slightly increased. The sector is also characterised by the presence of producers of various proportions: from small enterprises which satisfy domestic demand to major multinationals. Consequently, the productivity levels vary depending on the type and size of the enterprise. It must be pointed out that significant progress has been made in the field of selection of the beet variety best suitable to the different European climates, with evident positive effects on the yield per hectare and on the degree of polarisation of sugar beet. Finally, it must be remembered that the sector, subject to production quota restric-

Table 5: Sugar
White sugar production

(thousand tonnes)	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
EUR15 (1)	14 389	14 883	13 888	14 776	15 337	16 854	15 506	16 885	17 109	15 344
EUR12 (1)	13 546	14 123	13 210	13 942	14 375	15 872	14 690	16 037	16 114	14 479
Belgique/België	943	938	804	925	956	1 030	892	893	1 043	867
Danmark	530	499	388	506	487	544	468	411	521	448
Deutschland (2)	3 155	3 192	2 731	2 762	3 072	4 301	3 909	4 042	4 336	3 647
Deutschland from molasses	19	19	19	19	20	19	19	19	21	19
Ellada	218	287	182	216	387	287	274	355	307	249
España	903	1 020	1 005	1 187	954	953	849	944	1 226	1 109
France - Metropolitan	3 953	3 410	3 649	4 045	3 968	4 357	4 060	4 345	4 336	4 020
France - DOM (3)	296	305	303	328	198	245	252	289	179	204
Ireland	174	186	223	195	214	226	213	223	177	213
Italia	1 244	1 719	1 718	1 480	1 729	1 458	1 509	1 869	1 419	1 492
Nederland	915	1 239	979	989	1 140	1 232	1 046	1 192	1 133	967
Österreich	431	283	359	329	421	415	429	402	478	376
Portugal	4	5	2	2	3	2	2	2	N/A	N/A
Suomi/Finland	94	123	66	143	152	162	144	140	137	151
Sverige	318	355	253	363	388	406	244	306	381	339
United Kingdom	1 211	1 323	1 226	1 307	1 267	1 237	1 216	1 472	1 437	1 263
Share of world production (%)	14	14	13	14	15	16	16	16	N/A	N/A

(1) Excluding Luxembourg and including former East Germany from 1990/91 onwards.
(2) Including former East Germany from 1990/91 onwards.
(3) DOM: Départements d'Outre Mer (French Overseas Departments) are Guadeloupe, Martinique, Réunion.
Source: CEFS

Table 7: Sugar
International comparison in 1993

(%)	Consumption	Production	Exports
Europe	17.3	21.6	26.8
EUR12	11.8	15.5	25.5
Africa	8.4	5.7	4.8
North America	8.3	6.4	1.3
USA	7.3	6.3	1.1
Central America	6.6	10.7	18.8
Cuba	0.8	3.8	12.7
Mexico	4.0	3.9	0.0
South America	11.3	13.8	14.6
Brazil	6.6	9.0	10.8
Asia	37.3	30.6	21.4
China	7.5	7.6	7.0
India	11.5	10.5	1.2
Thailand	1.2	3.4	7.9
Former Soviet Union	9.7	6.7	0.0
Oceania	1.1	4.4	12.4
Total	100.0	99.9	100.1

Source: FAO

tions, is obliged to respect a predefined level of production and reserves.

INDUSTRY STRUCTURE

Companies

During the last decade, the number of sugar refineries in Europe has decreased by 30% to reach 177 units in 1995 (EU-15). The cause of this reduction may be found mainly in the quest for strong economies of scale in the production and storage phases of the product. The process of concentration taking place in the sector has left many EU countries where there are often only a few large production facilities, in some cases accompanied by small sugar refineries with limited supply markets and outlets and probably destined to be absorbed by large national companies in the future. During the last decade, the largest fall in number of refineries has been recorded in Italy (where refineries have been halved from 45 to 23 units), Spain, Belgium, the Netherlands and Ireland. Germany deserves special mention - since unification it has adopted a process of sector restructuring reducing the number of sugar refineries from 60 to 42 just in three years.

Currently, the largest enterprises prevalently operating on the single domestic markets are: Eridania Beghin-Say (total turnover: 7 739 million ECU in 1994), Tate and Lyle Sugars (total turnover: 5 463 million ECU in 1994), Sudzucker (total turnover: 2 727 million ECU in 1994).

Strategies

As noted above, a general process of concentration of enterprises is taking place in the sector, driven by the possibility to realise economies of scale amortising the cost of the refineries and installations. During the course of recent years, following a series of acquisitions by a few large European groups, the EU market has progressively fallen into the hands of a few industrial giants.

In 1993, six major acquisitions took place, of which in three cases the main players were French enterprises who have strengthened their position in the domestic market; two acquisitions were made by British enterprises who, on the con-

Table 6: Sugar
Areas under beet (1)

(thousand hectares)	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
EUR15 (2)	2 011	2 009	1 961	1 954	2 063	1 599	2 106	2 116	2 040	2 043
EUR12 (2)	1 886	1 899	1 841	1 835	1 866	2 088	1 985	1 983	1 903	1 803
Belgique/België	125	118	111	114	113	113	106	105	104	101
Danmark	73	69	67	69	66	66	65	65	67	67
Deutschland (2)	415	399	384	386	459	620	575	552	530	506
Ellada	43	44	28	34	49	44	39	50	46	40
España	178	195	182	190	172	168	162	163	180	178
France	464	421	420	417	427	459	435	439	404	406
Ireland	35	38	37	33	32	33	33	32	33	36
Italia	225	277	283	272	298	270	277	288	252	285
Nederland	131	137	128	123	124	123	123	119	118	115
Österreich	43	28.2	39	38	48	50	51.4	54	53	52
Suomi/Finland	30	30.6	30	30	31	32	31.6	32	33	34
Sverige	52	51.6	52	51	51	50	37.6	47	51	54
United Kingdom	197	201	200	197	194	192	170	170	169	170

(1) In Luxembourg and Portugal no sugar beet is produced.
(2) Including former East Germany from 1990/91 onwards.
Source: CEFS

Table 8: Sugar
Number of sugar factories

(units)	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
EUR15 (1)	234.0	228.0	221.0	208.0	204.0	197.0	213.0	194.0	180.0	177.0
EUR12 (1)	218.0	214.0	207.0	194.0	190.0	184.0	201.0	183.0	170.0	167.0
Belgique/België	14.0	14.0	14.0	12.0	12.0	11.0	11.0	9.0	9.0	9.0
Danmark	6.0	6.0	6.0	6.0	6.0	5.0	5.0	4.0	4.0	4.0
Deutschland (2)	46.0	44.0	42.0	38.0	38.0	37.0	60.0	52.0	43.0	42.0
Ellada	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
España	25.0	25.0	24.0	24.0	24.0	24.0	24.0	22.0	21.0	21.0
France	55.0	54.0	54.0	52.0	50.0	50.0	48.0	48.0	46.0	46.0
Ireland	4.0	4.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Italia	40.0	39.0	37.0	33.0	33.0	31.0	29.0	25.0	24.0	23.0
Nederland	10.0	10.0	9.0	8.0	8.0	7.0	7.0	6.0	6.0	6.0
Österreich	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Suomi/Finland	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0
Sverige	7.0	7.0	7.0	7.0	7.0	6.0	6.0	5.0	4.0	4.0
United Kingdom	13.0	13.0	13.0	13.0	12.0	12.0	10.0	10.0	10.0	9.0

(1) Excluding Luxembourg and Portugal and including former East Germany from 1990/91 onwards.
(2) Including former East Germany from 1990/91 onwards.
Source: CEFS

trary, have strengthened their position in the foreign markets. Finally, the last major M&A operation recorded was the take-over of an Austrian firm by a German firm.

In 1994, no major acquisition or merger acts took place, while in 1995 the British Tate & Lyle acquired, directly and indirectly, four companies, three of which non-EU companies and one German.

Research and development activities are specifically aimed at continuous improvement of the conventional production process, the adaptation of existing technology to recent environmental regulations and improved utilisation of by-products. The strategies adopted by the enterprises in the sector on the one hand focus on improvement of production efficiency, both in the transformation phases and in the selection of the beet variety most suitable to the climate of the area and the supply basins; on the other hand, on the development of new products or production processes. Some enterprises have launched experiments on the use of dried pulp in the chemical industry (production of polyurethane, sequestrants and super-absorbents) and compressed pulps in the paper and animal fodder industry.

Regional distribution

In Italy, 63% of the beet cultivated areas are concentrated in the North of the country. Emilia Romagna accounts for the largest share (21-22%) of the total, followed by Veneto. Beets are cultivated in Tuscany and Apulia too, although beet yields in Central and Southern Italy are lower than in the North.

In France as well, beet cultivated areas are located mostly in the North of the country. Twelve departments in the Loire Valley region account altogether for about 90% of total production.

Finally, in Germany the largest beet cultivated areas are located in Niedersachsen, Westfalia and the Rhine Valley.

ENVIRONMENT

The sugar sector has also been affected by the recent regulations on the environment and safety of the workplace. The main areas of application of the environmental regulations are: smoke emission into the atmosphere, solid waste disposal, excessive use of water in the production process, and industrial

Table 9: Sugar
Per capita consumption trends

(kg/capita)	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
EUR12 (1)	33.3	34.2	33.6	33.4	34.2	34.4	35.2	31.5	N/A	N/A
Belgique/België	38.3	36.4	37.1	37.4	41.9	41.1	41.9	47.5	46.3	N/A
Danmark	39.8	37.7	37.9	37.4	37.7	41.2	42.0	N/A	43.4	N/A
Deutschland (2)	35.2	34.8	34.9	34.6	35.2	34.9	34.8	33.7	31.8	33.1
Ellada	31.8	30.6	32.0	29.9	31.9	28.7	29.6	30.6	31.0	N/A
España	25.7	25.8	24.3	26.4	27.8	27.8	29.1	28.7	28.3	29.8
France	33.4	35.8	34.0	34.2	34.6	33.5	35.5	33.6	35.2	35.0
Ireland	38.6	38.0	38.3	37.0	37.6	38.1	38.0	38.0	41.6	39.6
Italia	26.8	26.6	25.9	26.6	27.3	28.0	28.3	28.3	25.6	26.0
Nederland	39.1	37.6	36.1	35.0	35.6	39.1	38.5	38.9	38.1	N/A
Österreich	44.5	42.5								
Portugal	30.1	31.0	29.8	31.0	29.8	31.0	30.3	29.4	29.5	29.0
Suomi/Finland	38.8	38.1								
Sverige	41.4	43.9								
United Kingdom	40.5	41.7	39.2	38.1	37.4	35.7	39.7	37.7	N/A	N/A

(1) Excluding Luxembourg and including former East Germany from 1990/91 onwards.
(2) Including former East Germany from 1990/91 onwards.
Source: CEFS

Table 10: Sugar Consumption 1994/95 (1)

(thousand tonnes)	B	DK	D	GR	E	F	IRL	I	NL	A	P	FIN	S	UK
Total consumption	479.7	225.5	2 700.0	320.2	1 185.0	2 084.8	139.5	1 486.0	585.0	341.2	284.5	194.1	387.0	2 185.0
Feedstuffs	0.0	0.4	0.0	1.5	0.0	3.2	0.0	0.0	1.0	0.4	0.0	0.0	0.0	N/A
Chemical industry	1.7	13.3	40.0	0.3	32.0	31.6	2.5	1.0	33.0	10.0	1.0	0.1	7.0	N/A
Human consumption, of which:	478.0	211.8	2 660.0	318.4	1 153.0	2 050.0	137.0	1 485.0	551.0	330.8	283.6	194.0	380.0	N/A
Direct	127.2	47.6	580.0	112.4	390.0	520.0	50.0	600.0	87.0	80.8	121.8	73.0	129.2	N/A
Industrial	350.8	164.2	2 080.0	206.0	763.0	1 530.0	87.0	885.0	464.0	250.0	161.7	121.0	250.8	N/A
Total consumption (kg/capita)	46.3	43.4	33.1	31.0	29.8	35.0	39.6	26.0	38.1	42.5	29.0	38.1	43.9	37.7
Human consumption (kg/capita), of which:	46.1	40.7	32.6	30.8	29.0	34.4	38.9	26.0	35.9	41.2	28.9	38.1	43.1	N/A
Direct (kg/capita)	12.3	9.2	7.1	10.9	9.8	8.7	14.2	10.5	5.7	10.1	12.4	14.3	14.7	N/A
Industrial (kg/capita)	33.8	31.6	25.5	19.9	19.2	25.7	24.7	15.5	30.2	31.2	16.5	23.8	28.4	N/A

(1) 1993/94 for Belgium, Denmark, Greece and the Netherlands.
Source: CEFS

waste resulting from industrial processing. Of particular interest are the recent regulations on labelling and recycling of packaging which have created some implementation difficulties within the sector.

REGULATIONS

The key regulation for sugar and sugar-based products is Reg. (EEC) 178/81 as last amended by Reg. (EEC) 3484/92. The scheme provides price and sales guarantees differentiated according to national basic quantities. According to this rules, for each Member State there is a limit for the quantity of sugar that can be marketed in the EU. The system of quotas operates also within a single country, laying down rules for the reallocation of national quotas by production plant.

The effects of seasonal variation in production are counterbalanced by a storage system: under certain circumstances firms are allowed to maintain sugar in storage in firm's own silos and warehouses at the operator's risk. Storage costs are then reimbursed to operators on flat rate basis, by EU intervention agencies. As a consequence of a recent Council decision, monthly refunds for sugar storage costs have been sharply decreasing since 1994.

The production quota system ruling the Community sugar market has been recently extended to 2000/2001 by Council Reg. (EC) 1101/95.

As far as price regulation is concerned, each year, the Community fixes prices for sugar beet and sugar. Sugar beet prices are fixed in the form of basic price (derived from the intervention price of sugar) and minimum price (the price at which processing firms are required to purchase the standard quality raw material).

With respect to sugar, the Council fixes a target price, an intervention price (the price at which sugar can be sold to EU intervention agencies) and a threshold price (the price for import from extra-EU countries).

Although considerably influenced by major changes in ACRs (agricultural conversion rates), prices in the sugar market seem to be more independent of agri-monetary movements than those of other products (i.e. cereals), at least in the short or medium term. The specific agricultural conversion rate applicable to the minimum sugar beet price has been recently modified by Reg. 1691/94.

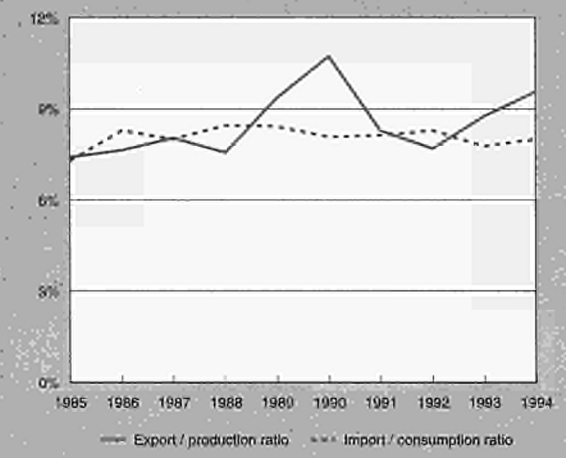
Other relevant regulations are: Council Directive 73/437 on the approximation of the laws of Member States concerning certain Sugars intended for human consumption; First Com-

Table 11: Sugar Acquisitions

1995 Bidder	Country	Target	Target country
Industrielle Sucrière de Bourbon	France	Sucrière de la Reunion	France
Pfeifer & Langen	Deutschland	Chamtor SA	France
Tate & Lyle PLC	United Kingdom	Industrial Azucarero de Occidente, Grupo (49%)	Mexico
Tate & Lyle	United Kingdom	Supreme sugar	US
Tate & Lyle	United Kingdom	AO Interraf-Odessa Sugar	Ukraine
UM (Tate & Lyle)	United Kingdom	ULS	Deutschland

Source: Nomisma

Figure 8: Sugar Trade Intensities



Source: DEBA GEIE, Eurostat

mission Directive 79/786 laying down Community methods of analysis for testing certain sugars intended for human consumption (semi-white sugar, sugar or white sugar, extra white sugar, sugar solution); and Directive 89/107/EC -94/43/EC on authorised food additives.

OUTLOOK

An increase in production and consumption is forecasted for the coming years. The intensification of research and development of new production techniques will lead to further cuts in production costs. Also the productive reorganisation, implemented by means of a series of concentration and mergers, is likely to generate a further drop in employment. During the coming years investment in research and re-utilisation of by-products of the sugar industry for production purposes will continue. Following the implementation of the GATT Agreement, a general drop in exports to non-EU countries is expected.

Written by: NOMISMA

The industry is represented at the EU level by: European Committee of Sugar Manufacturers. Address: Avenue de Tervuren 182, B-1150 Brussels; tel: (32 2) 762 0760; fax: (32 2) 771 0026.

Cocoa, sugar confectionery and ice cream

NACE (Revision 1) 15.84, 15.52

The market for cocoa, sugar confectionery and ice-cream products has been enjoying steady growth in the past decade.
EU production is concentrated in the hands of few large multinationals which supply a complete range of products.
The most important sector is that of cocoa-based products thanks to changes in eating habits which favour snack, strengthened by the disappearance of the traditional seasonal nature of ice-cream and cocoa product consumption.
The market is also characterised by strong levels of innovation both in terms of new products and dietetic products like sugar-free sweets and chocolate.

INDUSTRY PROFILE

Description of the sector

The cocoa, sugar confectionery and ice-cream industry comprises a wide range of products showing steady growth on markets world-wide as well as providing generally high average margins.

Cocoa products include products derived from the processing of chocolate such as chocolate bars, pralines and boxed assortments. Sugar confectionery includes sweets like chewing-gum, pastilles, jellies, nougats, boiled sweets and toffees. Ice-creams include products manufactured from milk, butter or cream and may or may not contain vegetable fats or oils depending on the country of production.

Altogether, the cocoa, sugar confectionery and ice-cream industry presented a level of value added in 1994 of 8 068 million ECU. The countries with the highest levels of value added are, in order of importance: Germany (2 236 million ECU), United Kingdom (1 996 million ECU) and France (1 316 million ECU): these three countries accounted together for 68.7% of the overall value added in the sector.

Recent trends

During the course of the 1990s, production in the cocoa, sugar confectionery and ice-cream industry enjoyed higher growth than that of the overall manufacturing sector. The growth in production was also accompanied by a less significant drop in employment compared to the manufacturing sector.

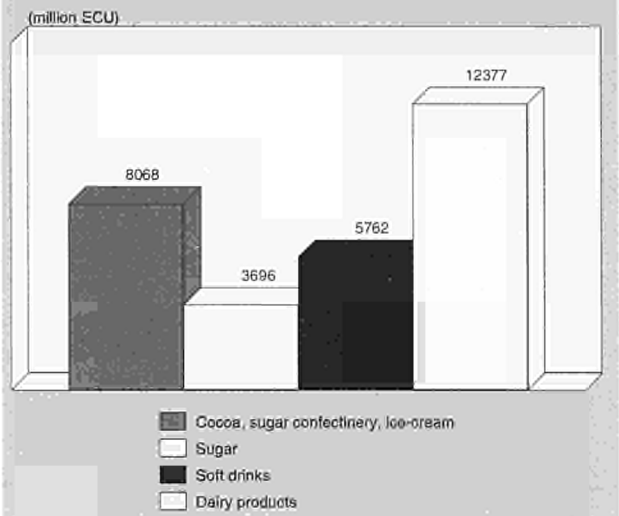
Apparent consumption of cocoa-based products, sugar confectionery and ice-cream showed a virtually uninterrupted growth trend in the 1985-1995 period.

In real terms, the apparent consumption of cocoa, sugar confectionery and ice-cream increased in the 1985-94 period by 2.25%. The rate of growth of consumption was higher in the 1985-90 period (+3.25%), while it slowed down in the 1990-94 period (+1%).

The expansion of the EU to include three new Member States, according to the first forecasts, should confirm this growth: apparent consumption should rise from the 25 025 million ECU of 1995 to 27 667 million ECU (+10.5%) in 1996.

Production followed a similar pattern to that of consumption (+2.67% in the 1985-94 period): the 3.24% growth in real value of the 1985-90 period was followed by a slowdown in the 1990-94 period (+1.98%). In the 1990s, production rose at slightly higher rates than consumption, due to the fact that extra-EU exports steadily increased. The latter strongly increased in the 1990-94 period (+14.22%), much faster than in the 1985-90 period (+3.25%). The overall growth of exports therefore totalled 7.99% over the 1985-94 period. During the same period, extra-EU imports rose at a much slower rate (+4.43%).

Figure 1: Cocoa, sugar confectinery, ice-cream
Value added in comparison with related industries, 1994



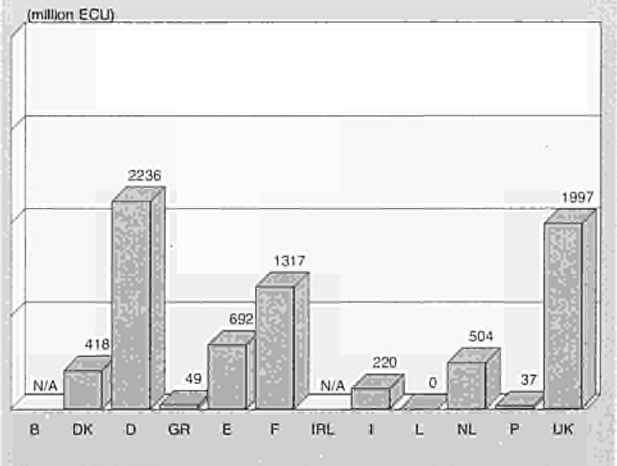
Source: DEBA GEIE

The only indicator to show a negative trend was employment which, during the same period of general growth, showed a slight but steady fall. This can be explained by the fact that higher production levels were achieved through concentration and fixed asset investments, which permitted the achievement of larger production volumes without any parallel increase in employment levels.

International comparison

The EU is the world's largest producer of cocoa-based products, sugar confectionery and ice-cream ahead of Japan and the USA. In 1994, the value of EU production amounted to 25 502 million ECU against 13 271 million ECU of Japan and 13 261 of the USA. Compared to 1985, the EU maintained its production leadership, while Japan ousted the USA to take second place.

Figure 2: Cocoa, sugar confectinery, ice-cream
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Cocoa, sugar confectionery, ice-cream
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	16 967	20 515	22 583	21 586	22 636	23 578	23 746	25 012	25 790	26 650	27 610
Production	17 679	21 458	23 534	22 735	24 066	25 502	25 655	26 902	27 900	28 990	30 210
Extra-EU exports	1 381	1 474	1 495	1 693	2 075	2 606	2 675	2 569	2 800	3 050	3 320
Trade balance	711.4	942.5	950.9	1 148.8	1 430.4	1 924.2	1 908.3	1 890.5	2 110.0	2 340.0	2 600.0
Employment (thousands)	176.1	177.0	178.9	169.5	164.6	164.0	162.8	172.0	170.0	160.0	160.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Cocoa, sugar confectionery, ice-cream
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.25	1.00	2.24	1.69
Production	3.24	1.98	2.67	3.77
Extra-EU exports	3.25	14.22	7.99	23.92
Extra-EU imports	3.88	5.14	4.43	-0.62

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Cocoa, sugar confectionery, ice-cream
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	1 381	1 230	1 144	1 146	1 372	1 474	1 495	1 693	2 075	2 606	2 675	2 569
Extra-EU imports	669.7	542.4	494.8	473.5	490.5	531.1	543.7	543.8	644.5	682.0	766.7	678.7
Trade balance	711.4	687.9	649.5	672.2	881.2	942.5	950.9	1 148.8	1 430.4	1 924.2	1 908.3	1 890.5
Ratio exports / imports	2.1	2.3	2.3	2.4	2.8	2.8	2.7	3.1	3.2	3.8	3.5	3.8
Terms of trade index	72.1	79.3	83.2	88.8	94.9	100.0	102.8	104.1	103.9	98.9	N/A	N/A

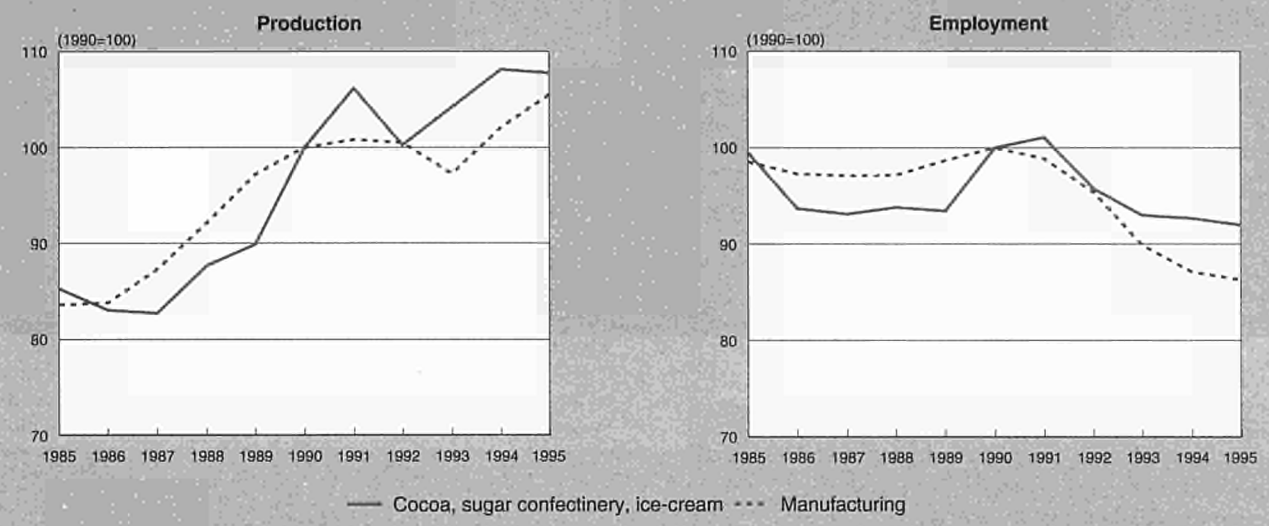
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Cocoa, sugar confectionery, ice-cream
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	85.7	88.6	88.8	93.4	96.3	100.0	105.0	104.7	112.1	116.7
Unit labour costs index (3)	94.3	93.4	96.4	97.8	100.3	100.0	104.7	106.6	104.9	103.7
Total unit costs index (4)	102.9	100.3	99.9	99.6	99.4	100.0	104.7	106.2	106.6	107.9
Gross operating rate (%) (5)	7.4	10.0	10.3	11.1	11.8	12.5	11.5	11.5	12.6	13.3

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Cocoa, sugar confectinery, ice-cream
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

In 1994, the highest apparent consumption was recorded in Europe with 23 578 million ECU. Conversely, apparent consumption in the USA fell from 15 178 million ECU in 1985 to 13 540 million ECU in 1994. The fall can be fully ascribed to the trend towards healthy nutrition, which is becoming firmly established in the USA. In Japan on the other hand, consumption figures rose, going from 7 556 million ECU to 13 628 million ECU.

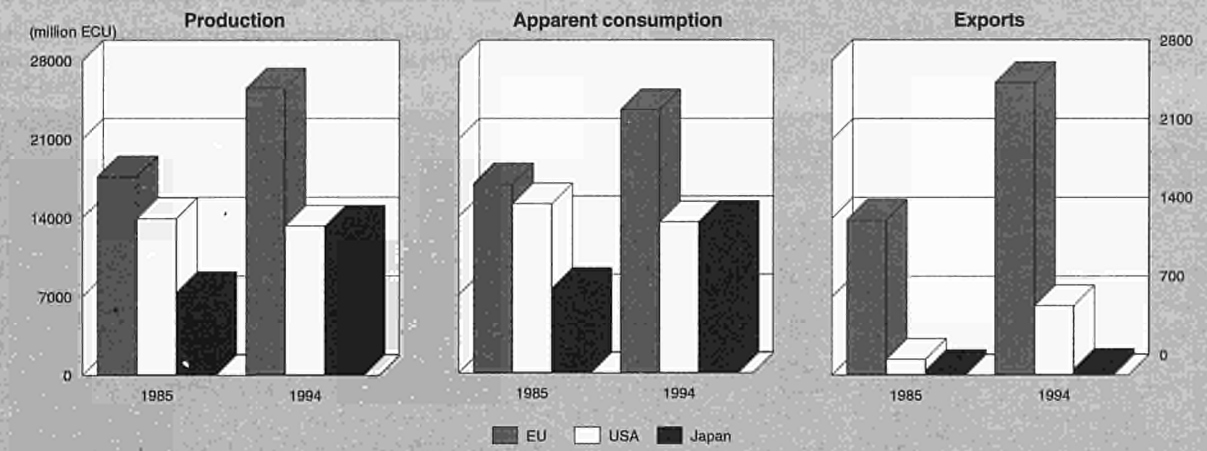
The EU is also the largest exporter of cocoa, sugar confectionery and ice-cream products. In 1994, exports from the EU amounted to 2 606 million ECU, while the correspondent figure for the USA and Japan was respectively 621 million ECU and 57 million ECU.

Foreign trade

The outlets for extra-EU exports are diversified. In 1989, the main importers of cocoa products, sugar confectionery and ice-cream from the EU were the EFTA countries which accounted for 30% of total extra-EU exports. In 1994, their share had dropped to 22%. The North-American market - Canada and USA - also recorded a relative fall in imports from the EU (15% in 1994 compared to 25% in 1989). Conversely, the weight of developing countries (named "Rest of the World" in Eurostat statistics) increased. In 1989, these accounted for 30% of total extra-EU exports, while in 1994 they had reached 40%. With regard to the East European countries, of great significance is the fast growth of Russia which, in 1994, accounted for 18.5% of total exports.

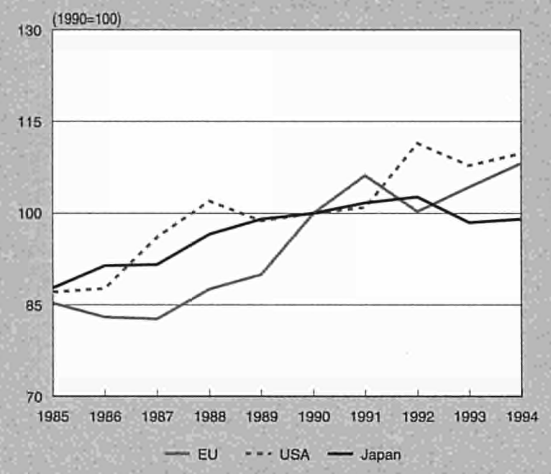
Turning to extra-EU imports, these have shown grater stability in recent years as far as origin countries are concerned. In 1994, the main cocoa, sugar confectionery and ice-cream suppliers of the EU remained the EFTA countries (mainly Switzerland) with a 43% share against 45% in 1989. Other countries are important mainly as a source of raw material: Malaysia (whose share went from 5% in 1989 to 7% in 1994), Ghana (from 4% in 1989 to 6% in 1994), and the Ivory Coast (whose share of extra-EU imports actually fell from 19% in 1989 to 10% in 1994).

Figure 4: Cocoa, sugar confectinery, ice-cream
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Cocoa, sugar confectinery, ice-cream
International comparison of production in constant prices



Source: DEBA GEIE

In relative terms, the analysis of the trade intensity trend during the 1985-94 decade shows a strong growth in export intensity and a drop in the import penetration ratio. The exports/production ratio did in fact rise from 7.7% in 1985 to 10.2% in 1994, while the imports/consumption ratio fell from 3.7% to 2.9%.

MARKET FORCES

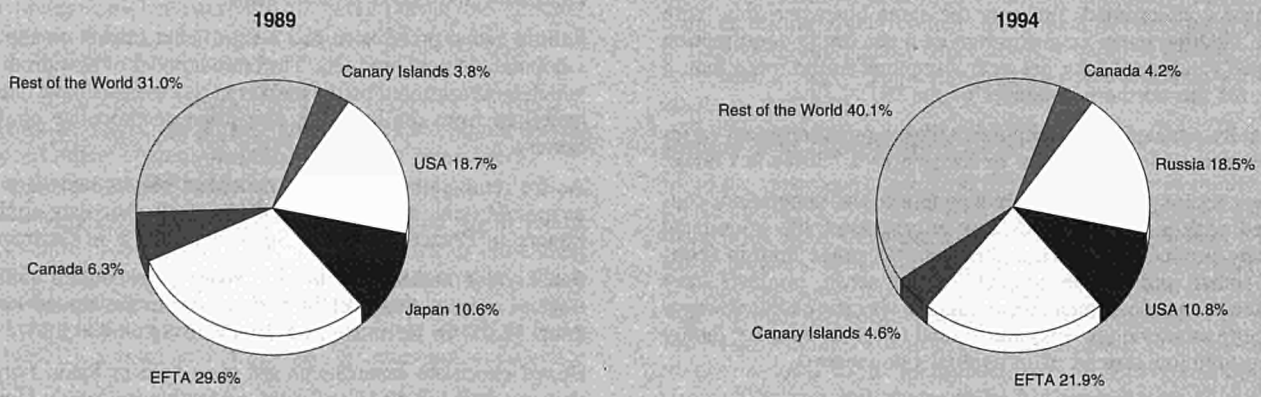
Demand

The industry of cocoa-based products, sugar confectionery and ice-cream presents varying consumption habits within the EU.

In the EU, the highest per capita consumption level of chocolate is to be found in Germany (8.8 kg per person in 1994), followed by Austria with a consumption of 8.2 kg per capita. Close behind come Ireland and the United Kingdom with 8.0 kg and 7.7 kg per capita respectively.

The Mediterranean countries show much lower levels of per capita consumption. On the other hand, Spain and Italy are the two countries where growth rates have increased most

Figure 6: Cocoa, sugar confectinery, ice-cream
Destination of EU exports



Source: Eurostat

Figure 7: Cocoa, sugar confectinery, ice-cream
Origin of EU imports

Source: Eurostat

Table 5: Cocoa, sugar confectionery, ice-cream
Production of chocolate and chocolate confectionery products

(thousand tonnes)	1990 (1)	1991 (1)	1992 (1)	1993 (2)	1994 (2)
EUR15 (3)	1 804	1 855	1 866	2 011	2 081
Belgique/België	110.5	112.7	121.4	124.3	125.6
Danmark	19.7	22.1	21.2	20.2	19.1
Deutschland	512.8	533.2	504.5	559.1	585.3
Ellada	21.0	21.5	21.5	22.0	22.3
España	40.8	42.1	41.6	50.6	61.5
France	225.4	247.4	253.9	266.4	272.0
Ireland	29.9	27.5	29.7	29.5	39.6
Italia	106.3	107.8	116.5	137.7	137.3
Nederland	161.6	166.0	172.0	185.0	181.0
Österreich	51.1	48.6	52.2	65.1	61.5
Portugal (4)	1.0	1.0	1.0	1.0	1.0
Suomi/Finland	24.5	24.8	28.9	39.0	40.0
Sverige	51.3	51.1	47.3	51.5	50.0
United Kingdom	448.3	449.4	454.0	459.7	484.8

(1) 1990-1992: white chocolate, sugar confectionery containing cocoa, chocolate powder (for the consumer) and other preparations for beverages and spreads containing cocoa are not included.
(2) 1993-1994: chocolate powder (for the consumer) and other preparations for beverages, spreads containing and other goods containing cocoa are not included.
(3) Excluding Luxembourg.
(4) Estimated.
Source: Caobisco

rapidly: by way of example, consumption grew in Italy from 1.8 kg per capita in 1990 to 3.1 kg in 1994.

Sugar confectionery presents the same characteristics, with the Mediterranean countries having a per capita consumption equal to about 2.5 kg per year compared to the more than 5 kg for the northern countries of the EU.

Finally, per capita consumption in the ice-cream segment varies between 13 litres per year in Sweden to 5.7 litres in France.

Over recent years, the gradual ageing of the population, coupled with a trend towards low-caloric food, has stimulated many producers to review their product range both in terms of image and calorie content. In this sense, products have often been repositioned, depending on specific cases, as: sugar free/low-calorie (sweets), nutritional (chocolate) or for family consumption instead of individual (ice-cream).

In addition, shifting meal patterns have created trends in eating such as snacking and 'grazing', which have increased confectionery and cocoa product sales.

Falling cocoa prices also had a significant impact on the development of new products. The large number of new products which have appeared on the market in recent years have indeed benefited from the lowering unit price of chocolate confectionery.

As for retail sales in Europe, chocolate blocks represent the most sold item, accounting for 54% of all chocolate confectionery in France, 34.8% in Spain and 26.9% in Germany.

Snacks also account for a large share of chocolate confectionery, representing 40.1% of total sales in the United Kingdom, 32.0% in Germany and 30.9% in Spain (30.9%).

Boxed chocolate assortments are most sold in Spain (where they account for 40.1% of total confectionery sales), United Kingdom (25.5%) and Italy (18.2%).

Table 6: Cocoa, sugar confectionery, ice-cream
Production of sugar confectionery

(thousand tonnes)	1990	1991	1992	1993	1994
EUR15 (1)	1 499	1 565	1 587	1 654	1 712
Belgique/België	60.0	63.9	64.0	71.0	73.0
Danmark	40.0	44.4	49.7	71.1	79.2
Deutschland	468.5	500.7	502.7	516.7	530.7
Ellada (2)	21.3	22.4	23.0	23.0	23.0
España	88.6	95.1	108.5	120.5	148.0
France	158.1	157.7	161.9	175.2	178.9
Ireland	19.7	21.8	23.6	21.6	22.3
Italia	116.7	121.4	123.5	124.5	122.1
Nederland	125.0	140.4	134.0	134.0	127.0
Österreich	14.3	15.3	16.1	17.3	17.2
Portugal (3)	2.5	2.9	2.5	2.9	2.9
Suomi/Finland	21.0	20.2	19.6	20.5	19.9
Sverige	34.7	34.6	32.6	30.4	29.3
United Kingdom	328.2	324.1	325.3	325.0	338.4

(1) Excluding Luxembourg.
(2) 1990-1992 are estimated.
(3) Estimated.
Source: Caobisco

Table 7: Cocoa, sugar confectionery, ice-cream
Per capita consumption of chocolate and chocolate confectionery products (1)

(kg)	1990	1991	1992	1993	1994
Belgique/België, Luxembourg	7.4	7.2	7.8	7.3	7.6
Danmark	5.6	6.7	6.8	7.1	7.0
Deutschland	6.8	7.1	6.5	9.0	8.8
Ellada	3.0	3.0	3.2	3.2	3.2
España	1.4	1.5	1.5	3.7	3.8
France	4.3	4.7	4.8	6.1	6.5
Ireland	6.4	6.7	6.7	7.9	8.0
Italia	1.8	1.9	1.9	3.0	3.1
Nederland	4.0	4.8	5.2	4.7	4.6
Österreich	7.8	7.8	7.9	8.3	8.2
Portugal (2)	1.3	1.3	1.3	1.3	1.3
Suomi/Finland	3.8	3.8	3.7	3.7	3.6
Sverige	5.5	5.3	5.1	5.0	5.1
United Kingdom (3)	7.5	7.5	7.4	7.2	7.7

(1) 1990-1992: Bonbons, pralines and other chocolate confectionery, sugar confectionery containing cocoa, chocolate powder (for the consumer) and other preparations for beverages, spreads containing and other goods containing cocoa are not included.
(2) Estimated.
(3) 1993-1994: chocolate powder (for the consumer) and other preparations for beverages, spreads containing and other goods containing cocoa are not included.
Source: Caobisco

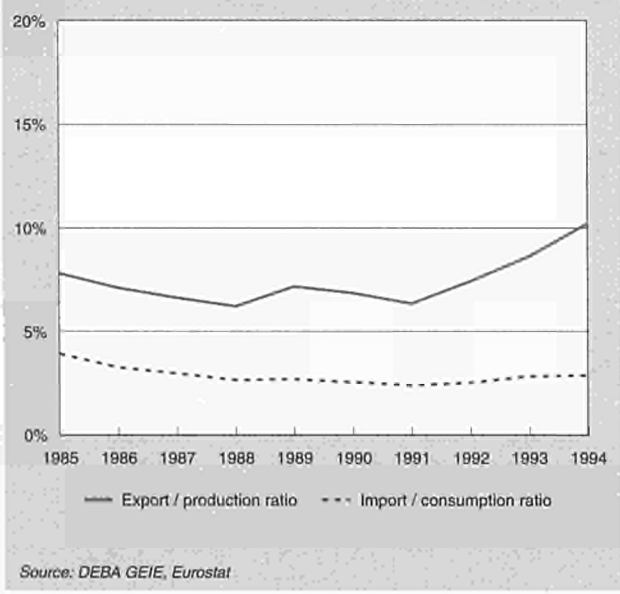
Chewing gum is most sold in Italy (34.7% of total EU sales) and in France (33.6%), followed by Germany (11.3%) and the United Kingdom (9.0%).

The ice-cream market is strongly affected by seasonal variables and presents higher sales growth rates during the summer months. In the case of ice-cream, interest has recently centred on the market of family packs.

In the sugar confectionery sector, the segments which have recently displayed the biggest growth rates are products with reduced sugar content, based on artificial sweeteners. This trend predominates especially in the gum market.

The emergence of niche markets based around sugar-free or low-calorie products mirrors general health trends but cannot account for the counter-trend towards premium products which offer the consumer an occasional self indulgence. In fact, marketing and new product development has tended to focus on these two extremes: sugar-free varieties and indulgence products.

Figure 8: Cocoa, sugar confectinery, ice-cream
Trade intensities



Source: DEBA GEIE, Eurostat

In Europe, retailing is characterised by a high level of concentration. The purchasing power of the major retailers is such that margins average between 8% to 12%. This figure is lower than the margins of retailing in other markets like the USA (estimated at around 16%). US multinationals have been therefore largely content to concentrate their activities in their domestic market while non-US based multinationals have been actively seeking acquisitions and licensing agreements in the USA.

Supply and competition

In 1990, chocolate production amounted to 1 804 thousand tonnes, while in 1994 it reached 2 081 thousand tonnes. Germany with 585.3 thousand tonnes, the United Kingdom with 484.8 thousand tonnes and France with 272 thousand tonnes are the biggest producers of chocolate and account for about 75% of total European production. The countries with the fastest growth rates however are Finland (from 24.5 thousand tonnes in 1990 to 40 thousand tonnes in 1994) and Spain (from 40.8 thousand tonnes to 61.5 thousand tonnes).

The supply pattern in the sugar confectionery segment is similar to that of chocolate. The production of sugar confectionery has also gradually risen: in 1990, it amounted to 1 499 thousand tonnes and in 1994 this figure had reached 1 712 thousand tonnes. The market is dominated by Germany, with a yearly production of 530.7 thousand tonnes, followed by the United Kingdom with 350 thousand tonnes. Production in the other Member States, though lower, is steadily increasing. The country with the fastest growth rate was Denmark, which went from 40 thousand tonnes in 1990 to 79.2 thousand tonnes in 1994, almost doubling its production, and Spain, which went from 88.6 thousand tonnes to 148 thousand tonnes.

Finally, ice-cream production in the EU is constantly rising. In 1985, output amounted to 1 403 million litres, and in 1994 it reached 2 510 million litres (for the EU-15). In this case too, Germany is the largest producer with a yearly production of over 550 million litres, followed by the United Kingdom at around 427 million litres per year and France with 358 million litres. Over the years France has reached third position, overtaking Italy in terms of overall production.

Given the fact that production is growing, the labour productivity index (base 100 in 1990) has gradually increased thanks to larger product volumes and stable employment levels. The increase in consumption has allowed producers to exploit economies of scale.

Table 8: Cocoa, sugar confectionery, ice-cream
Per capita consumption of sugar confectionery

(kg)	1990	1991	1992	1993	1994
Belgique/België, Luxembourg	4.5	5.0	4.9	5.2	5.4
Danmark	5.0	5.7	6.4	9.1	9.9
Deutschland	5.9	6.1	5.8	5.9	6.1
Ellada	2.1	2.1	2.2	2.2	2.2
España	1.8	2.0	2.4	3.2	3.3
France	2.7	2.7	2.9	3.1	3.1
Ireland	5.8	5.8	5.8	5.8	5.9
Italia	2.2	2.3	2.3	2.2	2.2
Nederland	5.7	5.6	5.7	5.7	5.5
Österreich	3.0	2.8	2.9	2.9	2.9
Portugal (1)	0.7	0.7	0.8	0.7	0.7
Suomi/Finland	5.0	4.9	4.6	4.7	4.6
Sverige	4.9	5.2	5.0	5.0	5.0
United Kingdom	5.1	5.1	5.2	5.0	5.0

(1) Estimated.
Source: Caobisco

The gross operating rate is also growing strongly, confirming the increased efficiency of the sector. In the ice-cream sector in particular, multinationals are able to develop further economies of scale through a logistic system of distribution integrated with that of frozen foods.

INDUSTRY STRUCTURE

Companies

Cocoa products, sugar confectionery and ice-creams are characterised by high concentration levels tied to the presence of a handful of multinationals.

Smaller enterprises tend to concentrate on domestic markets and often work as co-packers for larger companies. It is not unusual, however, for them to own a well-known local-market brand, so as to retain their independence in terms of production and image.

Among the major multinational groups in the sector are Cadbury Schweppes (UK), Jacob Suchard and Nestlé (CH) and Ferrero (I). Among the foreign groups with interests and factories in Europe are Mars and William Wrigley (USA).

Markets are very concentrated. In the United Kingdom, more than 80% of the cocoa-based products market is controlled by three companies (Cadbury, Nestlé and Mars).

The situation is different in Germany, where about 40% of chocolate blocks and bars are marketed under distributor brands, while the snacks market is more concentrated, with Mars, Ferrero and Nestlé controlling 70% of total sales.

The sugar confectionery sector presents a greater degree of fragmentation with a much bigger role played by smaller, local manufacturers, often operating in specific niche markets. Danone takes 25% of sales in France followed by Kraft (19%). In Italy, Perfetti accounts for 27% of sales followed by Sperlari (15%) and Nestlé (15%). In Spain, Chupa Chips is just ahead (12%) of General de Confiteria (11%) and Vidal (7%); in the United Kingdom, Cadbury (27%) precedes Nestlé (11%) and Wrigley (6%).

The ice-cream sector also shows high levels of concentration. Unilever and Nestlé are the leading multinationals in the sector, covering about 55-60% of the market in the major consumer countries. In this sector where large market shares are held by multinationals such as Grand Met (through its subsidiary

Table 9: Cocoa, sugar confectionery, ice-cream
Industrial ice-cream production by country

(million litres)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR15 (1) (2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2198	2510
EUR12 (1)	1 403	1 519	1 556	1 731	1 980	2 025	2 135	2 194	2 152	2 264
Belgique/België, Luxembourg	80.3	110.0	110.0	150.0	160.0	112.5	171.0	155.2	120.2	125.3
Danmark	40.8	52.0	49.4	54.4	57.9	58.0	70.4	88.0	90.3	86.4
Deutschland	306.0	330.5	325.3	356.4	381.8	435.4	538.7	543.0	500.0	563.6
Ellada	44.1	44.1	44.4	42.1	48.8	48.0	46.0	46.0	46.0	46.0
España	104.0	116.4	130.7	146.8	160.6	168.7	172.0	164.6	160.2	185.4
France	192.9	209.2	212.2	228.2	270.6	291.5	289.2	304.9	328.4	358.0
Ireland	23.3	23.3	24.4	24.0	27.8	29.4	31.8	32.2	33.2	30.3
Italia	225.5	223.3	227.7	298.0	317.3	322.4	332.2	332.2	347.7	353.9
Nederland	40.0	48.9	48.0	52.0	82.0	86.0	90.0	98.0	98.0	60.4
Österreich	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	45.5	45.5
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	28.0	28.0	28.0
Suomi/Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	86.7
Sverige	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	113.0
United Kingdom	346.0	361.0	384.0	379.0	473.5	473.4	394.0	402.0	400.0	427.0

(1) Excluding Portugal for 1984-1991.
(2) Excluding Finland and Sweden for 1993.
Source: Euroglaces

Table 10: Cocoa, sugar confectionery, ice-cream
Acquisitions

1994 Bidder	Country	Target	Target country
Carletti	Danmark	Brdr Christensen	Danmark
Barry	France	Natra cacao 33%	España
Ferrero	Italia	N/A	Portorico
Ferrero	Italia	N/A	USA
Kraft Jacobs Suchard	Switzerland	Chorzele	Poland
Kraft Jacobs Suchard	Switzerland	Poiana Produce Zamaroase	Romania
Lindt & Spruengl	Switzerland	Ludwig Hofbauer	Österreich
Nestlé	Switzerland	Malt chika	Bulgaria
Nestlé	Switzerland	Warncke (Unilever)	Deutschland
Nestlé	Switzerland	Anonima de Alimentacion	España
Nestlé	Switzerland	SAA	España
Ostkommerz Holding	Switzerland	Pomorzanka	Poland
Cadbury Schweppes	United Kingdom	Bouquet d'Or	France
Cadbury Schweppes	United Kingdom	Industrias Dulciora	España
Tudor Dairies	United Kingdom	Loseley Dairy Products	United Kingdom
Unilever	United Kingdom/Nederland	Safral	France
Unilever	United Kingdom/Nederland	Helados Tio Rico	Venezuela
Philip Morris	USA	Lyons Tetley	United Kingdom

1995 Bidder	Country	Target	Target country
Nestlé Australia (Nestlé)	Australia	Pacific Brands - Ice Cream & Yogurt Business	Australia
Lekkerland-Zentrale GmbH&Co KG	Deutschland	Perceval SA	France
Investor Group	Deutschland	Artigel (Beatrice Int.)	Deutschland
Gummybear Factory	Deutschland	Van Houten Holding	Deutschland
Stollwerck (Imhoff Group)	Deutschland	Hildebrand Kakao und Schokolad	Deutschland
Schluckwerder Family	Deutschland	Erasmi & Carstens	Deutschland
Pontania	Deutschland	Cocoa Processing (Ghana Cocoa)	Ghana
Nescalin (Nestlé)	Mexico	Fabrica de chocolates	Mexico
Unilever	United Kingdom/Nederland	Milkfold (Ice cream distribution)	India
Nestlé Espana	España	Conelsa (BBV)	España
Ost Commerz Holding AG	Switzerland	Park Lane Confectionery	Deutschland
KJS(Kraft General Food - Philip Morris)	Switzerland	United Kingdomraina chocolate Factory	Ukraine
Nestlé	Switzerland	La Azteca	Mexico
Investor Group	United Kingdom	Askey	United Kingdom
Cadbury Schweppes	United Kingdom	Allan Candy Group	Canada
Unilever	United Kingdom/Nederland	Nahariya Dairy Strauss - Ice cream operations	Israel
Premier Is- TLC Beatrice Int	USA-Danmark	Eventyr IS A/S	Danmark

Source: Nomisma

Häägen Dasz), distributor brands are tending to increase their market share.

The specialisation index shows how in 1994, the economic importance of the sector was particularly strong in smaller countries like Denmark (2.04), Greece (1.57) and the Netherlands (1.49). In all other, larger, countries the index varied between 0 and 1, with the sole exception of the United Kingdom where a value of 1.45 was achieved.

Strategies

Innovation is the instrument with which companies try and anticipate market changes and obtain competitive advantages over their competitors.

Given the tendency for prices to fall, only the larger companies are in a position to bear the cost of innovation. Innovation permits avoiding direct confrontation with competitors based only on price.

To promote growth in the cocoa products market, manufacturers have widened the supply of single and mini portions of products and emphasised their high nutritional value. Also evident in this market is the increasing supply of sophisticated confectionery, as manufacturers seek to differentiate their products and increase margins.

In the ice-cream sector too, the strategies adopted to promote the sale of products are based on a growing segmentation of markets, in order to meet the needs not only of children but also of families and singles.

Häägen-Dasz and other chains on the other hand have established a specific network of sales outlets centred on a high-quality image product, through which to offer a wide range of ice-creams. The size of the chain is an attempt to reap economies of scale in a sector otherwise characterised by extreme retail fragmentation.

In 1995, the cocoa products, sugar confectionery and ice-cream sector witnessed 17 acquisitions, i.e. a number slightly lower than that of 1994, when 18 companies changed ownership. All acquisitions but one had European companies as bidders, while only in 10 of the target firms were European.

Table 11: Cocoa, sugar confectionery, ice-cream Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.49	N/A
Danmark	1.55	2.04
Deutschland	1.07	1.09
Ellada	0.98	1.57
España	0.87	0.95
France	1.04	0.84
Ireland	N/A	N/A
Italia	0.15	0.19
Luxembourg	0.00	0.00
Nederland	1.75	1.49
Portugal	0.41	0.30
United Kingdom	1.28	1.45

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

In 1995, the operations conducted in Europe by multinational groups were six: Unilever bought out Milkfold (India) and Nahariva Dairy Strauss (Israel); Nestlé bought out Conelsa (E) and La Azteca (Mexico) and Fabrica de chocolates (Mexico); Kraft General Food bought out Ukraina Chocolate Factoru (Ukraine). These operations show how the major multinational groups strengthened on a certain number of markets where consumption of these products is likely to grow in the short-medium term.

REGULATIONS

Existing Directives concerning cocoa and chocolate are mainly aimed at ensuring the free movements of goods within the EU market. Such directives (Directive 73/241, subsequently amended by Directives 85/7 and 89/344) deal mainly with five sets of problems: product definition, product composition, manufacturing specifications, labelling and packaging. Cocoa and chocolate products may not be marketed in the Community unless they conform to the definitions and rules laid down in the Directives.

In 1996 a new Commission proposal for chocolate was formulated (96/0112) to further amend 73/241. Under this proposal, all chocolate products in the EU were to have consistent rules with regard to composition. Particularly, the amount of vegetable fat other than cocoa butter used in production of chocolate products was set at 5% by weight of the finished product.

In the field of sugar confectionery, EU legislation (based on Directive 79/693 as last amended by Directive 88/593) defines the raw materials which may be used in the manufacture of the products concerned the additives which may be added to those products and the maximum sulphur dioxide content. Very precise rules are laid down for the labelling of the products concerned.

With respect to the ice-cream sector, compositional legislation dates back to 1967. Free circulation of goods and fair competition among producers rely on provisions stated by the 1991 European Code of Practice. Labelling and packaging measures as well as norms concerning hygiene and quality standards, determine very important effects on this sector. The Dairy Products (Hygiene) Regulation came into force on 9th May 1995, implementing the Milk Hygiene Directive 92/46 which contains heat treatment instructions for dairy ice cream. To protect the smaller manufacturer, producers using less than 2 million litres of milk per annum can apply for permanent derogation from the need for automatic filling and sealing and the use of batch pasteurisers. Regulations cover dairy ice cream only, yet the health mark given under the regulations may also be applied to non-dairy ice cream. Hygiene conditions laid down by the Regulations also apply to the manufacture of ice cream containing non milk fats.

Internal barriers within the EU market still remain, in particular with regards to indirect taxation, a substantial harmonisation in VAT is to be considered one of the main priorities for this sector.

OUTLOOK

Over the next few years the consumption of cocoa products, sugar confectionery and ice-cream is expected to increase in most EU countries and also abroad in the medium term. In Europe, the products which will enjoy the greatest growth rates are those with low-calorie content and high nutritional value.

In 1995 there was an increase in the number of acquisitions by multinational groups aimed mainly at consolidating positions in single domestic markets and finding new market outlets. In the future, competition and the strength of mass market retailers will likely bring about price reductions and further polarise the market between economy lines and indulgent, premium confectionery products.

On the retail scene, traditional grocery stores and other small, independent outlets will continue to lose shares to discounters and hypermarkets on the one hand and to speciality shops on the other.

Market growth will mainly be swallowed by the increasingly dominant multinationals. Expansion, however will be gradual and consequently partnerships and joint ventures will become increasingly common. Meanwhile smaller quoted companies with strong domestic brands will have difficulty retaining their independence, but there will remain a role for the niche specialist serving local needs and catering to regional tastes.

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The industry is represented at the EU level by: Association of the Ice Cream Industries of the EC (Euroglaces). Address: rue Fondary 51-53, F-75015 Paris; tel: (33 1) 45 79 80 75; fax: (33 1) 45 79 61 29 and Association des industries de la Chocolaterie, Biscuiterie et Confiserie (Caobisco). Address: rue Defacqz 1, Bte 7, B-1050 Brussels, tel: (32 2) 539 1800; fax: (32 2) 539 1575.

Miscellaneous food products

NACE (Rev. 1) 15.85, 15.86, 15.87, 15.88, 15.89

This residual chapter includes food industries with very different characteristics and problems for both demand and supply.
The pasta sector, despite the high growth rates of some segments, is entering as a whole a phase of maturity. However, there are still notable differences in the per capita consumption levels between the different European countries. As a consequence, the sector is undergoing a deep restructuring process and companies are actively pursuing internationalised strategies.
In general, demand is also entering a phase of maturity in most other sectors considered, i.e. vinegar, coffee, tea, prepared soups and baby-food sectors, while dietetic products are in a growth phase, as a result of growing consumer attention to health aspects of nutrition. A common feature of all these sectors, is the widespread attention given to product innovation and the adoption of marketing instruments typical of mature sectors. Finally, the role of modern distribution is increasing with respect to conventional channels.

INDUSTRY PROFILE

Description of the sector

The "miscellaneous food" category refers to the whole of the food industry not specifically examined in the other chapters. Among these are pasta production, tea and coffee processing, baby food manufacture, dietetic foods, vinegar, sauces and soups.

These products have specific characteristics concerning the industrial structure, demand, supply, current trends, as well as future prospects.

In 1994, miscellaneous food products reached an added value of around 14 500 million ECU. This value expresses the overall economic importance of the industries included in this chapter, despite their limited individual weight. Available data shows that Germany (3 270 million ECU) is the European country with the highest added value, followed in order of importance by France (2 249 million ECU) and Italy (1 493 million ECU).

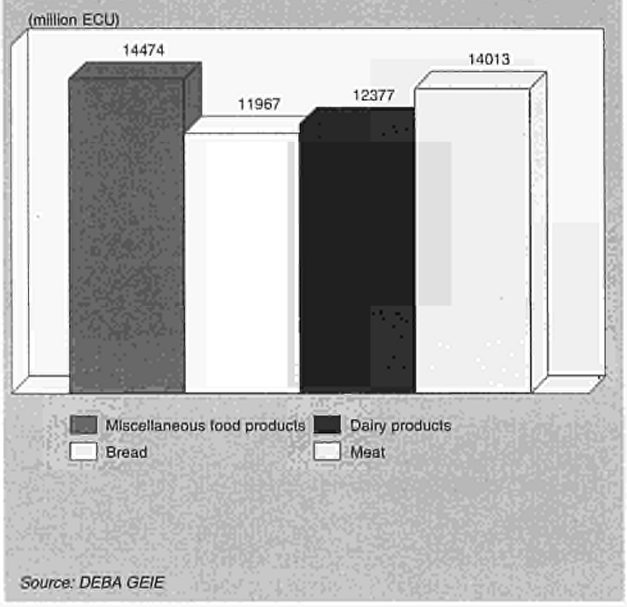
Pasta

As far as the pasta sector is concerned, the main economic indicators at current prices generally show positive annual changes up to 1992. The year 1992-93, however, was a critical year with a downturn of all indicators. On the other hand, 1994 marked a recovery in exports (+13.02%) which reached 403 million ECU. During the same year, consumption (4 270 million ECU), production (4 616 million ECU) and employment (19.4 thousand) registered a further, although slight, reduction.

Other products

Starting from 1987, other food products present positive annual variations in consumption, production and trade balance. Employment, on the other hand, although enjoying an overall growth trend in the last decade, shows more limited annual growth rates and even negative in the two-year period 1992-94.

Figure 1: Miscellaneous food products
Value added in comparison with related industries, 1994



Source: DEBA GEIE

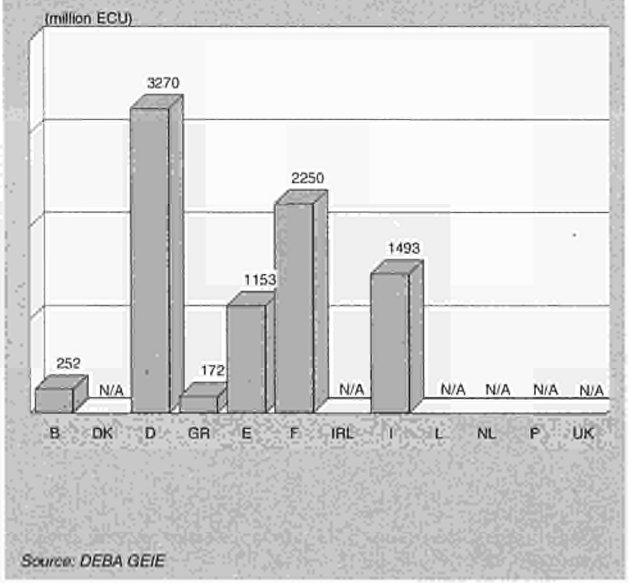
Recent trends

During the last decade, miscellaneous food production was characterised by a constantly positive annual growth rate. Furthermore, from 1988 to 1993, growth in the sector was greater than that of total manufacturing. In 1993-94, however, the change in production for the sector, although positive (2.8%), was less than that of the manufacturing industry as a whole.

Pasta

Apparent consumption and production in the pasta sector are characterised by low elasticity. From 1985 to 1994, only slight annual fluctuations were recorded, higher in production (1.26%) than in consumption (0.82%). In the same period, extra-EU exports rose by 11.4% per annum and extra-EU imports by 9.8% per annum. The latter, however, are reduced in quantity terms.

Figure 2: Miscellaneous food products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Pasta
Main Indicators In current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	3 863	4 386	4 425	4 639	4 595	4 514	4 270	3 808	4 233	4 400	4 580	4 780
Production	3 997	4 574	4 618	4 890	4 940	4 819	4 616	4 181	4 558	4 770	5 000	5 260
Extra-EU exports	159	215	223	287	387	357	403	438	398	450	520	600
Trade balance	134.2	188.1	192.7	250.9	345.2	305.7	346.0	372.9	324.7	370.0	420.0	480.0
Employment (thousands)	22.4	19.6	21.0	20.5	20.4	19.9	19.4	19.0	20.3	20.0	20.0	20.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Other food products
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	22 379	27 980	29 319	33 141	36 393	37 022	39 367	41 119	44 287	46 930	49 840	53 070
Production	23 167	29 195	30 587	34 464	37 956	38 884	41 572	43 615	46 460	49 370	52 560	56 110
Extra-EU exports	2 185	2 293	2 386	2 516	2 798	3 258	3 675	3 937	3 716	4 000	4 310	4 640
Trade balance	788	1 216	1 267	1 322	1 564	1 862	2 205	2 496	2 173	2 440	2 720	3 040
Employment (thousands)	165.7	180.4	194.1	201.4	207.1	202.9	200.5	198.3	210.6	210.0	220.0	220.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 3: Pasta
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	0.43	1.31	0.82	-0.32
Production	0.74	1.91	1.26	-0.03
Extra-EU exports	9.70	13.58	11.41	5.23
Extra-EU imports	6.45	14.24	9.84	11.12

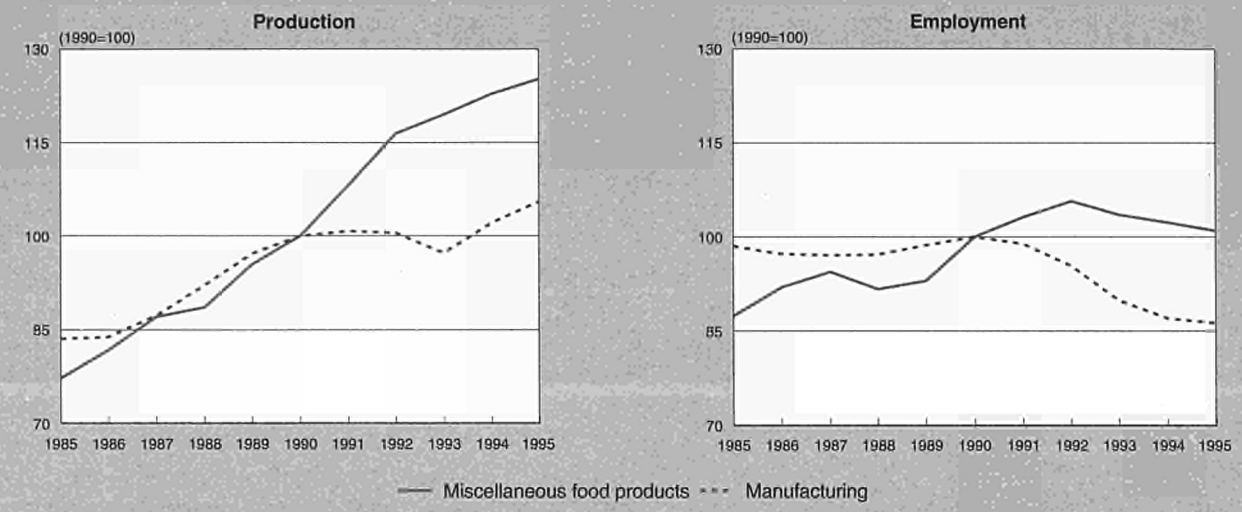
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Other food products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	6.55	5.61	6.14	2.79
Production	6.11	5.76	5.95	3.22
Extra-EU exports	0.16	7.46	3.34	8.70
Extra-EU imports	2.83	5.77	4.12	3.83

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Figure 3: Miscellaneous food products
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Other products

Average real annual growth rates of other food products are clearly positive. In the period 1985-94, consumption increased at an annual rate of 6.14%, slightly above that of production 5.95%. In 1993-94, extra-EU exports increased by 8.7% against an average change in 1985-94 of 3.3%.

International comparison

In 1994, the main manufacturers of miscellaneous food were the USA with 64 638 million ECU, followed by Japan with 50 682 million ECU and the EU with 46 188 million ECU. The USA and the EU show a good level of self-sufficiency, whereas Japan is a net importer. With respect to 1985, the EU shows the highest actual production growth (+45.6%), greater than that of Japan (+32%) and the USA (+13.4%).

Pasta

Italy and the USA are the main pasta producers at world level. Italy, which represents over 70% of European production, exports around 40% of domestic production, equally divided between the EU and non-EU countries. Within Europe, Italian exports are mainly directed to Germany, France, and the United Kingdom.

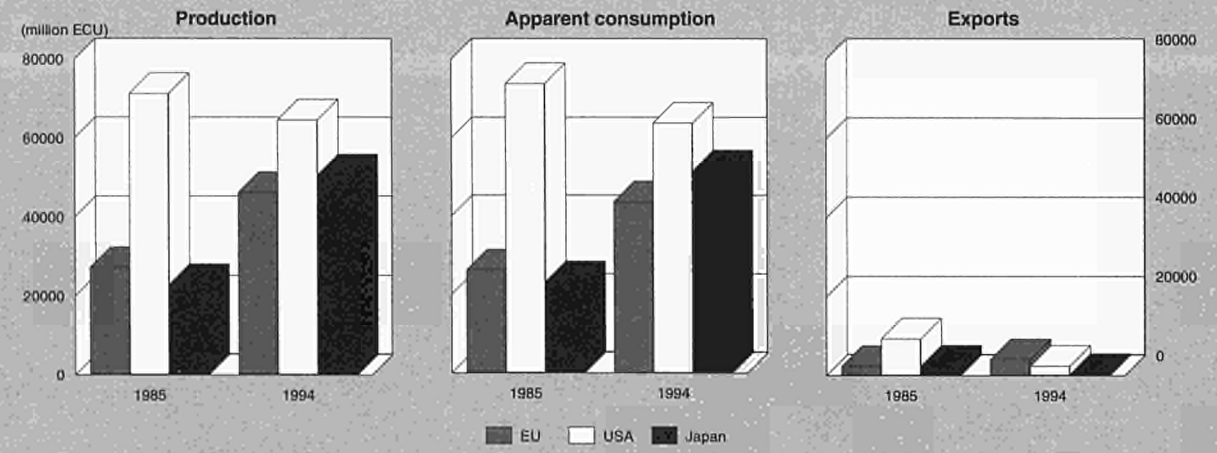
Other products

Concerning green coffee, the world-wide picture is characterised by a net distinction between the producing countries (mostly developing countries) and importers, above all the United States and Europe. Exceptions are Brazil, Colombia and a few other markets which, other than being among the main world producers, are also reasonably large consumers. Regarding tea, the main world producers are in the East (above all India, China and Sri Lanka), but also Kenya and Turkey are of some importance.

Foreign trade

In 1994, miscellaneous food products consumption within the EU was almost entirely satisfied by domestic production. Imports represent only 3.5% of total consumption. In the same year, exports cover 8.8% of production. Both these trade intensity indicators showed a slight overall downward trend in the period 1985-94. The largest annual negative changes were

Figure 4: Miscellaneous food products
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Table 5: Pasta
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	159.4	144.3	153.6	166.5	215.2	222.5	287.3	386.5	356.6	403.0	438.5	397.7
Extra-EU imports	25.2	22.8	24.4	24.6	27.1	29.8	36.4	41.3	50.9	57.0	65.5	73.0
Trade balance	134.2	121.5	129.2	141.9	188.1	192.7	250.9	345.2	305.7	346.0	372.9	324.7
Ratio exports / imports	6.33	6.33	6.30	6.77	7.94	7.46	7.89	9.35	7.01	7.07	6.69	5.44
Terms of trade index	98.6	101.5	97.5	98.0	100.5	100.0	98.6	97.5	91.1	97.0	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 6: Other food products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 185	1 940	1 902	2 059	2 293	2 386	2 516	2 798	3 258	3 675	3 937	3 716
Extra-EU imports	1 397	1 122	937	989	1 078	1 118	1 194	1 234	1 395	1 470	1 441	1 544
Trade balance	788	818	965	1 070	1 216	1 267	1 322	1 564	1 862	2 205	2 496	2 173
Ratio exports / imports	1.56	1.73	2.03	2.08	2.13	2.13	2.11	2.27	2.33	2.50	2.73	2.41
Terms of trade index	64.3	80.1	90.3	97.5	99.2	100.0	102.8	108.5	107.5	110.0	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 7: Pasta
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	90.3	88.8	95.6	98.8	108.3	100.0	107.3	109.1	113.9	116.7
Unit labour costs index (3)	84.1	89.0	89.0	93.7	84.9	100.0	95.4	98.7	93.3	93.3
Total unit costs index (4)	92.4	94.5	91.9	93.6	94.6	100.0	99.7	100.2	95.1	90.3
Gross operating rate (%) (5)	6.6	8.6	9.6	8.8	9.4	11.1	12.8	12.6	13.6	13.8

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 8: Other food products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	87.1	88.3	91.1	95.6	101.7	100.0	104.8	110.6	115.9	121.1
Unit labour costs index (3)	87.6	91.8	93.9	92.2	94.3	100.0	103.4	104.0	102.2	101.2
Total unit costs index (4)	105.5	107.2	99.8	99.6	102.7	100.0	102.1	102.4	101.8	103.3
Gross operating rate (%) (5)	10.7	11.4	11.4	13.5	13.0	14.1	14.8	15.1	15.3	16.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

witnessed in 1985-86, while in 1993-94 both indicators showed a positive growth rate.

Pasta

In 1994 the USA were the main destination of EU pasta exports, with a share of 28.3% of total extra-EU exports. In second place were the EFTA countries with 17%, followed at a distance by Japan (9%), Russia (8%), and Canada (4%). With respect to 1989, exports towards Japan and EFTA countries decreased.

The pasta sector is characterised by a low level of imports and by a considerable degree of self-sufficiency at EU level. In 1994, 24.8% of extra-EU imports originated from Switzerland, followed in order of importance by China, Malaysia and Thailand, each with a share of between 9% and 11%. With respect to 1989, a decrease in the weight of imports from Japan is signalled. Pasta from the East has completely different characteristics from the European pasta, typically Italian, which uses durum wheat.

Other products

Since 1987 onwards, extra-EU exports of other food products have enjoyed constant growth. In 1994, they reached 3 675 million ECU, i.e. two and a half times the correspondent value of extra-EU imports

Comparing the countries of destination for extra-EU exports in 1994 with those of 1989, no notable differences emerges as far as the shares are concerned. In 1994, 23.7% of extra-EU exports were directed towards EFTA countries. Much lower shares were destined for the USA (7.7%), Japan (4.5%) and Russia (4.8%).

Extra-EU imports of other food products are quite fragmented. Switzerland and the USA, each with a share of around 15%, are the main countries of origin of EU imports. Smaller volumes originate from Kenya (9.5%), India (7.4%) and China (4.3%).

The coffee and tea manufacturing industry depends completely on imports of raw materials from tropical countries. Concerning the imports of green coffee to the EU, in 1994 over a third was absorbed by Germany (716 351 tons), followed by France (315 619 tons) and Italy (317 291 tons).

Concerning tea, the main importer is the United Kingdom which in 1994 imported approximately 75% of total imports (or 148 387 tons). At considerable distance follow Germany (19 546 tons), France (12 204 tons) and Ireland (11 362 tons). Overall, in 1994 European imports saw a slight drop with respect to 1993, the year in which imports registered the highest level in absolute terms of the period 1987-94.

MARKET FORCES

Demand

Pasta

Italy, with 28 kg per capita per year, is the country with the highest per capita pasta consumption, not only in Europe but also world-wide. Within the EU, the highest consumption levels are to be found in the countries of southern Europe. Among the countries with the highest per capita consumption are Greece (8.9 kg), Portugal (7 kg) and France (6.8 kg).

Whereas in Italy pasta demand (at least from a quantitative point of view) is close to saturation, in the countries where pasta is not part of a consolidated nutritional tradition, high growth rates are possible In fact, consumers in these countries are beginning to see pasta (high in carbohydrates, low in fat, sugar and added salts) as a healthy, cheap, tasty and pleasant alternative to their traditional dishes to be consumed also as main meal, and not only as a side dish.

There are also differences depending on the product segment. Strong growth is recorded in demand for fresh pasta, stuffed pasta and ready-pasta meals. Product innovation is concentrated in the premium segments and plays a major part in the re-launch of consumption. Concerning dry pasta, product innovation is going towards new shapes and the use of special ingredients (herbs, wholemeal, etc.). In decline is the canned pasta market (to date important mainly in the United Kingdom), while more interesting prospects are found in the ready-meal sector based on pasta, fresh, frozen or packed in bags. A positive impact on pasta consumption also originates from the increasing availability of ready sauces, which reduce cooking time.

Other products

In 1994, Denmark and Belgium, respectively with 3.0 and 2.4 litres, were the countries with the highest per capita consumption of vinegar. From available data it results that in the same year, Germany, Austria, France and Spain registered per capita consumption of between 1.2 and 1.8 litres, while the other countries show lower consumption.

Within Europe, the United Kingdom presents the highest consumption of instant coffee (46 300 tons in 1994), or 46%. of total consumption The other EU countries register much lower consumption levels. In some of these countries (Italy, Spain, etc.), although coffee remains one of the most consumed hot drinks, different tastes prevail, with a preference for normal or espresso coffee rather than instant coffee. In general, coffee consumption is stable, with higher per capita consumption in the northern European countries. In these countries coffee is used as a hot drink and consumed in large diluted quantities, requiring a larger quantity of raw material with respect to

Table 9: Pasta
Production in volume

(thousand tonnes)	1990	1991	1992	1993	1994
EUR12 (1)	2 950	3 138	3 386	3 456	3 453
BENELUX	69.0	71.5	79.5	83.0	85.6
Deutschland (2)	239.5	255.4	259.4	270.0	291.6
Ellada	79.6	86.6	90.1	96.8	102.4
España	185.0	163.0	170.0	165.0	170.0
France	285.1	288.3	280.1	276.0	279.3
Italia	2 033.0	2 203.6	2 441.6	2 498.2	2 462.6
Portugal	59.0	70.0	64.8	66.5	61.6

(1) Excluding Denmark, United Kingdom and Ireland; including former East Germany.
(2) Including former East Germany; 1992: provisional data.
Source: UNAFPA

espresso and coffee as it is prepared in the Mediterranean countries.

Also the demand for tea has reached levels close to saturation. Nevertheless, in this sector, tea flavoured with herbs or fruit is a segment characterised by a certain dynamism. The highest per capita consumption is to be found in Ireland (around 3 kg per year) and the United Kingdom (about 2 kg), followed at great distance by the other EU countries (e.g. the Netherlands with 0.6 kg, Germany with 0.5 kg, etc.).

The demand for baby food, directly affected by birth rates, maternal employment patterns, and disposable income levels, presents considerable differences in the single countries. In general, while the southern European countries are experiencing a marked decline in birth rates, the north European birth rate has generally been relatively stable at a positive levels, but with negative oscillations in recent years. On the other hand, there is increased interest in added-value product lines. Thus there is a sharp increase in the demand for packaged gourmet products, hypoallergenic and vitamin-enriched products, juice and continuation/follow-on milks.

The demand for dietetic food has been stimulated by the increased interest of consumers in health, fitness and sport, as well as an ageing population and a considerable expansion in self-medication. Alongside the established market sectors, such as yeasts, which start to show the first signs of maturity, there are very dynamic segments still in their infancy. Among the most interesting segments are slimming aids, health and sport drinks and dietary supplements (without chemical additives) which are truly becoming part of daily nutrition and not just a remedy in case of illness.

The prepared soups market presents considerable differences in the various countries. While the canned soups dominate in the United Kingdom, de-hydrated soups hold the major share of the French, Spanish and German markets, while stock cubes dominate sales in Italy.

Supply and competition

Pasta

The main pasta producer is Italy with 2 462.6 thousand tonnes in 1994, a production almost equal to that of the preceding year. Among the other main producers, even if with much lower production levels, are Germany (291.6 thousand tons), France (279.3 thousand tons) and Spain (170 thousand tons).

In the European pasta industry, mainly durum wheat flour is used, which gives the pasta the retaining quality for cooking, along with other types of flours and other ingredients. Nevertheless, in Italy there is very strict legislation allowing only the use of durum wheat flour and the few ingredients required for the production of special and dietetic pasta. This situation determines a competitive disadvantage for the Italian industry in terms of capacity of adjustment to the changed tastes of the consumer through product innovation and the use of new ingredients.

Recently, and above all in 1995, the sector has been hit by the increase in the cost of the raw material, durum wheat, as well as the cost of packaging (both carton and cellophane). Concerning the marketing of pasta, while in the past this occurred through a whole range of outlets, the trend has increasingly been of concentration into supermarkets and hypermarkets. This is true not only for the dry pasta sector, but increasingly also for the fresh product.

Other products

The main European producers of vinegar in 1994 were Germany (1 731.8 thousand hectolitres) and France (1 133.1 thousand hl), followed, with more limited production levels by the United Kingdom (775.8 thousand hl), Italy (563.0 thousand hl) and Spain (486.2 thousand hl).

The United Kingdom, with 288.2 thousand tons and a turnover of 420.1 million ECU, is the main producer of soups and broths. On the other hand, Germany, in spite of reaching a production equal to just half that of the United Kingdom in volume terms, exceeds it from a turnover point of view (598.2 million ECU).

The availability of coffee as raw material, other than being affected directly by restrictive factors such as meteorological conditions, also depends on other economical factors (agreements between producers, reserve levels, etc.). Thus, this is a market subject to sharp fluctuations in prices. It is important to mention, in this connection, that during the course of 1994 the cost of raw materials almost quadrupled (mainly as a result of a frost in Brazil) creating difficulty for the processing industry.

The German market of dietetic supplements (404.4 million ECU) is the largest in Europe, followed by that of the UK (207.6 million ECU), France (186.6 million ECU), Italy (123.6), and Spain (35.3). Dietetic food includes different types of products (specific nutritional supplement products, slimming aids, sports nutrition, etc.). These products are consumed in place of and/or in addition to the normal intake of food and drink with the aim to improve the physical and health conditions. Their consumption has taken a particular impetus following their retailing in large distribution outlets. The same is true also for the baby food sector.

Production process

Pasta

The complete automation of the various phases of the production process has become a requirement to compete in the sector. The largest differences in the end-product are linked to the type of mixture used and some technical requirements

Table 10: Pasta
Number of pasta factories (1)

(units)	1990	1991	1992	1993	1994
EUR12 (2)	273	254	252	248	244
BENELUX	6	6	6	6	6
Deutschland	29	25	25	24	23
Ellada	11	11	10	10	10
España	26	26	26	26	23
France	10	10	10	10	10
Italia	180	170	170	167	167
Portugal	10	5	4	4	4
United Kingdom	1	1	1	1	1

(1) Having a capacity of production of more than 1 tonne per day
(2) Excluding Denmark and Ireland
Source: UNAFPA

Table 12: Green coffee
Extra-EU Imports

(tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR15	1 754 287	1 746 296	1 872 665	1 866 303	1 887 642	2 081 816	2 035 904	2 096 639	2 240 869	2 193 792
EUR12	1 551 710	1 537 300	1 645 341	1 651 344	1 649 089	1 819 822	1 773 913	1 828 751	1 985 552	1 951 957
Belgique/België, Luxembourg (1)	101 247	81 624	88 668	95 718	76 953	77 786	61 708	65 858	69 563	72 000
Danmark	46 296	46 455	50 844	50 019	55 065	50 570	51 606	55 983	53 225	54 654
Deutschland	423 427	452 888	487 026	492 399	500 238	580 743	609 773	622 766	740 286	716 351
Ellada (1)	20 292	12 500	21 361	22 734	22 410	23 682	8 604	3 714	9 642	12 000
España	133 396	149 092	147 198	148 966	158 110	175 326	170 387	194 730	166 290	180 027
France	275 750	281 515	297 020	303 001	304 068	312 933	322 061	321 755	317 907	315 619
Ireland (1)	530	654	756	858	924	984	1 470	1 854	1 242	1 500
Italia	281 087	251 547	263 318	259 401	270 565	307 930	267 003	267 724	325 933	317 291
Nederland	144 750	141 203	155 465	150 731	137 895	151 529	150 564	154 867	154 336	131 693
Österreich	58 764	57 829	58 646	67 929	86 534	99 431	107 109	111 139	91 713	68 862
Portugal	22 051	20 831	27 420	25 190	25 681	29 730	30 740	31 563	35 378	35 088
Suomi/Finland	53 235	57 885	74 275	57 621	63 409	64 487	60 018	60 017	76 086	78 816
Sverige	90 578	93 282	94 403	89 409	88 610	98 076	94 864	96 732	87 518	94 157
United Kingdom	102 884	98 991	106 265	102 327	97 180	108 609	99 997	107 937	111 750	115 734

(1) 1994, estimates.
Source: EUCA

such as the use of bronze extruders and drying techniques at high temperature. It is important to note that, beyond the various theses on the effects of this latter method of drying on the chemical and nutritional characteristics of the end-product, good quality levels may be obtained, even if starting with poor-quality mixes containing common wheat.

Other products

The coffee production process is complex and profoundly differs depending on whether the end product is instant, normal or decaffeinated coffee. Of prime importance is the choice of the coffee variety (Arabic, Strong) to be used for the formation of the mixture, typical of each brand.

The tea production process is a lot more simple insofar as the raw material does not require special processing but simply packaging.

Concerning baby food, the production process is heavily conditioned by the quality requirements (no residues hazardous to health, etc.) in all its phases, from purchasing of the raw material to transformation in a narrow sense, to preservation and distribution.

INDUSTRY STRUCTURE

Companies

Pasta

Of the 244 pasta manufacturing plants existing in Europe in 1994, over two thirds were located in Italy (167 producers). The number of factories in other countries is very limited: following Italy - at considerable distance - are Germany and Spain, each with 23 producers.

The examination of the data relative to the last five years points out to a progressive reduction in the number of factories in all European countries. This phenomenon of sector rationalisation and company concentration has been in course for many years now. The incentive has been the necessity to practise economies of scale, also through closing down of obsolete and inefficient plants. By way of example, Italy has witnessed a reduction in plants from about 2 000 in the time immediately after the Second World War, to 500 in the early 1970s, to about 250 in the 1980s, to stand at the current 167.

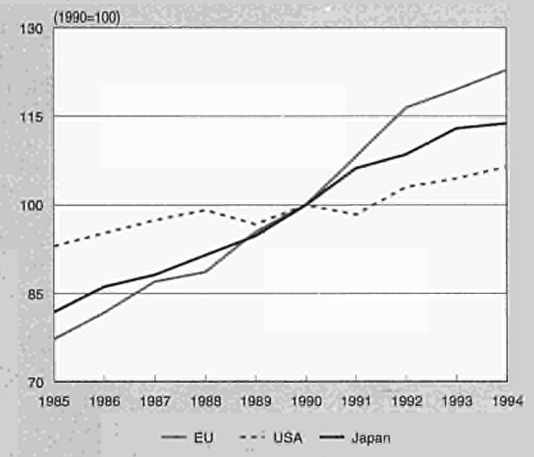
The merger and acquisition process, particularly strong in the 1980s, led to the constitution of four large groups operating on European level: Nestlé (CH), Danone (F), Ranks Hovis McDougall (USA) and Barilla (I). Among the other companies worth to mention are CPC (UK), 3 Glocken GmbH (D) and the Gallo Group (E).

Table 11: Pasta
Consumption per capita

(kg/head)	1990	1991	1992	1993	1994
BENELUX	4.1	4.2	4.4	4.5	4.4
Deutschland	4.8	4.5	4.5	4.6	4.8
Ellada	7.6	8.5	8.7	8.8	8.9
España	4.7	4.1	4.1	4.0	4.1
France	6.6	6.7	6.6	6.6	6.8
Italia	25.7	25.0	27.0	28.0	28.0
Portugal	5.8	7.0	7.0	7.1	7.0
United Kingdom	1.5	2.0	2.0	2.0	2.0

Source: UNAFPA

Figure 5: Miscellaneous food products
International comparison of production in constant prices



Source: DEBA GEIE

Other products

Italy accounts for the largest number of vinegar plants (41 units) at European level, followed by Germany (33 units) and Spain (31 units), while the other countries register a much lower number of plants. The high number in Italy, with a low production level, is indicative of the considerable fragmentation of the vinegar industry in this country.

The baby food sector is characterised by a high level of concentration. The high entry costs are linked both to the rigorous manufacturing requirements of the sector and to its specialised marketing against well-entrenched competition. Among the main specialist producers on the European market are Gerber (USA), Nutricia (NL), while among the diversified producers one can mention American Home Product (USA), Heinz (USA), Nestlé (CH), Danone (F).

Bayer (D), SmithKline Beecham (USA), Monsanto (USA), Boots (UK) and Quaker Oats (UK) (largely multinationals operating in the chemical-pharmaceutical sector), are among the major manufacturers of dietetic food. The market leaders in the EU vary depending on the single segments considered (sport drinks, artificial sweeteners, etc.).

The European market of prepared soups is dominated by six multinational suppliers: CPC International (USA), Unilever (UK/NL), Nestlé (CH), Campbell Soups Company (USA), Heinz (USA) and Danone (F).

The main leaders of the coffee market are diversified multinationals such as Nestlé (CH), Philip Morris (USA) and Sarah Lee (USA). Alongside these there are companies specialised exclusively in coffee production, both on a large scale such as Segafredo (I), and small coffee roasting factories, especially in Italy, operating in the niche of supplying the domestic hotels, bars and restaurants sector.

Finally, the tea sector is very concentrated under the control of a few food multinationals such as Unilever (UK/NL), Danone (F), and Allied Lyons (UK).

Strategies

Also in 1994-95, the merger and acquisition activity was intense, with about sixty major operations. These operations involved, as bidders, mainly companies based in the United Kingdom, the Netherlands, France, Switzerland and the United States. These operations, other than allowing consolidation of the companies on a national level, are also an expression of the production internationalisation and rationalisation strategies.

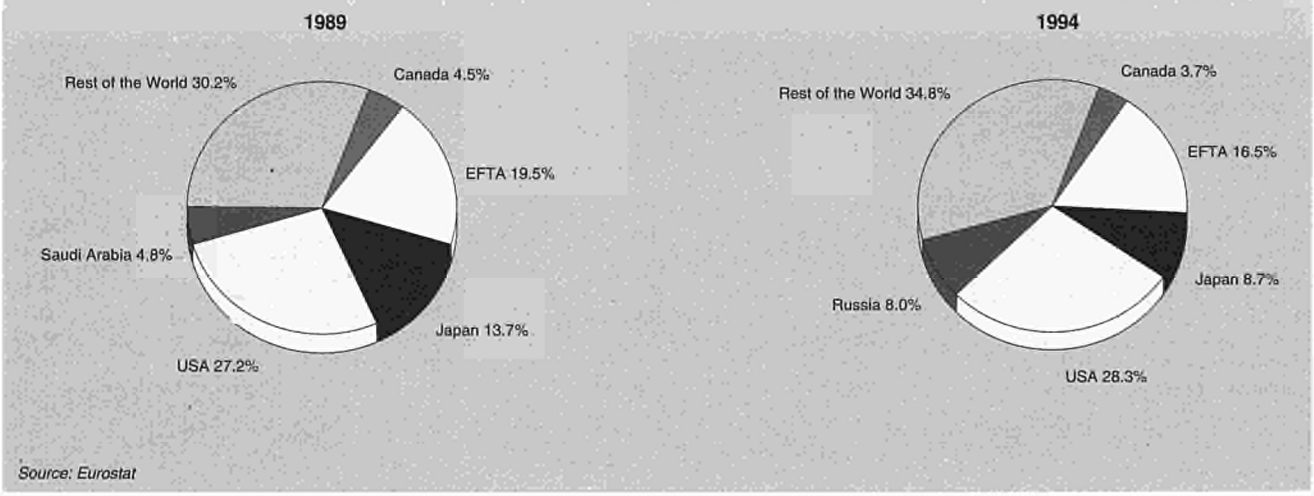
Pasta

Since the 1980s, the European pasta industry has been subject to an important concentration process. Food multinationals put into practice external growth strategies, which have led to the acquisition of small to medium sized pasta enterprises, mainly Italian. Thus the pasta brands, typically Italian, on the one hand, it can found under the force of globalisation of consumption, and on the other hand, the marketing force of the multinationals, can now find a place on the shelves of modern distribution channels all over Europe.

In a mature sector like that of pasta, product innovation in all its manifestations (shapes, pasta ready-meals, fresh and stuffed pasta, ingredients) plays a role of prime importance in stimulating consumption, especially of premium products. At the same time, especially for dry pasta, the importance of cost control pushes towards the rationalisation of production.

In this sector, vertical integration strategies with the milling industry are frequent. The incentive for this is the need to directly control the type of flour mixture to be used as raw material, whose composition strongly affects the product final

Figure 6: Pasta
Destination of EU exports



Source: Eurostat

Table 13: Tea
Extra-EU Imports

(tonnes)	1986	1987	1988	1989	1990	1991	1992	1993	199
EUR15 (1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	224677	211946
EUR12	224 974	195 250	215 779	216 346	198 371	205 823	205 298	222 521	209 472
Belgique/België, Luxembourg	1 498	1 214	1 316	1 587	1 486	1 984	1 617	1 200	1 200
Danmark	2 432	2 155	2 001	2 109	2 024	2 026	1 939	2 000	1 981
Deutschland	14 551	14 699	14 757	14 021	14 650	16 136	18 195	18 100	19 546
Ellada	398	370	363	407	303	690	626	550	600
España	719	768	747	770	747	721	514	650	700
France	10 036	9 148	10 155	10 090	11 056	11 852	11 750	13 336	12 204
Ireland	11 295	10 885	10 376	10 607	11 512	10 895	11 423	12 000	11 362
Italia	3 295	3 489	3 485	4 093	4 363	4 683	5 052	5 224	5 000
Nederland	9 429	9 725	9 598	9 551	10 125	10 464	9 290	8 900	8 232
Österreich	1 192	1 166	1 172	1 040	1 333	1 146	1 556	1 145	1 462
Portugal	255	218	282	250	211	291	250	250	260
Suomi/Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 011	1 012
United Kingdom	171 066	142 579	162 699	162 861	141 894	146 081	144 642	160 311	148 387

(1) Excluding Sweden.
Source: International Tea Committee

quality, and defines the qualitative standard of the pasta. Furthermore, other advantages of the upstream integration can be obtained, such as increased storage possibilities, better protection against raw material price fluctuations, etc.

Other products

The baby-food producers invest considerably in product and packaging innovation. In this context, manufacturers are substituting tins for recyclable glass jars in tamper-proof packs, more appreciated by the consumer, also for greater recognition of hygiene and sterilisation. Furthermore, as a response to the decrease in birth rates, they are also trying to broaden their target, extending the age range for baby food with follow-on products and post-weaning variations.

Concerning tea, the widening of the range through the introduction of instant, deteinated and new flavoured products are some of the most common strategies to stimulate consumption in this mature sector.

REGULATIONS

In the field of coffee and chicory extracts, EU legislation is based on Council Directive 77/436, subsequently amended by Directives 85/7 and 85/573. The Directives lay down rules on the compositional characteristics of extracts of coffee and chicory, substances liable to be used in their manufacture, and their packaging and labelling. Trade in these products is allowed only if such products conform to the definitions and the rules laid down in the Directives.

Horizontal Directives 94/35, 94/36 and 95/2 on the use of colourings, sweetenings and additives in foodstuff will affect particularly producers in the sauce sector: by stimulating the harmonisation of national legislation's these directives will remove barriers to trade within the internal market resulting from different national rules.

As to pasta, ready to serve soups, prepared desserts and diet products, the ongoing harmonisation process of packaging and labelling norms play a central role in promoting a fair competition among producers as well as in guaranteeing a better consumers information.

Directive 89/398 provides various elements of definition for diet products and lays down measures aimed at protecting consumers against fraud. Specific norms on infant formulae and follow-up milks have been introduced by Directive 91/321, which has been partly modified at the end of 1994.

Table 14: Instant coffee

Consumption by Member State (tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR12 (1)	97 141	96 326	97 006	98 024	96 383	98 466	98 395	99 739	99 119	N/A
Belgique/België, Luxembourg	1 257	1 318	1 296	1 344	1 390	1 460	1 490	1 670	1 600	N/A
Danmark	300	408	360	380	506	479	660	500	380	N/A
Deutschland (1)	12 500	12 000	11 900	11 500	11 700	12 500	13 000	13 200	13 400	13450
Ellada	3 357	3 470	3 180	3 180	4 559	5 153	5 249	5 715	6 000	N/A
España	8 500	8 700	8 900	9 430	9 400	9 600	9 690	9 580	9 300	N/A
France	16 400	16 200	16 300	17 000	16 500	17 400	17 200	18 500	17 235	N/A
Ireland	2 287	2 350	1 760	1 760	1 957	2 115	1 711	1 330	1 330	N/A
Italia	1 300	1 490	1 490	1 500	1 631	1 759	1 812	1 445	1 555	N/A
Nederland	1 440	1 590	1 530	1 530	1 510	1 450	1 353	1 324	1 419	N/A
Portugal	800	800	1 390	1 400	1 400	1 400	1 730	1 905	1 300	N/A
United Kingdom	49 000	48 000	48 900	49 000	45 830	45 150	44 500	44 570	45 600	46300

(1) Including former East Germany from 1990 onwards.
Source: AFCASOLE

OUTLOOK

Pasta

Despite the general maturity of the sector, in some segments at high added value (fresh and stuffed pasta, ready-meals, new ingredients, etc.) there are still market niches experiencing fast growth. In the classical dry pasta segment, price competition from own-label products will boost the rationalisation process in the industry. As a result, industrial concentration will deepen and manufacturers will support national brands through continued heavy advertising and promotional expenditure.

Other products

Baby food consumption will remain overall stable in Europe over the next few years. The efforts of the producers will tend to develop further added-value/premium lines which offer the best chances of growth for the sector.

Concerning dietetic products, given the growing interest in health topics, the increase in the demand in many key sectors will continue.

The demand for coffee, almost stagnant on European level, presents some growth prospects for the espresso segment.

Product innovation through the supply of flavoured products, may guarantee some growth possibilities for the tea sector, despite the general maturity of the market.

Written by: NOMISMA

The industry is represented at the EU level by: European Federation of Coffee Roasters Associations (EUCA). Address: Boulevard Baudouin 21, 7th Floor, B-1210 Brussels; tel: (32 2) 223 0141; fax: (32 2) 223 1244; Association of Soluble Coffee Manufacturers of the EEC (AFCASOLE), and European Tea Committee (CEdT/ETC). Address: 51-53 rue Fondary, F-75015 Paris; tel: (33 1) 45 79 80 75; fax: (33 1) 45 79 61 29; Standing International Vinegar Committee (CPIV), and Federation of Soup Industry Associations of the EEC (FAIBP). Address: Reuterstrasse 151, D-5300 Bonn; tel: (49 228) 21 20 17; fax: (49 228) 22 94 60.

Alcohol and spirits
NACE (Revision 1) 15.91, 15.92

The EU spirit market is characterised by a slow but steady decrease in consumption as a consequence of a trend towards a healthier life-style, fuelled by campaigns aimed at discouraging alcohol abuse, and by increasing taxes on consumption. As a consequence, the major actors in the industry are devoting increasing resources to developing markets (i.e. Asia, Eastern Europe) in order to compensate for the stability of more mature Western markets, which remain nonetheless the most important outlet for the industry.
On the other hand, the alcohol market is characterised by the presence of a derived demand due to the fact that the product is used as raw material in the spirit, cosmetic and pharmaceutical industries. In this respect, it can be considered a commodity.

INDUSTRY PROFILE

Description of the sector

The alcohol and spirits sector embraces three main categories of products.

First come distilled spirits for human consumption. They comprise all distilled products with an alcoholic strength of less than 96° (80° on average). These products retain part of the organoleptic characteristics of the raw material used for fermentation. This category includes whisky and corn schnapps (distilled from grain), brandy (distilled from wine), grappa (distilled from grape residues), rum (distilled from sugar cane) and eau-de-vie (distilled from fruit mash).

The second main product are neutral alcohol for human consumption and industrial uses. This category includes products distilled at more than 96° that have lost the organoleptic characteristics of the raw material used. Neutral alcohol-based products include apéritifs, bitters, sweet liqueurs and various other preparations (gin, etc.). Neutral alcohol is also used by the cosmetic and pharmaceutical industries.

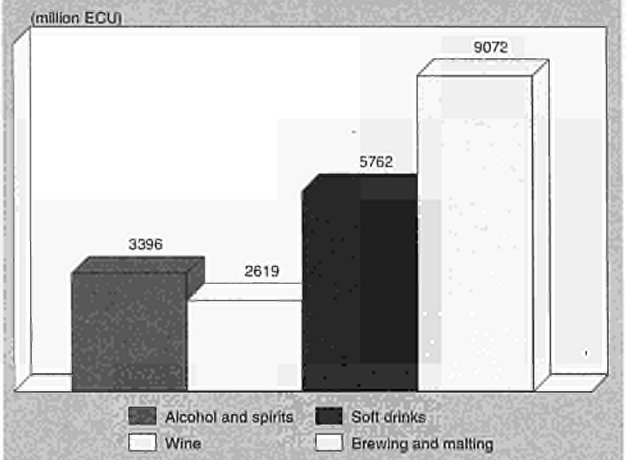
Finally, the third category is "general" ethyl alcohol for industrial use. This is a residual category which accounts for the other uses of alcohol and for which the law does not require any specific chemical and organoleptic characteristics.

The alcohol and spirits industry is a vast sector having considerable economic weight within the EU, particularly considering its role in generating tax revenue. The largest EU alcohol and spirits producer is the United Kingdom, followed by France, Germany and Italy.

In production volume terms, the most important distilled spirits for direct consumption are produced from grain and wine. Outstanding in this group is whisky, mainly produced in the United Kingdom, which accounts for about 50% of the EU spirit production. France is the second largest producer with distilled spirits obtained from wine (cognac and others). Germany produces, in particular, alcohol from potatoes and corn schnapps from cereal grain and rye. It also imports large quantities of wine distillates and neutral alcohol which are transformed into spirits; the country is also the largest consumer of the above mentioned products. Italy mainly produces several varieties of eau-de-vie from wine including brandy and grappa.

Similarly, the other Member States, produce well-known spirits from grain and potatoes, e.g. whiskey in Ireland and aquavit in Denmark. In general, the production of drinks with a high alcoholic level is widespread throughout the EU. Among others, we can mention anisette, bitters, apéritifs and liqueurs

Figure 1: Alcohol and spirits
Value added in comparison with related industries, 1994



Source: DEBA GEIE

in Italy and France, jenever in the Netherlands, gin in the United Kingdom and ouzo in Greece.

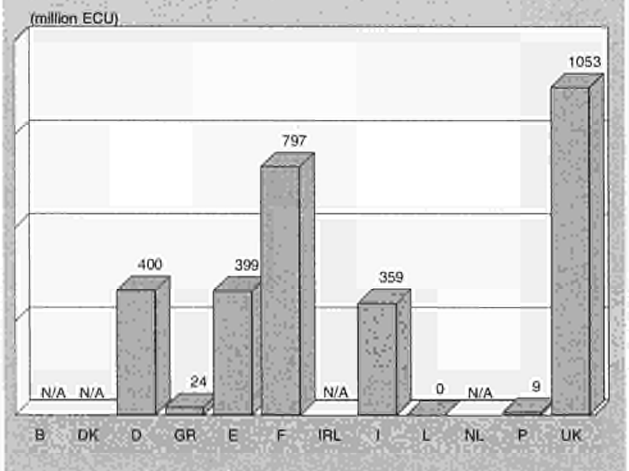
Apparent consumption of alcohol and spirits has reached 9 898 million ECU in 1995 (according to DEBA and Eurostat estimates) and showed a variable trend until 1989, with alternating periods and slight growth to decreases. A declining trend became evident after 1991, flattening in 1994-95.

Alcohol and spirits production reached 13 365 million ECU in 1995. Annual variations were very volatile in the decade 1985-95, with annual decreases in the period 1991-95 (except a 0.6% increase in 1993-94).

The EU alcohol and spirit industry employed 41 700 units in 1995. Employment fell, on average, by 3.3% on a yearly basis throughout the decade The reduction in employment that has affected the industry does not show a clear time trend.

The alcohol and spirits industry is, in general, a low value added one. Within the EU, the United Kingdom, France, Germany and Italy reveal the highest added value production. The ranking reflects the weight of these countries within the

Figure 2: Alcohol and spirits
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Alcohol and spirits
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	8964	9048	10039	11087	10658	10168	9936	9773	10906	10970	11060	11180
Production	11259	11749	12939	14074	13874	13694	13771	13365	14544	14820	15110	15460
Extra-EU exports	2478	2956	3226	3327	3579	3929	4230	3981	4039	4270	4530	4800
Trade balance	2295	2700	2900	2987	3216	3526	3835	3592	3638	3850	4050	4280
Employment (thousands)	58.6	48.2	47.7	46.6	46.0	44.9	43.3	41.7	45.3	40.0	40.0	40.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Alcohol and spirits
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	-0.48	-2.24	-1.27	-0.34
Production	0.27	-1.24	-0.40	0.14
Extra-EU exports	3.59	1.72	2.75	0.91
Extra-EU imports	7.98	-1.08	3.85	-5.28

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Alcohol and spirits
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1995(2)
Extra-EU exports	2478	2160	2235	2505	2956	3226	3327	3579	3929	4230	3981	4039
Extra-EU imports	182.5	176.3	198.5	195.8	256.2	326.2	340.0	362.7	402.3	395.7	388.7	400.9
Trade balance	2295	1984	2036	2310	2700	2900	2987	3216	3526	3835	3592	3638
Ratio exports / imports	13.6	12.3	11.3	12.8	11.5	9.9	9.8	9.9	9.8	10.7	10.2	10.1
Terms of trade index	111.6	106.8	105.0	99.1	95.8	100.0	101.7	106.5	94.1	96.7	N/A	N/A

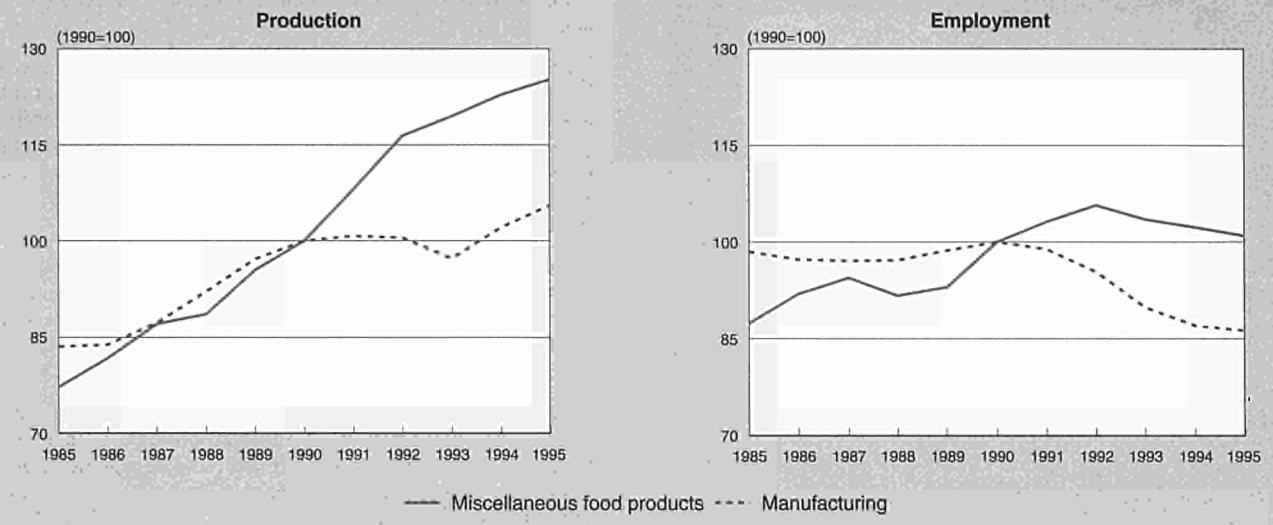
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Alcohol and spirits
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	80.3	83.4	89.0	92.2	93.6	100.0	104.7	100.5	100.8	104.7
Unit labour costs index (3)	92.8	93.8	91.9	94.8	101.5	100.0	104.3	113.0	113.5	112.1
Total unit costs index (4)	81.1	77.0	79.1	85.3	96.2	100.0	110.1	112.5	112.6	114.4
Gross operating rate (%) (5)	17.5	16.9	17.3	17.1	15.6	16.2	14.1	15.4	12.9	13.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Alcohol and spirits
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

European alcohol and spirits industry. It is interesting to note that Spain (ranking fifth in terms of production) shows approximately the same added value as Germany, which produces larger alcohol and spirits volumes. This reflects the concentration on lower added value products in the German industry.

Recent trends

The alcohol and spirit sector is beset by considerable problems resulting from:

- falling consumption throughout Western Europe;
- competition from low-alcohol flavoured soft drinks which are increasingly preferred by health-conscious consumers;
- slower demand growth from extra-EU countries, notably the USA; and,
- the reduction in export refunds resulting from the latest GATT agreement.

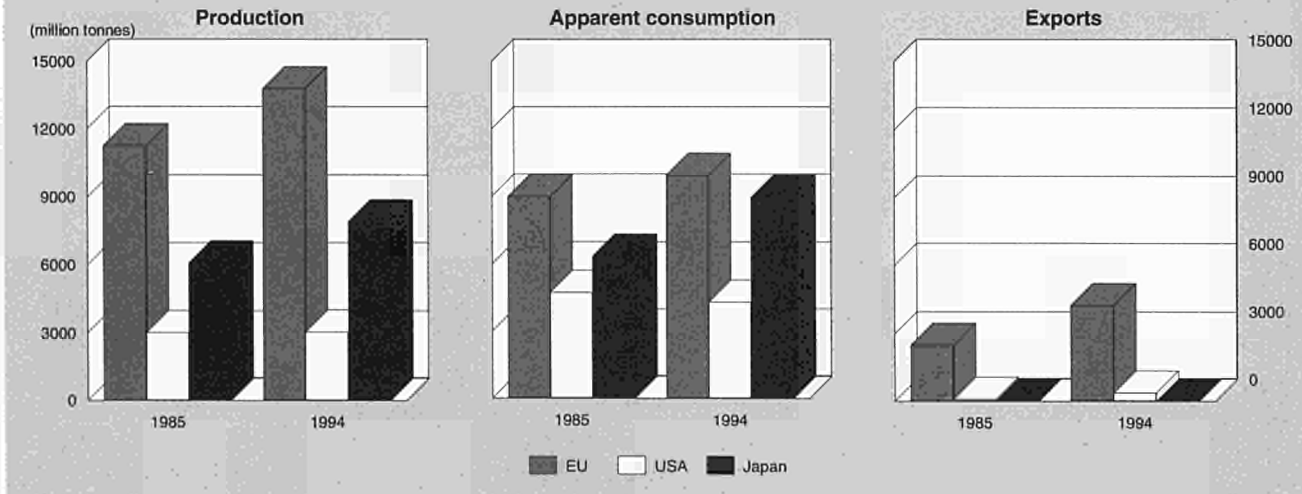
The market for alcohol of agricultural origin presents remarkable complexities related to the raw materials used. In fact, while all raw materials (e.g. corn) are each regulated by a common market organisation (CMO), the alcohol sector is not regulated by any CMO, with many differences from country to country, particularly as far as consumption taxes are concerned.

Apparent consumption in volume terms dropped, on average, by 1.3% per year during the period 1985-94. Such decline was more intense in the period 1990-94 (-2.2%), as compared to -0.6% during the 1985-90 period. The downward trend is slowing down, albeit remaining negative. Production in terms of volume shows a negligible average decrease during the years 1985-94 (-0.4%) and a slight increase in the period 1993-94.

International comparison

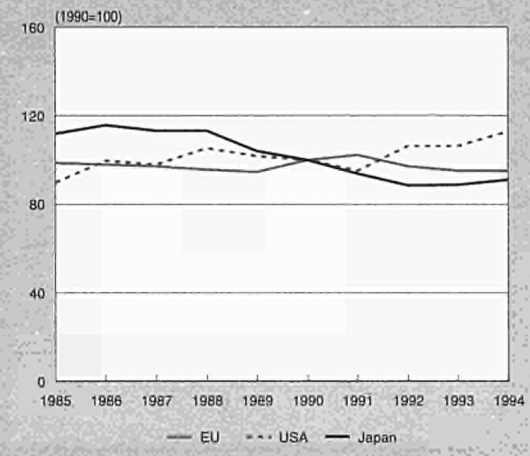
The EU is the world's largest producer, consumer and exporter of alcohol and spirits.

Figure 4: Alcohol and spirits
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Alcohol and spirits
International comparison of production in constant prices



Source: DEBA GEIE

US alcohol and spirits production has remained relatively static during the 1985-94 period. At the same time, anti-alcohol campaigns enforced by Federal authorities and social pressure against spirits have induced a drop in consumption rates.

Japan shows the highest growth in consumption rate compared to the US and EU and, in general, higher growth for all three indicators (production, consumption and exports) during the period considered.

The analysis of production in constant prices leads to a more accurate analysis of trends for the three areas. Constant price production and consumption indices disclose annual average decreases both for EU and Japan (-0.3% and -2.4% respectively).

Foreign trade

After steady growth in the 1987-90 period, extra-EU exports have shown slower increases in following years and a drop during 1994-95. Extra-EU imports grew remarkably in the period 1988-89 (18.1%), and by an average 4.1% rate thereafter. Decreasing exports yielded negative growth of the overall trade balance.

In 1994, Japan and USA were the main importers of EU alcohol and spirits, though their share of total EU exports decreased compared to 1989. The two countries purchase 32.8% of EU exports. The main destinations of EU exports basically remained unchanged in the period 1989-94, with the exception of Canada, which was recently replaced by Russia.

The main countries of origin of extra-EU imports are the USA, Trinidad and Tobago and the Bahamas, which account altogether for over 50% of EU imports. There has been no great variation compared to 1989, with the only exception of Martinica which has been replaced by Bahamas in 1994. Imports from the USA have strongly increased (19.8% of total imports in 1989 versus 29.2% in 1994).

In general, the origin of imports largely reflects national characteristics and specialities in the sector. Whisky is mostly sourced in the UK and to a lesser extent Ireland, Canada and the USA, vodka in Russia and Poland, brandies and liqueurs in Italy, Germany, Spain and Greece, eau-de-vie from France.

Overall, the EU remains a net exporter of alcohol and spirits even though consumption of imported products is increasing. Changes in both imports and exports indicate a great volatility in the figures that alternate consistent increases (i.e. the period 1988-89) to sudden drops.

Among alcoholic beverages, cognac and armagnac and whiskey enjoy particular success. Major destinations of Cognac and Armagnac exports are Hong Kong, Japan, the USA, Taiwan, and Singapore, with different regional preferences in the consumption of the two products. These countries account for 83% of total Cognac export value and 74% of Armagnac. The strong presence of Asian countries confirms the importance of such areas for the alcohol and spirit producers. On the other hand, the main export destinations for whiskey are the USA, Japan, South Korea, and Thailand. The USA and Japan alone account for 30% of total whiskey exports.

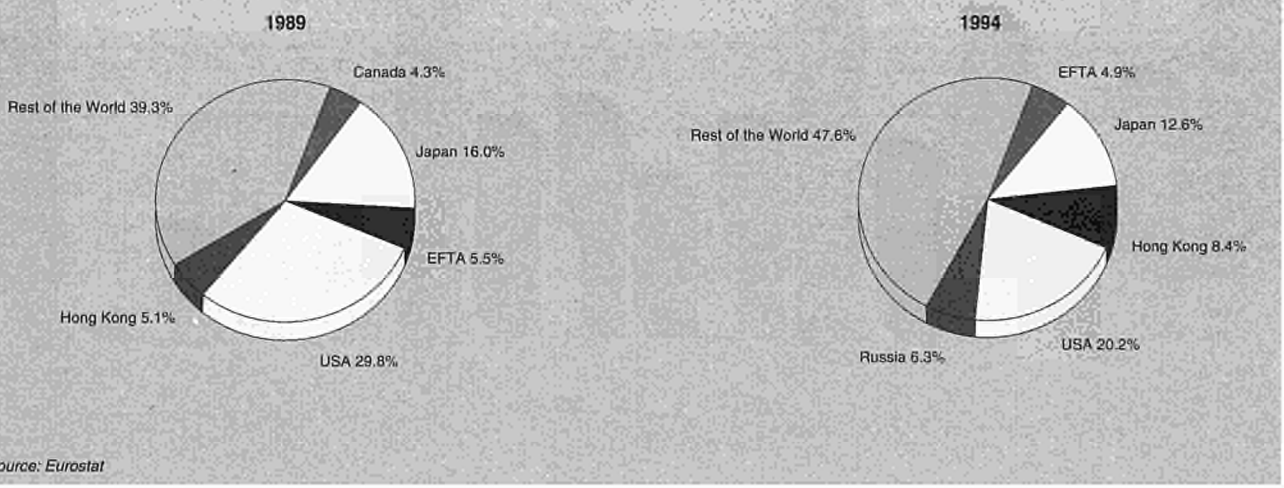
MARKET FORCES

Demand

Human consumption of alcohol is stagnating throughout Western Europe. The situation differs from country to country but the underlying trend is common.

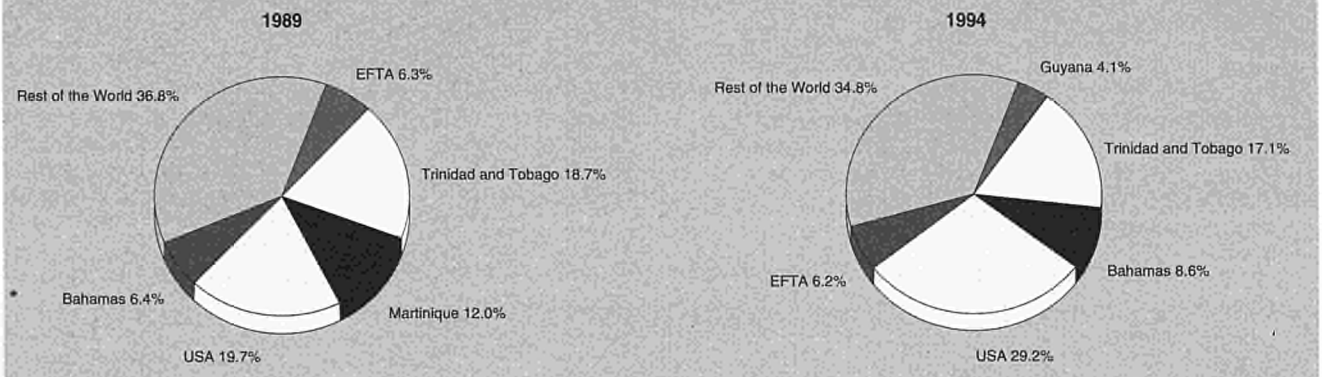
Per capita consumption of alcoholic drinks shows differences between EU countries with different consumer and cultural habits. Counties' consumption patterns also differ due to different tax rates which vary according to the presence of a

Figure 6: Alcohol and spirits
Destination of EU exports



Source: Eurostat

Figure 7: Alcohol and spirits
Origin of EU imports



Source: Eurostat

government policy to discourage alcohol abuse or encourage the preferential consumption of national alcoholic drinks.

Nevertheless, it would be too simplistic to indicate taxation as the main explanation for the fall in alcohol consumption. Recent changes in life-styles (i.e. fast-food, greater attention to healthier life-styles) are factors reducing the consumption of alcohol more than specific taxes. Furthermore, a growing number of consumers are tending to replace alcoholic drinks with healthier beverages such as fruit juices and mineral waters, the latter having experienced dramatic growth over the last few years.

Within the industry, ethyl alcohol is more of a commodity which implies that its demand is influenced by the needs of related industries, i.e. spirits, pharmaceuticals, cosmetics.

Given the nature of demand, company strategies concentrate on cost control and rationalisation of production.

Supply and competition

The alcohol and spirits market is experiencing fierce competition that is leading producers to take advantage of consumption trends in major world areas. This has also created a geographical differentiation of supply.

In volume terms the EU market is only expected to experience marginal growth. In value terms, a degree of stability is expected, with increasing competitive pressure among manufacturers keeping prices low on one side, and the effect of EU taxes that will inflating prices on the other.

In general, sales in horeca outlets (hotels, restaurants and cafés) are decreasing while retail sales are increasing in importance. The horeca sector suffered in particular from the adverse effects on alcohol consumption in restaurants and bars related to the introduction of more stringent drinking & driving laws throughout Europe. Furthermore, spirits have remained expensive in these outlets, while the development of lower-priced brands has increased sales in retail outlets.

Prices and margins in the spirits sector vary according to distribution channels. The retail market is dominated by hypermarkets and large supermarkets, where such retail outlets are predominant (i.e. Germany, the United Kingdom and France). Nonetheless, major differences exist in terms of distribution throughout Europe, related to the degree of retail concentration of EU countries.

The EU, as already mentioned, is the undisputed world leader in the production of spirit drinks followed by Japan and the US. For ethyl alcohol, large quantities of the product are manufactured in South and Central America. Brazil, in par-

Table 5: Alcohol and spirits
EU spirit drinks production in 1994.

(thousands of hectolitres of pure alcohol)	B/L	DK	D	GR	E	F	IRL	I	NL	A	P	FIN	S	UK
Whisky (1)	N/A	0	0	0	90.3	0	70.8	0	0	16.8	0	0	0	3622.5
Brandy (2)	N/A	0	505	68	308.6	809.1	0	362.1	0	30	0	0	0	0
Vodka and Gin (3)	N/A	51.7	634	0	107.6	0	0	0	288.4	5.6	0	128.5	247.65	541.1
Aniseed spirits (4)	N/A	0	0	218	62.4	608.1	0	0	0	0	0	0	0	0
Liqueurs and other spirits	N/A	24.7	484.8	10.5	233.9	330	105.9	485.6	130.4	31.8	13.05	19.7	3.6	0
All spirits	51	76	1624	297	803	1747	177	848	419	84	13	148	251	4164

(1) Including Whiskey and Rum
(2) Including Fruit Brandies, Armagnac, Calvados
(3) Including Aquavit and Korn
(4) Including Ouzo
Source: CEPS-UEAES

Table 6: Alcohol and spirits
Destination of EU exports of Whisky, Cognac and Armagnac, 1994

(million ECU)	Cognac		Armagnac		Whisky
Total	1236.6	Total	20.3	Total	1836.6
Hong Kong	305.0	Japan	7.7	USA	381.4
Japan	278.5	USA	2.3	Japan	190.8
USA	208.4	Taiwan	1.8	South Korea	93.4
Taiwan	113.4	Hong Kong	1.6	Thailand	89.9
Singapore	75.7	Switzerland	0.9	EFTA	72.6
EFTA	54.5	Singapore	0.6	Taiwan	72.2
Malaysia	39.5			Venezuela	66.4
South Korea	13.9			South Africa	60.1
Thailand	13.7			Aruba	56.2
Mexico	13.4			Paraguay	54.9
Canada	12.9			Australia	49.0
				Canada	41.3

Source: Eurostat

ticular, has developed a specific "alcohol fuel programme" which aims at incrementing this alternative use of alcohol. India is implementing the so-called "alco-chemical" programme.

US demand of EU alcohol and spirits is hampered by the country's customs duties that make European products disadvantageous. Furthermore, the US has specific trade agreement with the Caribbean area and Central America which allow preferential trade flows for the processing of alcohol used as fuel. The Caribbean area is also a major source of EU ethyl alcohol.

From 1990 on, unit labour costs have increased at a rate higher than total unit costs in the industry, with the exception of 1994. It is important to point out that the increase in labour costs has been relevant in absolute terms, showing increments which have been, on average, more relevant than those of other food and drink sectors.

The gross operating rate is declining and this is probably related to the increased labour costs of the sector.

Production process

Ethyl alcohol, derived from a number of different sources, is the raw material used to obtain distilled spirits. It can be produced either by a biological process (fermentation) or by chemical synthesis.

The first method involves the fermentation of carbohydrate-rich plant products. In the EU, four major product categories can be used: wine; molasses and beet; grains (in their original state and as starch); and fruit. These products are all subject to particular common market regimes.

Alcohol can also be obtained by chemical synthesis which involves catalytic hydration of ethylene. The raw material comes principally from the oil industry.

The level of technological development of plants does not depend upon their size, given the existence of very advanced small plants and larger-scale but less efficient ones.

INDUSTRY STRUCTURE

Companies

In general, EU countries are affected by an excess of distillation capacity that will cause further surpluses unless alternative uses of alcohol are more intensively developed and implemented.

From a general perspective, in the distillation industry larger scale operations always guarantee a higher economic efficiency, assuming equal technical and economic parameters in comparing small and larger plants. In the USA, this has caused the development of larger companies, which are the only ones that have successfully resisted the high competitive pressure of the market. In the EU, on the other hand, there is a trend towards decreasing the size of distilleries. This is essentially due to the need to control the environmental impact of operations (which is more difficult with larger scale operations) and to the close link of processing plants with local agriculture. In many cases, in fact, distilleries are well integrated in the economic structure of the areas where they are located.

Germany, for example, has a high number of small distilleries which use residues from distillation for the production of animal fodder. Since in most cases fruit is used as the raw material, distilleries strongly contribute to the protection of farmer livelihoods. Furthermore, in some cases, cottage-style distilleries produce traditional and high-quality spirits.

For the above mentioned reasons, even though the decrease in the number of distilleries would probably enhance the efficiency of the sector, many obstacles persist, related to the socio-economic impact that a restructuring process would involve. Smaller industrial units help keeping agricultural processing industries active in geographical areas where they would be otherwise neglected.

The largest companies in the sector are: Grand Metropolitan (UK), Allied Domecq (UK), Guinness (UK), Pernod Ricard (F), Remy Cointreau (F), Martini & Rossi (I).

Grand Metropolitan is a diversified food group and it operates its wine and spirits business through International Distillers & Vintners (IDV). IDV sells in more than 50 countries across four geographical regions: North America, Europe, Asia-Pacific and Africa & Latin America. The company has developed a portfolio of over 150 brands which include some of the most widely sold products within major spirits categories.

The Allied Domecq group operates in the spirits and wine, retailing, brewing, wholesaling and food manufacturing sectors. In the spirits and wine area, the company has developed international scale operations and closely controls the distribution of is products.

Guinness produces a wide range of spirit drinks and beer. The company's strategy is to focus resources on the development of the two core businesses. In recent years Guinness has pursued policies of productivity improvements and increasing marketing activities.

Pernod Ricard is a major player in the international markets for spirits, wine and non-alcoholic beverages. The group generates 54% of its sales outside France and it is represented

Table 7: Alcohol and spirits Acquisitions

1994 Bidder	Country	Target	Target country
Seagram	Canada	Larios	España
Danish Distillers	Danmark	Ninheset Norden	Danmark
Pernod-Ricard	France	Altai	Russia
Domaines Cordier (Cie de Suez)	France	Barton et Guestner bottling	France
Eckes	Deutschland	Stock	Italia
Averna	Italia	Pernigotti	Italia
Koninklijke Bols Wessanen	Nederland	Bols Benelux	Nederland
Koninklijke Bols Wessanen	Nederland	Davide Campari	Italia
Allied-Lyons	United Kingdom	Pedro Domecq	España
Guiness	United Kingdom	Whyte & Mackay Group	United Kingdom
Matthew & Clark PLC	United Kingdom	Gaymer Group Europe Ltd.	United Kingdom

1995 Bidder	Country	Target	Target country
W. Hammerle Destillerie-Friehof	Österreich	Seyringer Scholssbraende	Österreich
Seagram	Canada	Dole Food Company inc	USA
Orpar	France	Remy Cointreau	France
Underberg	Deutschland	Seyringer	Österreich
Underberg	Deutschland	May-Werke Spirits	Deutschland
Berentzen Gruppe	Deutschland	CW Tasche (HAMAG)	Deutschland
Louis Paez	España	Williams & Humbert	España
Allied Domecq	España	Even Lucas Bols	Argentina
Highland Distilleries Co PLC	United Kingdom	HRB Investment	United Kingdom
Grand Metropolitan	United Kingdom	Picon Amer (Remy Cointreau)	France
Matthew Clarck & Sons	United Kingdom	Hudson & Hill (Forte)	United Kingdom

Source: Nomisma

in about 150 countries in various forms, i.e. licensed agents agreements and subsidiaries.

Remy Cointreau has the absolute leadership in the high quality cognac market (its share is over 90%). It sells approximately 20 million bottles per year and 97% of sales concern foreign markets.

Martini and Rossi's strategies aim at counter-balancing the reduction in volumes sales in EU markets by careful price policies. At the same time the group is intensifying its efforts in product innovation and improvement of the existing product line.

From the available data, the United Kingdom has the strongest industry specialisation, though this is decreasing over time. Spain and Italy follow as highly specialised national industries.

Strategies

As a reaction to the constantly declining consumption of alcohol and spirits in the EU, companies are improving the range of products offered (mostly through acquisitions of other firms specialised in niche markets), covering the whole price range and developing an appealing image for their products. In this way, most consumer types and related drinking habits can be addressed.

Manufacturers are launching aggressive marketing campaigns (where these are permitted) which usually play on the quality and prestige of a particular brand to justify, in some cases, its higher price.

Because of the increasingly competitive nature of markets, companies have to individualise and convey a clear competitive advantage for their product range.

In consolidated markets, other non-promotional strategies are concentrating on the rationalisation of distribution and on the analysis of company structure and organisation, to improve the profitability of the resources used.

Furthermore, among major producers in the industry, those with well-established operations in Latin America and Asia-Pacific are finding that growth from these fast-developing markets is providing some compensation for the still dull performance of the more mature markets of North America and Western Europe.

One of the major problems in emerging markets is parallel trading, which is very difficult to control. One possible solution is to introduce different brands in different markets, which could reduce the source of parallel imports.

In other cases, companies have approached such markets by developing good relationships with duty free shoppers. This provides the opportunity for low cost marketing tests in exchange for exclusivity of product distribution for a limited period of time.

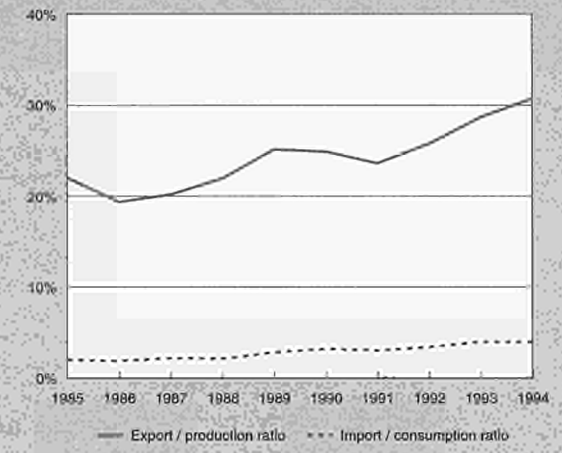
Mature markets remain, nonetheless a considerable source of sales volume. This explains the amount of resources that major companies devote to projects and advertising campaigns in traditional markets. To increase consumption, for example, several companies have been involved in promotional campaigns in bars and discos where drinks are offered at lower prices. These activities have often been successful also considering that drink varieties targeted at younger consumers are the fastest growing ones.

Mergers and acquisitions in the sector show that companies have mostly devoted their resources to national targets to strengthen their position on domestic markets (i.e. to provide a complete product portfolio and cover most market segments).

There have been 22 mergers and acquisitions during 1994-95. During this period, the highest number of acquisitions were seen in the United Kingdom (6) Germany (4) and France (3).

International acquisitions had as main target countries Italy, Austria, France, Spain, Argentina and Russia. The last three

Figure 8: Alcohol and spirits
Trade intensities



Source: DEBA GEIE, Eurostat

Table 8: Alcohol and spirits
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	N/A	N/A
Deutschland	0.62	0.66
Ellada	0.84	0.99
España	1.09	1.16
France	1.08	1.39
Ireland	N/A	N/A
Italia	0.89	0.90
Luxembourg	0.00	0.00
Nederland	N/A	N/A
Portugal	0.31	0.25
United Kingdom	1.73	1.39

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

countries confirm the interest of companies towards faster growing markets.

ENVIRONMENT

In recent years, distilleries have been increasingly controlling the environmental impact of their operations in order to reduce effluent cleaning costs. Such activities are mandatory at the EU level.

One major problem relates to the inconsistency that environmental standards are applied variably in individual Member States, even if, in theory, these have been harmonised at EU level.

In general, besides effluent purification activities, attention is also on vehicle traffic to and from processing plants for the supply of raw materials. In some cases, distilleries are located in populous regions of Europe that already suffer from increasing traffic congestion and pollution problems.

REGULATIONS

The alcohol sector is characterised by the absence of an uniform regulatory framework. Alcohol can be produced from wine, cereals and molasses, and fruit.

Regulation for cereals has very important effects on the alcohol market. Measures like the set-aside mechanism as well as refunds for the export of grain alcohol can be regarded as income support mechanisms.

Alcohol distillation plays a key role in the wine sector, in order to guarantee a minimum price to producers. Distillation has perhaps been misused in the past, allowing the conversion of wine surpluses into alcohol surpluses. The reform of the CMO in the wine sector may produce opposite effects, leading to a shortage of alcohol for wine-alcohol based products.

Even if the CMO for sugar does not make direct reference to alcohol, its influence on the alcohol market is important: in fact molasses are the raw material most often used in its production.

Neutral alcohol of agricultural origin and neutral alcohol of vinous origin are defined in Reg. (EEC) 1576/89 and Reg. (EEC) 822/87. Problems with respect to consumer protection and subsidising policies are determined by the absence of precise definitions concerning qualitative differences between alcohol of various origins.

In the absence of a uniform market organisation, the EU alcohol market is greatly affected by disturbances arising from the activity of national intervention agencies in agricultural markets. As a consequence of the lack of a common market regime, market measures aimed at guaranteeing fair competition and at preventing market distortions, such as those specified in Articles 92 and 93 of the European Union Treaty on the free movements of goods, can not be really effective.

Large differences between EU countries still exist in the field of taxation. This situation is highly detrimental to normal trading practices.

As far as international trade is concerned, relevant consequences will be probably determined on this market by the Uruguay Round Agreement which provide for an annual 6% reduction in duties on EU imports for the next six years. The resulting level of protection will drop considerably, especially with respect to denatured alcohol: a remarkable increase in imports is expected in the next future.

OUTLOOK

The decreasing demand of alcohol and spirits for human consumption will continue in the future. Intra-EU demand will present negligible growth rates which will not be sufficient to absorb the production of the sector. Exports can and probably will compensate for the decreasing internal consumption, inducing major producers to concentrate their future strategies on faster growing extra-EU markets.

As in most food and drink sectors, employment is likely to continue its declining trend as a consequence of the restructuring of the sector.

Finally, future developments in the production of alcohol (as a commodity) could be affected by future modifications in the EU energy policy regarding the use of ethanol in the fuel sector. The EU industry has already developed the technical know-how to be able to dehydrate alcohol for energy purposes.

Written by: NOMISMA

The industry is represented at the EU level by: Confédération Européenne des Producteurs de Spiritueux (CEPS). Address: Avenue de Tervuren 192, Bte 3, B-1150 Brussels; tel: (32 2) 779 2423; fax: (32 2) 772 9820; and Union Européenne des Producteurs d'Alcool (UEPA). Address: Avenue de Tervuren 192, Bte 3, B-1150 Brussels; tel: (32 2) 772 9830; fax: (32 2) 772 9824.

Wine
NACE (Revision 1) 15.93, 15.94

The European wine market is going through a phase of advanced maturity conditioned by unfavourable changes in nutritional habits and consumer purchase patterns. This phenomenon has effected the EU wine industry, which is the world's leading producer with 58% of the global wine output. The lack of alternative market outlets and increased competition from new foreign producers have heightened competitive tension, pushing enterprises to pursue growth strategies, rationalisation of production and greater commercial and marketing efforts. The market segments enjoying strongest growth are, at present, quality wines and low alcohol wines.

INDUSTRY PROFILE

Description of the sector

The sector includes the production and bottling of wine and other beverages obtained from the fermentation of fruit.

The EU production amounted to 10.5 billion ECU in 1994 yielding an added value of 2.6 billion ECU and approximately 50 000 employees.

The sector enjoys a net trading surplus with third countries, although it exports a limited part of domestic production to these markets, equal to less than 900 million ECU.

By far the main producing and consuming countries are Italy, France and Spain. The added value ranking , however, shows different positions: the different cost structures and the higher qualitative standards allow Spain and Germany to reach a relatively higher added value with respect to the quantities produced.

Recent trends

The EU wine market has shown substantial stability in domestic production and consumption over recent years. In particular, during the last decade production has increased at an average annual rate at constant prices of just over 1%. This trend worsened at the beginning of the 1990s coming close to a growth rate of zero.

Consumption patterns are slightly steeper than those of production. In fact, although the domestic market increased during the second half of the 1980s by an average rate of more than 3%, a progressive inversion of the trend took place at the beginning of the present decade and turned into negative growth in recent years.

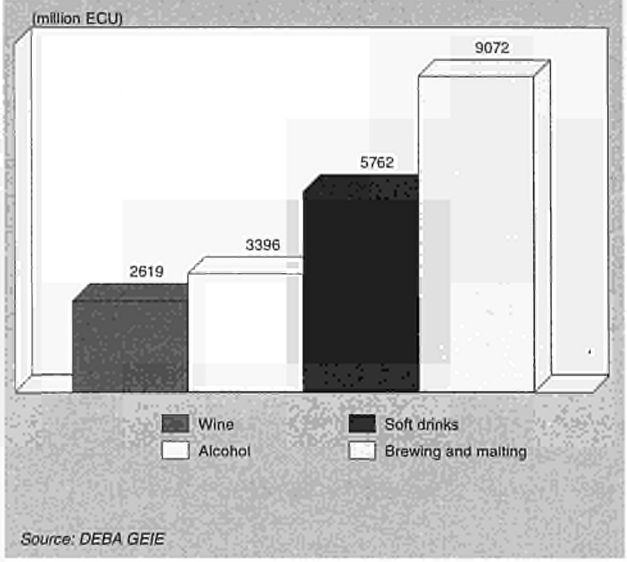
On the other hand, the evolution of consumer preferences has resulted in a sharp average increase in demand for quality wines, making up in terms of value the consistent decrease in quantity.

External trade has been characterised by volatility. Extra-EU exports, which in the 1980s decreased at an annual rate of 10%, have inverted the trend in recent years with an average growth rate of 5% and even an increase of more than 18% in 1994.

Extra-EU imports, although very small in terms of quantity, have maintained a constantly upward trend of over 10% in the past five years.

The number of employees in the sector has reduced, partially due to statistical reasons (i.e. most wine growers are considered as farmers).Notwithstanding this, , employment in the sector has had a constantly downward trend in recent years, with a loss of around 13% from 1990 to 1994.

Figure 1: Wine
Value added in comparison with related industries, 1994



Source: DEBA GEIE

International comparison

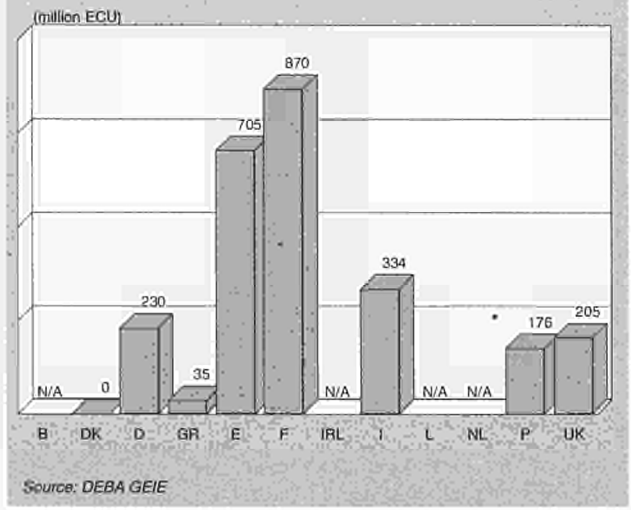
World wine production in 1994 reached about 252 million hectolitres, a decrease of 6% compared to 1993.

This decrease can be mainly attributed to a fall of 14% in production in the EU (mainly due to continued grubbing up of vineyards) which remains by far the leading world producer with 58% of the total world wine output

In other European countries, wine production in Eastern Europe amounted to more than 11 million hectolitres in 1994, a decrease of about 10% from 1993. The main producers in the region are, in order of importance, Romania, Hungary and Bulgaria. Hungary's wine production, in particular, has taken advantage of the positive boost given by the agricultural liberalisation program as well as favourable growing conditions. These countries have enjoyed good performance on foreign markets, showing an increase in exports of about 40%.

The countries of the former Soviet Union (with 12.6 million hectolitres of production), despite a slight recovery, still feel

Figure 2: Wine
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Wine
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	7 111	8 103	9 549	10 164	9 888	9 404	9 662	10 168	11 032	11 510	12 030	12 610
Production	7 515	8 857	10 256	10 821	10 517	10 167	10 537	11 000	11 826	12 360	12 930	13 570
Extra-EU exports	800.5	781.4	743.1	701.8	684.3	827.1	939.6	899.3	859.9	900.0	940.0	980.0
Trade balance	404.3	753.8	707.1	657.7	629.2	762.8	875.3	832.0	794.5	850.0	900.0	960.0
Employment (thousands)	54.6	49.1	54.2	55.6	51.9	50.6	49.9	48.1	51.3	50.0	50.0	50.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimetes.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Wine
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	2.10	0.20	1.25	-0.95
Production	1.69	0.52	1.17	0.46
Extra-EU exports	-10.75	4.96	-4.08	18.51
Extra-EU imports	-40.64	11.92	-21.31	0.21

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Wine
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	800.5	723.9	716.7	708.6	781.4	743.1	701.8	684.3	827.1	939.6	899.3	859.9
Extra-EU imports	396.2	20.9	21.6	24.7	27.6	36.0	44.1	55.1	64.3	64.3	67.4	65.4
Trade balance	404.3	703.0	695.1	684.0	753.8	707.1	657.7	629.2	762.8	875.3	832.0	794.5
Ratio exports / imports	2.0	34.6	33.2	28.7	28.3	20.7	15.9	12.4	12.9	14.6	13.4	13.2
Terms of trade index	75.1	73.3	67.2	95.8	98.5	100.0	99.3	99.8	95.2	91.4	N/A	N/A

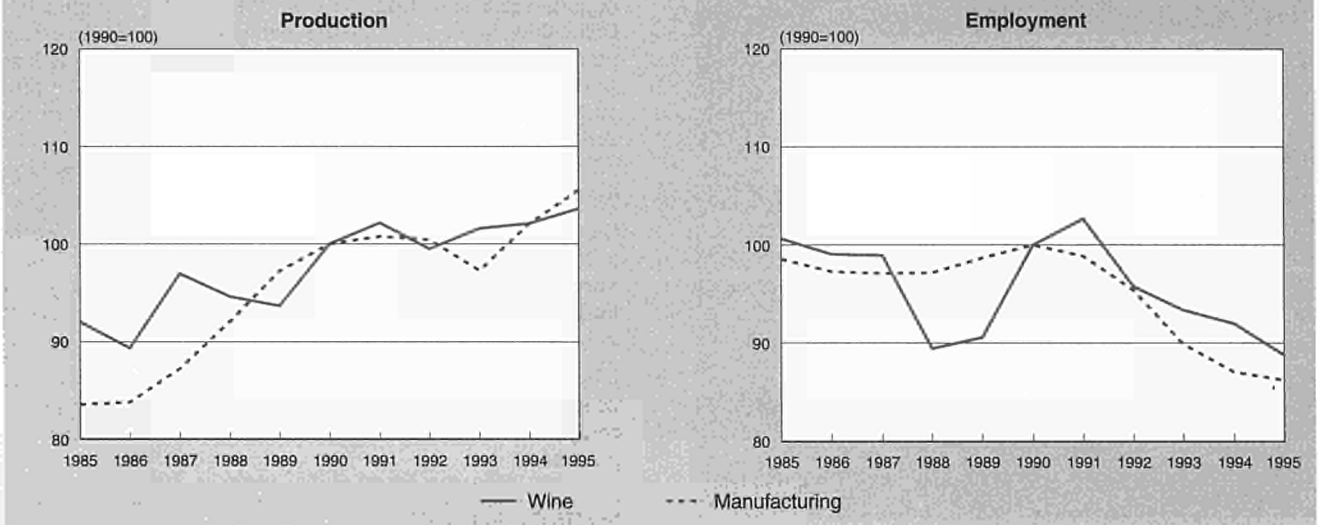
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Wine
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	91.3	90.2	98.0	105.8	103.5	100.0	99.6	103.9	108.9	111.0
Unit labour costs index (3)	89.9	92.3	88.8	86.8	96.7	100.0	103.8	108.4	103.9	102.6
Total unit costs index (4)	79.9	80.0	79.1	78.8	92.4	100.0	101.4	100.2	95.0	96.7
Gross operating rate (%) (5)	16.7	16.4	16.6	16.2	13.1	13.3	13.0	11.7	11.8	12.3

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Wine
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

the strain of a heavy reduction in total grape-growing area which took place in the 1980s, following an anti-alcohol campaign.

The United States, with 7% of world production and a growth of 9% in 1994, is in second place in the world ranking of producers. The US domestic market, the main export market for the EU countries, confirms the now consolidated trend of reduction in wine consumption, but records greater vivacity of table wine at low prices distributed in large quantities.

Among the Latin American countries, Argentina is by far the largest producer with an exceptional production of over 22 million hectolitres in 1994. Chile, although with decidedly lower production levels (3.2 million hectolitres) is successfully continuing conversion of its production towards quality wines for export to the western and Japanese markets. Also Brazil recorded growing exports.

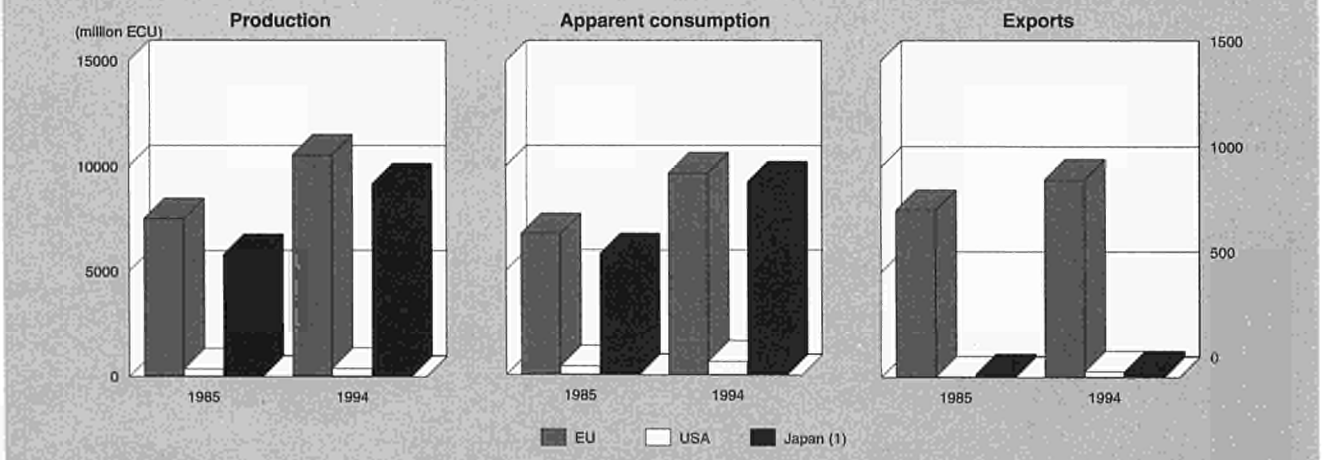
North African countries, although producing relatively small quantities, are progressively increasing their production and could soon become an important supplier to the European market. South Africa shows considerable growth, with production approaching 9 million hectolitres.

Finally, Australia has seen a considerable increase both in area cultivated and in wine production (5.3 million hectolitres) confirming its position as significant competitor on the Northern European and American markets.

Foreign trade

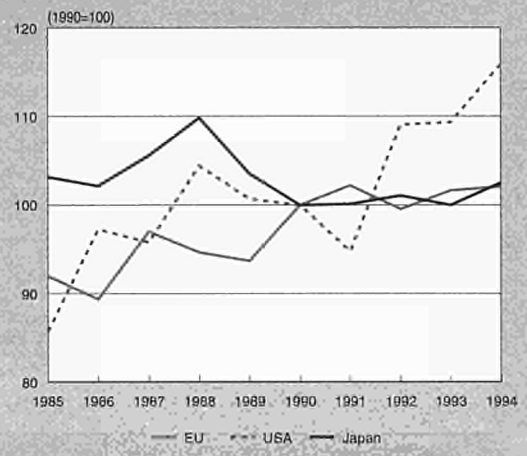
In 1994, the European Union exported around 940 million ECU of wine products for a total of. The main end market of wine produced in the EU remains that of the United States, accounting for around a third of total exports. Exports to the US have, however, drastically decreased in the last five years: in 1989, the USA accounted for about half of the EU total wine exports. The US market is going through a period of extreme difficulty. From the mid-eighties a change in consumer preferences (linked to health considerations) caused a drop of about 20% in wine consumption.

Figure 4: Wine
International comparison of main indicators in current prices



(1) Including rice wine.
Source: DEBA GEIE, Eurostat

Figure 5: Wine
International comparison of production in constant prices



Source: DEBA GEIE

The main countries supplying wine to the United States remain France and Italy, with 390 and 239 million ECU, respectively. Spain lost its third place in 1994 to the new competitors in the market: Australia (36 million ECU), and Chile (29 million ECU).

While the United States remains historically the main export market for the European wine sector, Russia is the market with the best future prospects. This market already takes almost 15% of total EU exports, with a marked preference for high quality sparkling white wines. This success may be attributed to the emergence of a rich class which is culturally bound to Europe.

Switzerland remains in third position among main export markets for EU wine, although its share of total exports fell from 13% in 1989 to slightly over 10% in 1994.

Extra-EU imports of wine show an upward trend, almost tripling during the last decade, although in value terms, they represent about 7% of EU total production value (or 63 million ECU).

Increasing imports is above all a consequence of the emergence of more supply markets. The ranking of the top five countries supplying the EU has radically changed in the past five years, with the appearance of new suppliers and the disappearance or redimensioning of others. The USA, for example, stands out as main supplier of the EU with a share of total extra-EU imports increasing from 15% in 1989 to the current 24%. Difficulties in the US domestic market have forced American producers (mainly based in California) to seek new markets abroad, increasing exports from 3% to 8% of domestic production. These imports are for a large part directed to the British market, but development prospects do exist for the North-European markets: Benelux, Denmark, Sweden, Germany.

Other important wine supplier countries for the EU are in order of importance Cyprus, Ukraine, Australia and Japan. The appearance of the Ukraine in the ranking confirms that Eastern Europe represents an important supply market as well as a final outlet.

It is interesting to note the good performance of Australia, which despite a geographical distance is becoming a dangerous competitor for EU producers, above all in the North-European markets.

MARKET FORCES

Demand

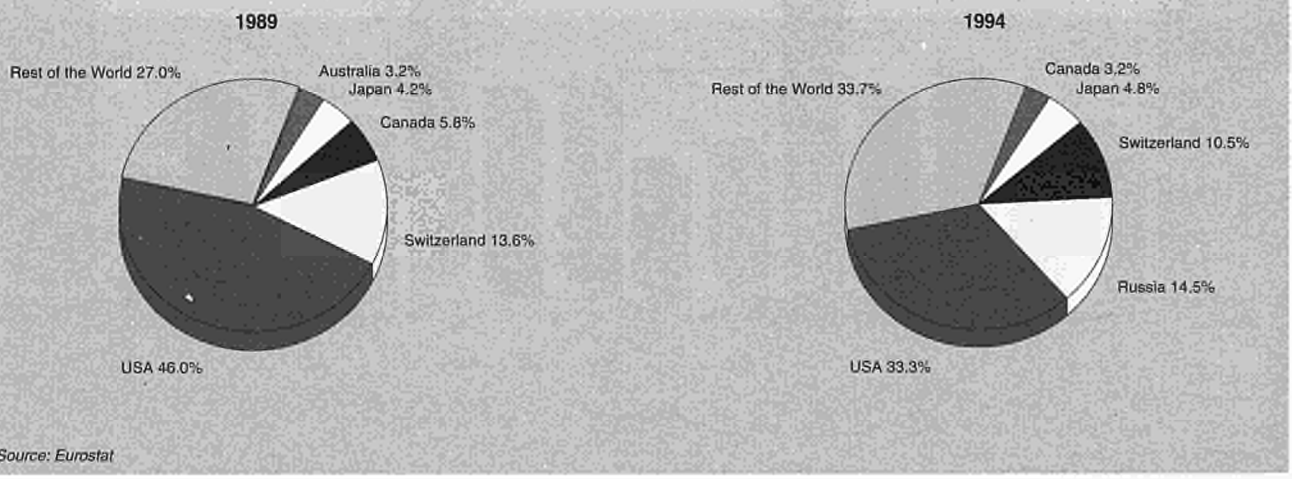
The European wine market can be divided into a few important segments. By far the most important segment is that of still wines. This may further be divided into medium-low quality wines (table wines) and higher quality wines normally subject to rigid disciplinary regulations. Other sectors in this market are fortified wines, including sherries and ports, sparkling wines and champagne (including the German Sekt), vermouth and aromatic wines (e.g. Italian Cinzano and Martini) and finally wine coolers (a mix of wine, fruit juice, fragrance and carbonated water), a relatively new product.

The development of demand in this sector must be analysed with an appreciation of the world evolution of the alcoholic beverage market, which has been greatly influenced by the increasing consumer awareness of health problems connected with the consumption of alcohol.

In this context, the quantity of wine consumed in the European market is progressively declining, sustained in value only by the increase in tax burdens on the product and by the shifting of consumer preferences towards premium price products.

In the light of these considerations, the segments most negatively affected are those of red table wines, fortified wines

Figure 6: Wine
Destination of EU exports



Source: Eurostat

Table 5: Wine
Production in volume

(1000 hectolitres)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR12 (1)	194 245	189 040	211 420	212 018	160 293	181 008	187 185	160 650	197 675	163 913
Belgique/België	2	2	2	2	2	2	2	1	2	2
Deutschland (1)	8 887	6 102	10 921	9 713	9 981	14 491	9 510	10 704	13 487	9 970
Ellada	5 025	4 782	4 334	4 467	4 345	4 532	3 526	4 022	4 050	3 378
España	36 249	34 511	37 042	41 481	23 249	32 444	42 231	33 324	37 981	29 602
France	64 360	71 297	73 974	69 340	57 620	61 058	65 530	42 689	65 401	53 284
Italia	70 900	62 340	76 962	75 822	61 010	60 327	54 866	59 788	68 686	62 618
Luxembourg	152	107	160	142	142	232	151	86	271	170
Portugal	8 655	9 893	8 017	11 047	3 938	7 901	11 351	10 021	7 771	4 871
United Kingdom	15	6	8	4	6	21	18	15	26	18

(1) Including former East Germany from 1991 onwards.
Source: Eurostat

and the vermouth segment, while better prospects exist for quality wines and low-alcohol wines (especially white and sparkling).

A country comparison of the market shows that France and Italy represent, in absolute terms, the largest markets with 36.6 and 35.8 million hectolitres, respectively. These two markets are also characterised by the highest level of per capita consumption, equal to about 63 litres per annum, notably higher than the European average of 37 litres. The considerable drop in per capita consumption in these two countries in the last five years, as in the whole Mediterranean area, is the main cause of the fall in consumption in the market, only partially mitigated by the increase in average prices.

A notably different situation is seen in the North-European markets, where wine-based beverages are a relatively new type of product and characterised by a lesser degree of market penetration than other alcoholic beverages. In these markets the per capita consumption, although low, shows some signs of increase, which, combined with the preference for more expensive products, make for forecasts of moderate positive growth.

Supply and competition

The wine sector is characterised by a structural surplus. Wine production, in fact, exceeds domestic market consumption potential and the quantity potentially destined for international markets.

The EU has for some years been launching programs to reduce this surplus production capacity, in two ways; by creating incentives to reconvert or abandon lower-quality viticulture activities, mainly in Spain, Italy, France (which brought about a 15% drop in production since the peak period of 1982-85); and also by setting an obligatory quota of output (about 15%) to alcoholic distillation.

Within this framework Italy, France and Spain represent the three main wine producers with an average production in recent years of 60.9, 55.5 and 31.6 million hectolitres, respectively.

The state of advanced maturity of the sector has without doubt precipitated production rationalisation process. The effort to streamline the productive structure of the sector has only partially succeeded in reviving stagnant demand. Labour productivity has increased by about 11% in the last five years combined with substantial stability of total costs and labour costs.

Finally, wine product distribution follows the same pattern on all the main markets in the world: it is highly fragmented with a very high number of small retailers spread over the territory. An underlying trend can, however, be seen in the shift of quantities distributed from the wholesale channel (hotels, restaurants, catering) towards the retail channel destined for domestic consumption (supermarket chains, etc.). This kind of distribution allows a more competitive product in terms

Table 6: Wine
Consumption per capita

(litres/head)	1989	1990	1991	1992	1993	1994
EUR12 (1)	42.0	39.0	38.0	37.0	37.0	37.1
Belgique/België	18.7	19.7	18.4	20.9	20.5	19.5
Danmark	21.2	18.4	21.7	22.0	22.5	23.1
Deutschland (1)	26.2	26.0	26.1	22.8	23.1	23.1
Ellada	33.3	31.8	25.7	25.3	25.7	30.0
España	46.0	41.0	44.0	43.0	42.0	42.5
France	73.2	71.9	67.2	64.5	64.9	63.5
Ireland	4.2	4.4	4.5	3.9	3.9	5.7
Italia	69.7	58.6	62.0	61.6	63.0	62.8
Luxembourg	61.3	58.2	59.3	58.2	57.7	63.3
Nederland	13.5	13.1	14.0	14.0	12.7	13.1
Portugal	53.0	54.0	59.0	57.0	55.0	59.4
United Kingdom	11.7	12.8	10.9	10.4	11.7	11.6

(1) Including former East Germany from 1991 onwards.
Source: Eurostat

Figure 7: Wine
Origin of EU imports

Source: Eurostat

of price and is more in touch with modern consumption models and purchasing pattern.

INDUSTRY STRUCTURE

Companies

The European wine industry is characterised by extreme fragmentation of production and commercialisation of wine products, above all in the Mediterranean countries like Italy, Spain and Greece.

Furthermore this sector is characterised by the considerable weight of the co-operative societies. For example, these produce about 65% of French table wine and 40% of wine traded on the Italian market.

Even if the largest share of output is comes by small and medium-sized enterprises, there are a small number of multinationals which are characterised by global strategies on international markets and management of wine products as a component of the larger alcoholics market, including beer and spirits. These large groups use the European market both as supply market of products of the best European tradition and as principal end market of alcoholic products. The main companies are: Allied-Lyons (UK), Grand Metropolitan (UK), LVMH-Moet Hennessy Louis Vuitton (F), Seagram Company (Canada) and Martini & Rossi (I).

Among the enterprises only focusing on wine products and with a smaller presence on the non-EU markets are: Antinori (I), Gancia (I), Castel (F) and Lagedar (F).

Strategies

The advanced maturity of the sector and more in general the progressive disappearance of small retail outlets have pushed the companies in the wine industry towards production rationalisation processes and growth strategies.

In 1995 there were 17 major M&A operations within the EU, involving a value more than double that of the preceding year. These appear mainly motivated by the search for that optimal dimension necessary to sustain increased horizontal and vertical competition.

These operations mainly have the purpose of absorbing competition from the market and reaching new market segments.

Table 7: Wine
Gross human consumption

(1000 hectolitres)	1989	1990	1991	1992	1993	1994
EUR12 (1)	135 897	127 751	132 232	127 536	132 459	128 627
Belgique/België	1 848	1 958	1 837	2 092	6 062	1 970
Danmark	1 087	947	1 118	1 137	1 166	1 199
Deutschland (1)	16 137	16 292	20 781	18 290	18 593	18 773
Ellada	3 336	3 198	2 623	2 595	2 651	3 124
España	17 883	15 892	17 158	16 834	16 283	15 965
France	41 009	40 473	38 019	36 903	37 354	36 663
Ireland	147	154	158	137	140	205
Italia	40 081	33 754	35 782	35 572	35 843	35 859
Luxembourg	230	220	226	227	228	254
Nederland	1 996	1 955	2 098	2 111	1 941	2 009
Portugal	5 435	5 570	6 182	5 636	5 421	5 874
United Kingdom	6 708	7 338	6 250	6 002	6 777	6 732

(1) Including former East Germany from 1991 onwards.
Source: Eurostat

Table 8: Wine Acquisitions

1994 Bidder	Country	Target	Target country
Danish Distillers	Danmark	Ninheset Norden	Danmark
Credit Agricole Banking	France	N/A	France
GAN	France	Kirwan	N/A
Vranken	France	Barancourt	France
Franz Wilhelm Langguth Erben	Deutschland	Keller-Geister	Deutschland
Banco Bilbao Vizcaya	España	Bodegas	España
Luis Paez (Koninklijke Ahold)	España	Bodegas Internacionales	España
Cereal Industries (Ass. British Foods)	United Kingdom	Allinson (Booker)	United Kingdom

1995 Bidder	Country	Target	Target country
W. Hammerle Destillerie-Friehof	Österreich	Seyringer Scholssbraende	Österreich
Grands Chais de France	France	Crus et Domaines de France	France
Investor Group	France	Gardere Vinyard	France
Michel Picard	France	Foucher - Lebrun	France
Vranken	France	Charbaut	France
Geldermann Privatsektkellerei	Deutschland	Rene Brun	France
Henkell und Sohnlein Sekthellereien	Deutschland	Kurpfalz Sektkellerei (Gebrueder Maerz)	Deutschland
Caviro	Italia	CPD	Italia
Snow Brand Milk Products	Japan	Mison Joseph Drouhin	France
Albada Jelgersma Holding	Nederland	Chateau de Giscours	France
Sogrape	Portugal	Forrester & Cia (Bacardi/Martini)	Portugal
Bodegas Berberana	España	Raventos y Blanc	España
Grupo Prac (Pernod - Ricard)	España	Palacio de La Vega Navarra	España
Torre de Ona	España	Bogedas La Roja Alta SA	España
Nestlé	Switzerland	Winiary	Poland
Highland Distilleries	United Kingdom	Allied Domecq - Black Bottle Scotch Whiskey	United Kingdom
Grand Metropolitan	United Kingdom	Picon Amer (Remy Cointreau)	France

Source: Nomisma

It must also be noted that the external growth process is confined to the EU and for the major part, deals are made between companies in the same country. In this context the French wine industry with seven operations, is without doubt the most involved, but also Spain shows a remarkable rate of activity (five major operations in 1994-95).

The cross-border operations conducted with non-EU producers have been so far insignificant.

REGIONAL DISTRIBUTION

Wine production is traditionally linked to the climatic characteristics of the Mediterranean. Cultivation is also found in large continental areas in Germany and France. Of small significance is the production of the United Kingdom, Benelux and other northern countries.

In the countries with the best natural conditions for production, some areas of particular specialisation may be identified. These are the regions of Valencia, Extremadura and Castilla de la Mancha in Spain; Languedoc-Roussillon, Provence, the French Riviera, Champagne, Alsace, the Pyrénées and Bordelais in France; the Peloponnese and Aegean islands in Greece; western Ribatejo in Portugal; Emilia-Romagna, Veneto, Trentino, Tuscany and Puglia in Italy; and finally, Rheinland, Mosel, Franken and Württemberg in Germany.

ENVIRONMENT

The sector's main impact on the environment comes from the use of high amounts of pesticides during grape growing. Recently, however, the spread of integral/organic cultivation methods have helped to reduce the environmental impact which is directly attributable to the sector.

Wine sold in bottles involves the problem of recycling the glass. To eliminate this problem, some companies have promoted the sale of wine in cardboard "briks".

REGULATIONS

The basic regulation for the wine dates back to Reg. (EEC) 822/87 as last amended by Reg. (EEC) 1756/92 which fixes norms governing oenological practices and processes, price system and intervention rules (private storage aid, preventive and compulsory distillation).

A proposal of general reform of market organisation in wine (submitted by the Commission in may 1994) was still under discussion at the end of 1995. The basic aim of this proposal is to achieve a market equilibrium preventing surplus formation instead of financing their elimination. The new system will also involve different quality standards for wine enrichment as well as a simplification of the distillation system.

With respect to price regulation, until 1995 the representative price (average production price for each type of wine) and the reference price (minimum price at which wine could be imported from a non-EU country) were fixed every year by the Commission. In order to comply with commitments arising from Uruguay Round agreements, the EU system of reference prices for wines was definitively abandoned since last July. For grape juice and grape must, the reference price system

Table 9: Wine
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	0.00	0.00
Deutschland	0.31	0.44
Ellada	2.33	3.27
España	3.90	2.55
France	1.48	1.78
Ireland	N/A	N/A
Italia	1.48	1.20
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	0.30	3.97
United Kingdom	0.49	0.47

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

has been replaced with an entry price system, by which a specific duty is charged according to the level of import prices.

As far as further developments in regulation are concerned, harmonisation in advertising and fiscal legislation between EU countries is to be considered the main priority for this sector.

OUTLOOK

With a general trend towards falling consumption in the alcoholic beverage market, the lighter white wine varieties with a lower percentage of alcohol seem destined to maintain their current market positions with respect to the other alcoholic beverages and red wines.

The premium price products will continue to hold their market value, although the "polarisation" between quality wines, on the one hand, and low-priced wines on the other, will tend to restrict space for the competition competing in the medium-priced range.

Finally, although in percentile terms of little significance, a further increase in imports from third countries can be expected (with the foreseeable entry of South Africa and New Zealand), above all in the North-European market with less rooted production and consumption traditions.

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Brewing
NACE (Revision 1) 15.96

In 1994 there were 1 677 independent beer manufacturers in the EU. They employed 139 000 workers and produced 316 092 thousand hectolitres of beer. Germany, with 1 278 beer manufacturers, 53 600 workers, and a production of 118 600 thousand hectolitres, is the largest producer country in the EU. Its per capita consumption of 139.6 litres per year also makes it the largest consumer country.
Slow growth in demand has encouraged the concentration of the supply. Acquisitions in the sector, aiming at controlling distribution, look set to continue. Large-scale distribution and hard discount can encourage the development of domestic consumption.

INDUSTRY PROFILE

Description of the sector

The brewing sector includes not only the processing of hops, corn, and barley for making this beverage, but also the placement of the final product on the market.

Beer is classified by type: organic beer, exotic beer, non-alcoholic beer, light beer, normal beer, special beer, and double malt beer. It can also be classified by colour: golden, red, and dark. Finally, it is classified by the type of packaging used: draught beer, beer in returnable glass bottles, beer in non-returnable bottles, and beer in cans.

The overall beer and malt sector plays an important role in the European drinks industry. The total value added generated by this sector amounts to 9 072 million ECU. As for the geographical distribution of value added, the largest producer country is Germany, which covers approximately 38% of EU value added, followed by the United Kingdom with 20%. Spain, France, Belgium, and the Netherlands together make up 30%, while the remaining EU countries cover the remaining 12%.

Recent trends

Real growth in production and consumption in the industry was practically zero from 1985 to 1990, while a sharp drop of respectively -1.4% and -1.0% was recorded in the 1990-95 period Extra-EU exports show a slightly growing trend, especially since the beginning of the 1990s, with a notable boost in 1993-94 (approximately 12%). Extra-EU imports are of little significance although they grew by approximately 12% a year during the last decade.

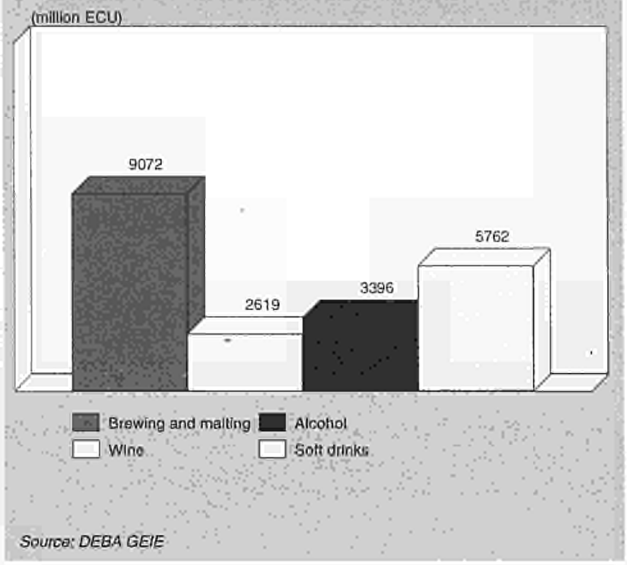
Production in volume terms did not show large percentage variations during the 1985-95 period, always less pronounced than those of the total manufacturing sector.

As for employment, the brewing sector experienced a continuous drop in the number of employees. As demand and production of beer have been relatively stable during the last decade, the fall in employment was mainly attributable to the process of reorganisation of the sector, entailing wider use of technology in the production process and market concentration to reap economies of scale.

International comparison

On the basis of 1994 data, the EU is the world's largest producer, consumer, and exporter of beer and malt. Japan is in second place except for exports, for which it is in third place after the USA. The USA confirms the impression that it is losing ground on world markets, since its production capacity has shown a tendency to contract compared to 1985.

Figure 1: Brewing and malting
Value added in comparison with related industries, 1994



Source: DEBA GEIE

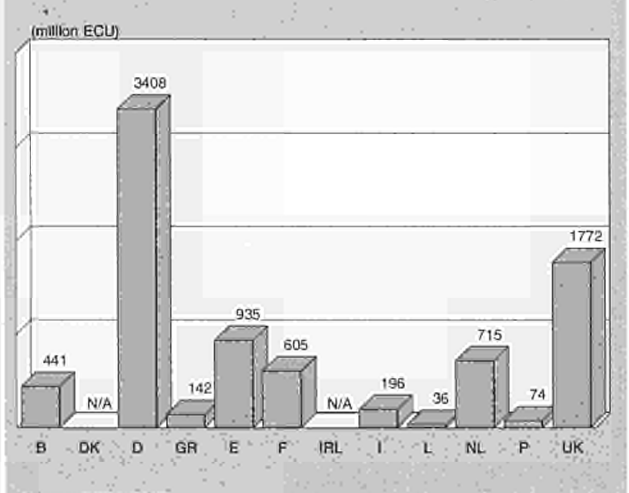
The analysis of the evolution of production at constant prices reveals a different picture, i.e. relative stability of EU production; growth in the USA with annual rates of approximately 6-7% in some years. On the other hand, Japan experienced strong growth until 1990 and since then the production index fluctuated in the region on the base value for 1990.

Foreign trade

Extra-EU exports of beer and malt are much higher than imports. Therefore, the trade balance has been constantly positive over the past decade and growing, except for the three-year period from 1986 to 1988 during which it experienced a slight reduction.

The majority of brewing exports were directed to the USA; however, the share of extra-EU exports to this country has dropped from 60% in 1989 to 46% in 1994. The other main destination market for EU beer is Russia, which absorbed 8% of the exports, followed by Switzerland, Japan, and Hong Kong, each of which takes 4%. In comparison with 1989, export markets are more fragmented, and the main reference partners have radically changed.

Figure 2: Brewing and malting
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Brewing and malting
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	19 281	21 670	23 057	24 349	24 905	24 547	25 314	25 637	28 383	29 190	30 090	31 100
Production	20 242	22 585	24 036	25 343	25 966	25 704	26 572	27 106	29 857	30 750	31 720	32 820
Extra-EU exports	1 008	971	1 049	1 109	1 168	1 267	1 373	1 597	1 607	1 700	1 800	1 900
Trade balance	961	915	979	994	1 061	1 158	1 258	1 469	1 474	1 560	1 630	1 720
Employment (thousands)	159.9	141.0	138.9	137.7	134.2	127.7	120.1	116.5	128.1	120.0	120.0	120.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Brewing and malting
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	0.87	-1.44	-0.16	0.64
Production	0.88	-1.04	0.02	1.21
Extra-EU exports	1.59	7.42	4.14	12.02
Extra-EU imports	11.77	11.56	11.68	13.06

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Brewing and malting
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	1 008	958	846	840	971	1 049	1 109	1 168	1 267	1 373	1 597	1 607
Extra-EU imports	47	44	43	49	56	70	115	107	109	115	128	133
Trade balance	961	914	803	791	915	979	994	1 061	1 158	1 258	1 469	1 474
Ratio exports / imports	21.6	21.8	19.9	17.2	17.4	15.0	9.7	10.9	11.6	11.9	12.5	12.1
Terms of trade index	89.3	93.0	95.9	101.1	103.5	100.0	97.7	95.5	89.5	92.6	N/A	N/A

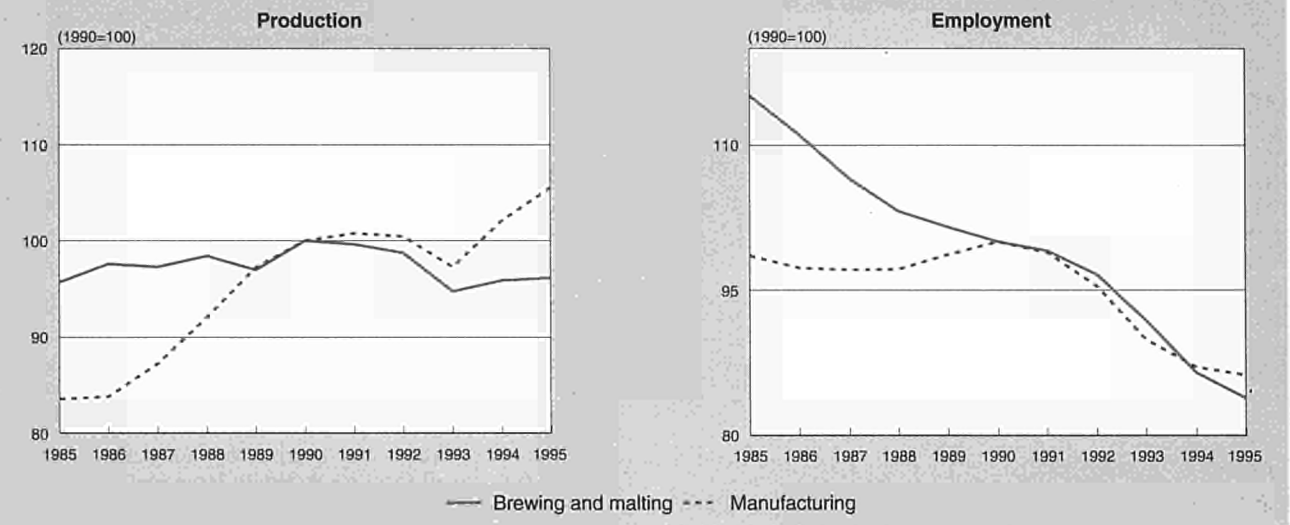
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Brewing and malting
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	83.2	87.8	91.3	95.4	95.5	100.0	100.6	102.3	103.1	110.9
Unit labour costs index (3)	92.4	92.4	93.8	92.7	98.2	100.0	106.0	109.9	114.6	110.1
Total unit costs index (4)	86.0	87.2	88.3	91.6	96.9	100.0	105.9	109.8	112.7	112.1
Gross operating rate (%) (5)	13.4	15.2	15.7	15.7	13.8	14.1	14.3	14.8	14.4	15.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Brewing and malting
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

In 1994 the main countries of origin of imported beer were the USA (50%), the Czech Republic (16%), Mexico (13%) and China (6%). Since 1989, imports from the USA have grown, like those from Mexico and the Czech Republic, while imports from Hungary have been greatly reduced.

MARKET FORCES

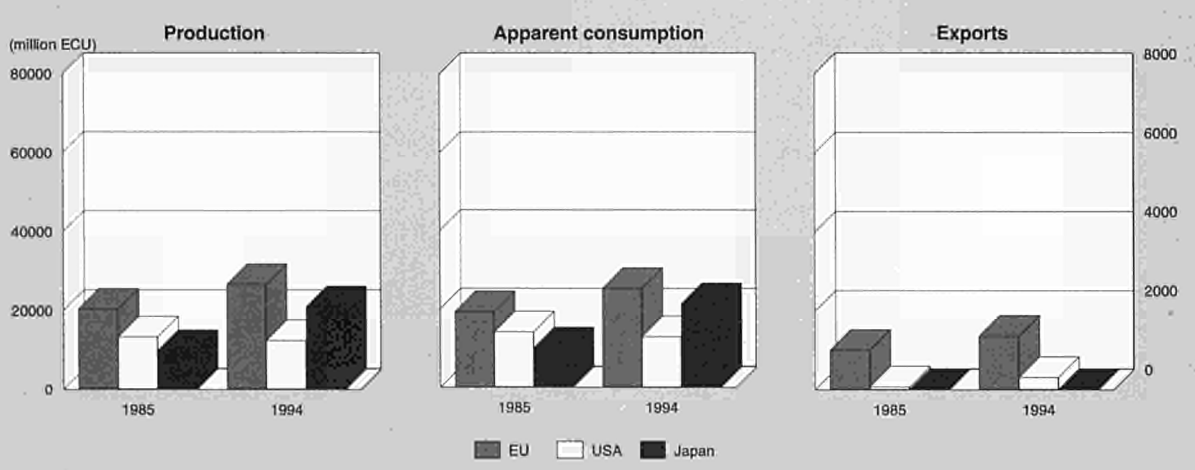
Demand

Annual world-wide growth in beer consumption is estimated to be approximately 2%. The most visible growth is taking place in industrialising countries with high population growth in Asia and Latin America.

The consumption of beer in Europe usually goes through periods of stagnation alternating with periods of growth. Until the end of the 1980s, per capita consumption of beer in Europe dropped and then began growing again, although discontinuously, in the 1990s. There has been a general change in the preferences of consumers, who switched from beverages with a high alcohol content to those with a lower one, especially non-alcoholic products. The recent economic recession also contributed to the stagnation of demand.

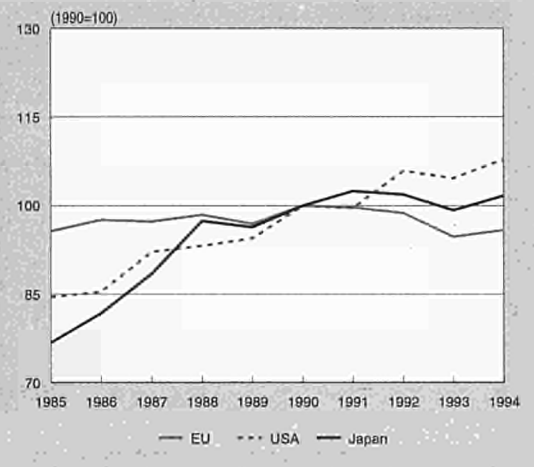
Beer is a product characterised by a seasonal nature particularly in the Mediterranean countries where it is drunk as a thirst-quencher in the summer. For example, the exceptionally warm summer of 1994 in most of Europe caused the consumption of beer to rise. All Mediterranean countries have very low per capita consumption levels. Especially the Italian market, although it makes up a fifth of total consumption volume in Europe, is characterised by a very low per capita consumption level, i.e. 26.2 litres per year. This value is four to five times lower than that in Northern EU countries where beer consumption is not seasonal. The highest levels of per capita consumption occur in countries that are typically beer producers or exporters: Germany with 140 litres per capita in 1994, Denmark (127.1), Austria (117.1), Ireland (112.1), Belgium (106.1), and the United Kingdom (102 litres).

Figure 4: Brewing and malting
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Brewing and malting
International comparison of production in constant prices



Source: DEBA GEIE

The advanced maturity of the traditional markets in Northern Europe, has made Mediterranean countries (particularly the Italian market) very attractive, also because the drop in wine consumption has left a vacuum in the drinks sector, which has only been partially filled by beer.

Attention to health and fitness has stimulated the demand for non-alcoholic beer or organic beer made from raw materials that were grown without the use of pesticides or fertilisers. Also, the demand for "exotic" beers, such as Latin American beers, has grown. The most important brand is "Corona" beer produced by Cerveceira Modelo in Mexico and is exported to 68 countries.

Supply and competition

The EU country with the highest export intensity is Ireland (45% of total production is destined for export). Also a large share of the production of other countries such as Luxembourg, the Netherlands, Belgium, and Denmark is destined for foreign markets. Germany, instead, has only a timid presence on foreign markets because the majority of its production is used to satisfy its high domestic demand. In Spain, France, and Italy, beer imports are greater than exports. These countries produce the least amount of beer in the EU and have some of the lowest per capita consumption rates. Internal demand in these countries is satisfied especially by EU partners.

The brewing and malting industry is characterised by the use of a large amount of fixed capital, which grew especially during the 1980s. The annual labour productivity index improved continuously, except for 1989, with annual growth rates between 0.5% and 7.5%, mainly as a consequence of reduction in employment levels. The cost of labour anyway remained constantly higher than the productivity index. The production specialisation index has undergone a general improvement from 1985 to 1994, except for Italy and England where a drop occurred.

Production process

Beer is a beverage made with barley and other grains, obtained with the fermentation of a mash of barley malt and malt of other grains, mixed with flavouring substances such as hops and which contains carbon dioxide. The beer production process requires a large amount of fixed capital.

The sector of beer is characterised by companies of different sizes, from small local producers to large multinational companies that produce a large quantity of beer both directly and under license for other companies located in other countries. The levels of productivity vary considerably according to the type and size of the enterprise.

INDUSTRY STRUCTURE

Companies

In 1994 there were 1 677 independent beer producers in the EU. Germany has by far the highest number of manufacturers (1 278), followed by Belgium (106) and the United Kingdom (93). The top 50 European manufacturers produce more than 60% of the total production, while the smallest 860 manufacturers produce only 3.5%.

The industry in the EU is not homogeneous in terms of size and performance. By way of example, France, which has approximately the same number of factories and produces approximately the same volume of beer as Spain, has less than half the number of employees as Spain. It is therefore characterised by strong capital intensiveness in the processing cycle. Another example: in 1994, the total production of the 17 Dutch plants was 22 175 thousand hectolitres, while the total production of the 106 Belgian plants was 14 700 thousand hectolitres.

Figure 6: Brewing
Destination of EU exports

Source: Eurostat

Figure 7: Brewing
Origin of EU imports

Source: Eurostat

In the last few decades there has been a general process of concentration by means of mergers and acquisitions which have centralised the production of beer in the hands of large multinationals. In some countries, such as the Netherlands, Portugal, Ireland and Greece, medium-large firms dominate the market, while in Germany there are still a large number of enterprises with very low production capacities.

Strategies

The increase in competition, coupled by the reduction of prices and margins, as well as the substantial stability of demand, have forced beer producers to look for economies of scale in production and to rationalise the production process.

Faced with stagnating demand in the traditional markets of Northern Europe and the USA, the largest multinationals (e.g. Interbrew and Heineken) concentrated their marketing efforts on rapidly developing markets (Asia, Central America, South America, Eastern Europe and Southern Europe).

The only way for beer companies to sensibly increase their market share is to resort to acquisitions. A general market concentration, encouraged by the possibility of achieving large economies of scale, took place within the sector. At world level, there were 32 acquisitions during the 1994-95 period. About 24 of these were performed by EU companies, with the following breakdown: 8 by Dutch companies, 7 by German companies, 7 by Belgian companies, 1 by an Austrian company and 1 by a Swedish company. The year 1994 saw particularly intense acquisition activity, with 21 acquisitions in the world, 12 of which were started by companies from the EU. The German Brau & Brunner, the Dutch Heineken, and the Belgian Interbrew were among the most active companies. Many of the acquired companies were located in Eastern Europe (13 acquisitions), as a confirmation of the great interest in this market.

Table 5: Brewing
Beer statistics, 1994

(1000 hectolitres)

	Total production	Total exports	Total imports	Number of employees (units)	Number of breweries (units)	Per capita consumption (l/head)
Belgique/België, Luxembourg	15 274	4 593	570	8 306	111.0	105.6
Danmark (1)	9 410	2 674	46	4 289	15.0	126.7
Deutschland	118 600	7 750	2 776	53 600	1278.0	139.6
Ellada (1)	4 250	250	200	1 900	5.0	42.0
España	25 024	360	2 075	10 124	25.0	66.5
France	20 445	1 289	3 529	6 467	26.0	39.3
Ireland	7 186	3 255	476	2 160	7.0	112.6
Italia	12 098	242	3 154	3 527	18.0	26.2
Nederland	22 175	9 357	545	8 190	17.0	86.0
Österreich	10 144	1 005	290	6 250	51.0	116.6
Portugal	6 637	608	164	1 411	8.0	62.3
Suomi/Finland	4 538	208	53	2 700	8.0	82.9
Sverige (2)	5 430	90	456	3 700	15.0	67.3
United Kingdom	54 881	3 168	5 172	29 000	93.0	102.4

(1) 1992 figures for imports and exports.
(2) Production excluding exports.
Source: CBMC

Table 6: Brewing Acquisitions

1994 Bidder	Country	Target	Target country
Oesterreichische Brau-Beteiligungs (1)	Österreich	Starobrno	Czech Republic
Interbrew (1)	Belgique/België	Zagreb Breweries	Croatia
Brau & Brunnen (1)	Deutschland	Kamenitza	Bulgaria
Brau & Brunnen	Deutschland	Wickueler	Deutschland
Brau & Brunnen (1)	Deutschland	Okocim	Poland
Brau & Brunnen (1)	Deutschland	Wernersgruener Brauerei	Deutschland
Heineken	Nederland	Komaromi Sorgyar RT	Hungary
Heineken	Nederland	Brauerei Haldengut	Switzerland
Heineken (1)	Nederland	Zywiec	Poland
Heineken (1)	Nederland	Aguila	España
Nordic Capital Svenska	Sverige	Falcon AB (Unilever)	Sverige
BB Group CO	Deutschland	Mittweidaer Loewenbraeu	Deutschland
Interbrew	Belgique/België	Proberco	Romania
Koenigsbacher bauerei AG (Karlsberg Brauerei Weber)	Deutschland	Hirschbrauerei AG Cerverceria	Deutschland
John Labatt (1)	Canada	Cuauhtemoc Moctezuma	Mexico
Coors	USA	Aguila	España
Brewinvest	Nederland	Zagora Brewinvest	Bulgaria
Brahma	Brasil	C A Cerverceria Nacional	Venezuela

1995 Bidder	Country	Target	Target country
Interbrew	Belgique/België	John Labatt	Canada
Interbrew Belgique/België	Belgique/België	Kamenitsa	Bulgaria
Interbrew	Belgique/België	Burgasko Piva	Bulgaria
Interbrew	Belgique/België	Havelius	Poland
Baltica Holding	Danmark	Aldaris	Latvia
Investor Group	Deutschland	Brauhaase Management (Gebrueder Maerz)	Deutschland
Dransfield Holding	Hong Kong	Redruth Brewery	United Kingdom
Heineken	Nederland	Zlaty Bazant	Slovak Republic
Indol Int. (South African Breweries)	Nederland	MacMahon Brewery - Beira Brewery	Mozambique
Heineken Holding	Nederland	Interbrew Italia	Italia
Damm	España	Cervezas Turia (Damm)	España
Investor Group	Sverige	Falcon Briggerier (Volvo)	Sverige
Bass	United Kingdom	Ostravar	N/A
Bass	United Kingdom	Vratislavica	N/A

(1) Brand acquisition.
Source: Nomisma

ENVIRONMENT

The main problems tied to the production of beer are linked to the disposal of packaging (i.e. mostly glass and aluminium cans), whose widespread recycling is providing considerable energy savings. Furthermore, over the last few years, considerable savings have been realised in the field of water used during the production process. Other problems concern the disposal of yeast generated during brewing and of fumes discharged into the atmosphere.

The EU Directive 94/62 has introduced a series of measures concerning the recovery and recycling of food packaging. These measures will result in important benefits for the environment inasmuch as they will oblige companies to adopt adequate packaging and change supply and transport organisation within the sector in order to facilitate and expand the recovery and recycling of packaging. Most Member States have begun to implement this Directive.

REGULATIONS

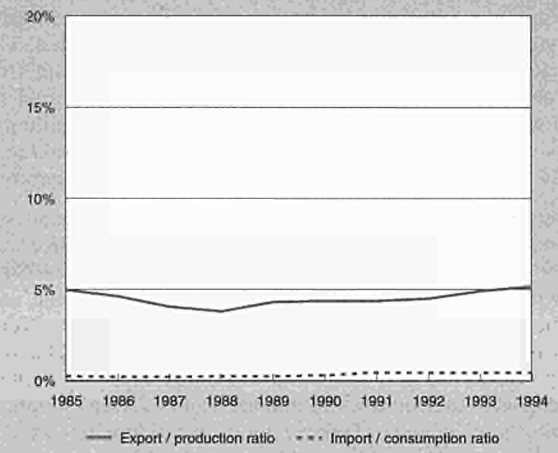
Directive 92/93 define the excise duties to be collected on beer, wine and other alcoholic drinks. Reduced rates are foreseen for drinks with low alcoholic content. Directive 92/94 provides for the harmonisation of the production charges for beer, wine and other alcoholic products.

In order to take into account the results of the GATT multilateral agreement on agriculture, the Council modified the Community quota for beer made from malt, with an original malt content of less than 20% in barrels, which was previously administered by Regulation EU 3379/94.

OUTLOOK

The most important medium-term prospects of the sector are substantial sluggishness of the demand for beer and further market concentration. The process of product differentiation will sharpen, favoured by the change in consumer tastes which

Figure 8: Brewing and malting
Trade intensities



Source: DEBA GEIE, Eurostat

Table 7: Brewing and malting
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.27	1.36
Danmark	N/A	N/A
Deutschland	1.05	1.13
Ellada	1.11	1.82
España	0.77	0.93
France	0.43	0.42
Ireland	N/A	N/A
Italia	0.28	0.21
Luxembourg	1.05	1.24
Nederland	N/A	1.46
Portugal	0.75	1.06
United Kingdom	1.96	1.70

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

will mean higher growth rates for non-alcoholic beer, light beers, special beers and double malt beers. A rise in consumption in the Mediterranean countries is expected. Also, purchasing patterns are changing, favoured by the growing importance of discount retailers in the sales channels. The reduction of margins will contain growth of production costs. This will be accomplished by increasing concentration of the processing chain to achieve economies of scale.

Mergers and acquisitions will be increasingly oriented towards new markets such as Asian countries with strong population and consumption growth. The concentration in the sector, which will facilitate the achievement of large economies of scale, will continue to fuel the process of layoffs of workers even during the next few years.

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Malting
NACE (Revision 1) 15.97

The EU is the biggest malt producer in the world. Developments in the industry are overwhelmingly determined by trends in the beer industry. In fact, 95.2% of the malt production is used in the manufacture of beer. The reduction of barley cultivated area and the growing demand of malt from non-EU countries has provoked a restriction of supply on the EU market thus generating a rise in prices.
Trade is very intense since malt is produced only in few countries while beer is almost universally consumed. Furthermore, consumption is strongly growing in new markets with limited domestic malt production, while EU malt consumption is stable. If malt becomes subject to the 21% reduction of coarse grain export tonnage foreseen in the GATT agreement, we can expect to see a reduction in EU exports in the next years. In 1994, there were 165 malt-houses in the EU, with a total production capacity of 6 915 thousand tonnes of malt. Germany, with 92 malt-houses and 53 600 workers is the largest producer country in the EU.

INDUSTRY PROFILE

Description of the sector

The production of malt is closely tied to the beer sector. In fact, 95.2% of the malt produced is used in the manufacture of beer, 3.5% is used in whisky distilling and the remainder 1.3% is used in other food industries, especially for the production of confectionery products and alcoholic beverages and liquors.

In 1992, 5 800 thousand tonnes of malt were produced in the EU. Intra-EU trade reached 2 340 thousand tonnes, while 1 360 thousand tonnes were sold outside the EU. In the last decade, malt production capacity has increased from 5 490 thousand tonnes in 1985 to more than 7 071 thousand tonnes in 1995. Germany (1 950 thousand tonnes of malt production capacity), England, (1 556 thousand tonnes) and France (1 284 thousand tonnes) are the major producing countries, concentrating more than 50% of the total production capacity. They are followed by Belgium (718 thousand tonnes), Spain (411 thousand) and Denmark (170 thousand). A further extension of production capacity is planned in 1996-97 adding about 321 thousand tonnes, concentrated mainly in UK (120 thousand tonnes), Denmark (100 thousand) and Sweden (75 thousand).

Recent trends

Barley production in the EU has been declining more or less steadily over the last ten years. Changes in the Common Agriculture Policy have made barley growing less attractive in comparison to other cereals such as wheat, which has greater yield increase. Also, set aside policies contributed to the reduction of barley areas in the EU. The fall in cultivated areas generated a significant loss in barley production estimated at 10 million tonnes.

This loss generated a considerable tension on EU malting barley market. Exceeding demand on the internal market generated a rise in prices. Malting barley prices for 1995 crop were estimated to show a 50% premium over barley used in animal feed.

International comparison

The EU is by far the biggest malting barley producer in the world. In 1994-95, the EU produced 44 726 thousand tonnes (EU-15) of malting barley. US production reached much lower levels (8 835 thousand tonnes), followed by Australia (2 610 thousand tonnes) and South America (535 thousand tonnes).

In North America the total malt requirement has been increasing at a 1.9% annual rate since the mid 1980s, reflecting the significant increase in beer consumption in Mexico. This rise has more than compensated the reduced demand from US and Canadian breweries. Total malt requirements in the area were 2.575 million tonnes in 1983 and 2.889 million in 1993 and are forecast to rise in the next years peaking at 3.424 million tonnes at the beginning of the next century.

In recent years, a remarkable increase in malt demand was recorded in the East Asia. China is a leading producer, accounting for 50% of the demand of the area. Since 1984, a growing part of the local production of malt has been used in the same area, reducing exports to other regions. Nonetheless, malt requirements are estimated to increase at a very steep rate in the next years and especially Japanese brewers are expected to acquire extra tonnage from overseas suppliers. South America, Asia (Turkey) and Central America are also estimated to increase their malt demand in the next decade.

Foreign trade

Although beer is more or less universally consumed, malt production is significantly concentrated only in 50 countries where the availability of suitable barley first allowed the development of modern malting. As a consequence, trade of malt is very intense from producing areas to regions where there is little or no malting production.

Europe, with a 70-72% share of world exports (including intra-EU trade), is the world's largest malt exporter, followed by Australia, Canada and the Czech and Slovak republics. In the EU, France is the most export oriented malt producer. In 1994, French exports peaked at 1 069 thousand tonnes, half of which was destined to intra-EU trade and the other half to East Asia (mainly Japan and Vietnam), South America (especially Brazil), and Africa (Cameroon). The second major malt exporter in the EU was Belgium, with 439 487 tonnes: Japan, Brazil and South Africa are its main destination market.

During 1994, a fifth of the malt coming from the EU was exported to Japan and a share of approximately 10% went to Brazil and to Venezuela. The EFTA countries and South Africa followed with 6% each. In comparison with 1989, the share of each country has remained approximately the same except for Japan, whose share at that time was just 14%.

The Czech Republic was the main supplier of malt with a share of 50% of extra-EU imports, followed by Finland with 24% (now in the EU) and the USA with 12%. In comparison with 1989, the share from the Czech Republic and Slovakia has increased at the expense of the USA and especially Hungary.

The degree of export intensity decreased until 1988 from 5% to 3.8%. From 1989 onwards, this trend reversed and by 1994 the situation was back to the levels of 1985. The import penetration ratio doubled during the decade, but it remains tiny at 0.5% in 1994.

MARKET FORCES

Demand

The high quality of European malt makes it popular all over the world. The world-wide growth in the production and consumption of beer, estimated to be approximately 250 thousand - 300 thousand hectolitres, indicates that there will be a growth in demand for malt particularly in non-EU countries.

Malt requirements from other sectors, such as the baking industry or vinegar manufacturing, have been stable in recent years and no relevant changes are expected in the near future.

Table 1: Malting
Number of malting companies, 1994

(units)	B/L	DK	D	E	F	IRL	I	NL	A	FIN	S	UK	Total
Independent	5	3	66	4	5	3	3	2	3	2	1	10	107
Associated to breweries	2	1	26	7	1	1	0	1	4	0	1	6	50
Associated to other industries	0	0	0	1	0	1	0	0	0	1	0	5	8
Total	7	4	92	12	6	5	3	3	7	3	2	21	165

Source: EUROMALT

Table 2: Malting
Number of malting companies by capacity, 1994 (1)

(thousand tonnes)	0-9	10-19	20-29	30-39	40-49	50-99	100-199	200+	Total
EUR15(2)	73	19	15	12	9	20	17	4	169
Belgique/België, Luxembourg	0	0	2	0	0	1	4	0	7
Danmark	1	0	1	0	1	1	0	0	4
Deutschland	55	9	5	6	4	11	1	1	92
España	4	0	3	0	3	1	1	0	12
France (3)	1	0	0	0	0	N/A	3	2	6
Ireland (4)	2	5	1	0	0	1	0	0	9
Italia	0	0	1	2	0	0	0	0	3
Nederland	0	0	1	0	0	1	1	0	3
Österreich	3	1	0	1	1	1	0	0	7
Suomi/Finland	0	1	0	0	0	2	0	0	3
Sverige	0	0	0	2	0	0	0	0	2
United Kingdom	7	3	1	1	0	1	7	1	21

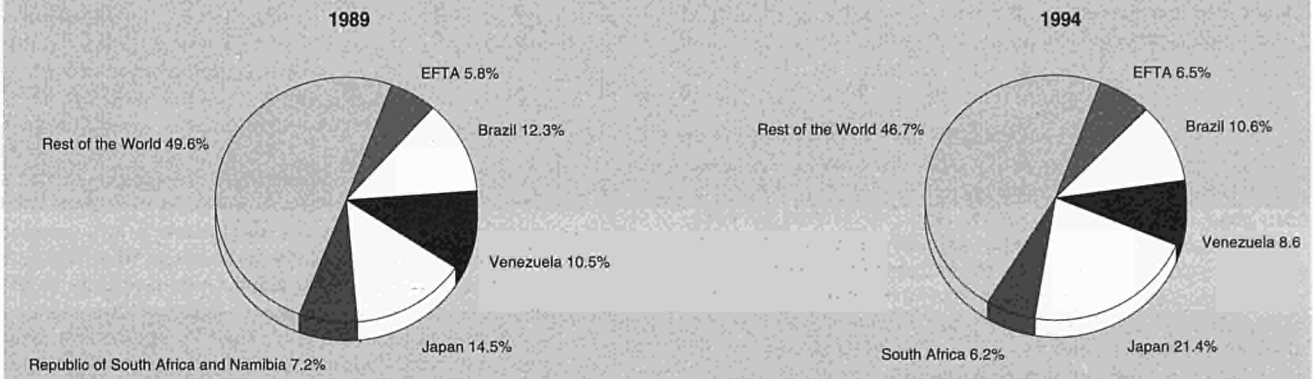
(1) All maltsters whether independent or associated with the brewing distilling or other industries are included.
(2) Excluding Greece and Portugal.
(3) Total number of malting companies of capacity size 50-199=3.
(4) Malting plant and not malting company for the malting of capacity size 50-99.
Source: EUROMALT

Table 3: Malting
Total capacity of malting companies, 1994 (1)

(thousand tonnes)	0-9	10-19	20-29	30-39	40-49	50-99	100-199	200+	Total
EUR15(2)	282	249	387	417	407	1 279	2 226	1 669	6 915
Belgique/België, Luxembourg	0	0	55	0	0	80	583	0	718
Danmark	6	0	24	0	40	90	0	0	160
Deutschland	200	100	150	210	190	640	140	300	1 930
España	28	0	64	0	134	85	100	0	411
France (3)	N/A	N/A	N/A	N/A	N/A	N/A	255	1 025	1 280
Ireland (4)	10	72	24	0	0	68	0	0	174
Italia	0	0	21	64	0	0	0	0	85
Nederland	0	0	26	0	0	60	150	0	236
Österreich	9	17	0	37	43	64	0	0	170
Suomi/Finland	0	11	0	0	0	124	0	0	135
Sverige	0	0	0	72	0	0	0	0	72
United Kingdom	29	49	23	34	0	68	998	344	1 544

(1) All malsters whether independent or associated with the brewing distilling or other industries are included.
(2) Excluding Greece and Portugal.
(3) Capacity size 0-199, global total of 255 000 tonnes.
(4) Malting plant and not malting company for the malting of capacity size 50-99.
Source: EUROMALT

Figure 2: Malting
Origin of EU imports



Source: Eurostat

On the contrary, whisky production and as a consequence malt demand for this use has fallen is recent years . The United Kingdom, which is the major whisky producer in the EU, cut its malt-for-whisky demand of 13% in the last four years. In 1993-94, UK distillers used 356 780 tonnes of malt for malt whisky and 73 448 tonnes of malt for grain whisky production.

Supply and competition

Australia is an important maltster competitor for the EU industry. Its destination outlets are mainly the booming East Asian markets, and in recent years South American countries too. In this last region, Brazil (25 thousand tonnes) and Colombia (21 thousand tonnes) were the main partners. Australia sold on the international market about 400 thousand tonnes of malt in 1994. Canada, with 327 thousand tonnes, is another important malt exporter, whose production is destined mainly to Japan.

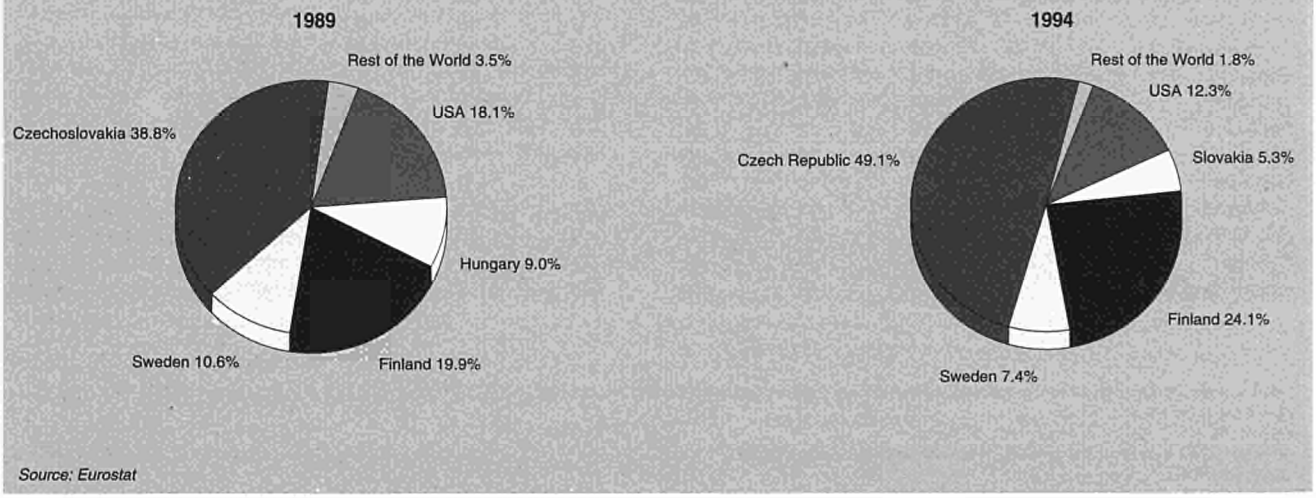
Production process

Because the production process for malt requires a large amount of energy, in the last few years European malt-houses have invested largely in energy saving technologies, halving the amount of fuel used in kilning. A large amount of effort has also gone into improving the technical efficiency and the product quality.

Selected malting barley undergoes a natural process of maturation under careful control, before being converted into malt enriched by different flavours on the base of the requirements of the beer or whisky for which it is made.

Infra-red micronising of cereal grain, which offers significant advantages in the production of adjuncts in the brewing industry could develop in malt industry too, increasing the quality of produces offered to brewers.

Figure 1: Malting
Destination of EU exports



Source: Eurostat

Table 4: Malting Acquisitions

1994 Bidder	Country	Target	Target country
Irish Agricultural Wholesale Society	Ireland	Malting Company of Ireland	Ireland
Malteurop	France	Intermalta	España

Source: Nomisma

INDUSTRY STRUCTURE

Companies

In 1994 there were 165 malt-houses in the EU, 107 of which independent and 50 of which affiliated with breweries, while the remaining 8 were associated to other industries.

The largest number of malt processing plants is in Germany (92 plants), 70% of which are independent. The United Kingdom is in second place with.21 plants, 10 of which are independent. It is important to note that while the total number of plants has been falling over the years due to the closure of independent plants, the number of plants affiliated with breweries has remained substantially stable.

About 54% of the malt processing plants have a production capacity of less than 20 thousand tonnes, and 24% have a production capacity of more than 50 thousand tonnes. In Germany the small plants predominate. 81% of the plants have a production capacity of less than 40 thousand tonnes and contribute only 34% of the total production. On the other hand, the United Kingdom is characterised by plants with large capacity (43% of the plants have a production capacity of more than 50 thousand tonnes) accounting for 91% of the total production. In France five malt-houses which have production capacity of more than 100 thousand tonnes manufacture 18% of the EU malt output, thus putting France in third place.

Malt processors are undergoing a wide concentration process, aiming at growth in production capacity of every single plant, thus permitting larger economies of scale to be achieved. In fact, the top 41 companies control two-thirds of the total production capacity.

Main maltsters in EU are Malteurop (F, 428 thousand tonnes of malting capacity), Malterie Soufflet (F, 570 thousand tonnes), Heinrich Durst KG (D, 135 thousand tonnes), Friederich Weissheimer (D, 310 thousand tonnes), Export Mouteij Nederland (NL, 150 thousand tonnes), Intermalta S.A (E, 100 thousand tonnes), Crisp Malting Ltd (UK, 152 thousand tonnes), Hugh Baird and Sons (UK, 158 thousand tonnes), Pauls PLC (UK, 350 thousand tonnes) and United Distillers (UK, 192 thousand tonnes). Minch Norton has recently taken over the Midland Malting Company, the Irish capacity is now 132 000 tonnes.

Strategies

The sluggishness of beer consumption in the EU domestic market has pushed many malt-houses to recover the losses on the EU market by increasing exports to extra-EU countries.

To satisfy quality breweries demand, malt-houses have strengthened their relation with barley growers, intensifying the selection of new barley varieties.

The EU's main competitors on world markets are Australia, Canada and the USA, to which Argentina and Uruguay will soon have to be added. The export capacity of the EU malt-houses will be considerably influenced by the decisions made by the EU when applying the GATT agreement, if malt will be considered a commodity.

There were three acquisitions in the malt sector in 1994. In the first one, both the bidder and the target company were Irish, as a result of the integration of a farming firm and a malt processor. In the second one, Malteurop (F) bought Intermalta (E) following a strategy of consolidation on the Spanish market. In the third one, Malteries Soufflet bought Malteries Franco-Belges.

OUTLOOK

The medium-term prospects of the sector are influenced by substantial sluggishness in the demand for beer in the EU.

In the malt sector, further concentration and rationalisation of the production process will take place, easing the achievement of large economies of scale and fuelling the process of layoffs during the next few years.

Exports to countries outside of the EU will keep on growing to satisfy world-wide growth in production and consumption of beer. Faced with booming demand, the malting supply will be tight and any crop reduction due to climatic factors could lead to strong prices increase.

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Soft drinks and mineral waters

NACE (Revision 1) 15.98

The soft drinks and mineral waters sector is characterised by a high level of self-sufficiency, as demonstrated by the marginal nature of trade with countries outside of the EU. The sector has been enjoying steady growth over the past decade and wide differences continue to exist in national tastes. The market, however, is naturally tending towards globalisation, due to the fact that, particularly in the soft drinks segment, the market is controlled by a handful of multinationals. However, the degree of product differentiation has been increasing in recent years, following the small but significant success of own-label products.

INDUSTRY PROFILE

Description of the sector

A large range of drinks composes the "soft drinks and mineral waters" sector. Mineral waters include still and sparkling waters; soft drinks are made up of colas, lemonades, carbonated fruit-flavoured drinks, carbonated fruit drinks containing a portion of juice, tonics, bitters, sodas, fruit drinks, and sports/energy drinks.

Available data shows that the largest soft drinks manufacturers are in Germany (6 165 million litres in 1994), the UK (4 123 million litres in 1993), Spain (2 756 million litres in 1993) and Italy (2 589 million litres in 1994). The highest per capita consumption is to be found in Austria (90.5 litres per year), Germany (87.8), Belgium (85.6) Ireland (83.4), and Sweden (80.5). The Netherlands and Austria are the largest exporters of soft drinks (467 and 268 million litres respectively).

The largest producers of mineral waters in 1994 were Germany (7 300 million litres), Italy (6 980 million litres), and France (5 300 million litres). Italy is the country with the highest per capita consumption (124.0 litres per year), followed by Belgium (105.4), Germany (102.6), France (82.5), and Austria (76.0). France is the main exporter to countries outside of the EU (173 million ECU), followed by Italy (19 million ECU) and Belgium (10 million ECU).

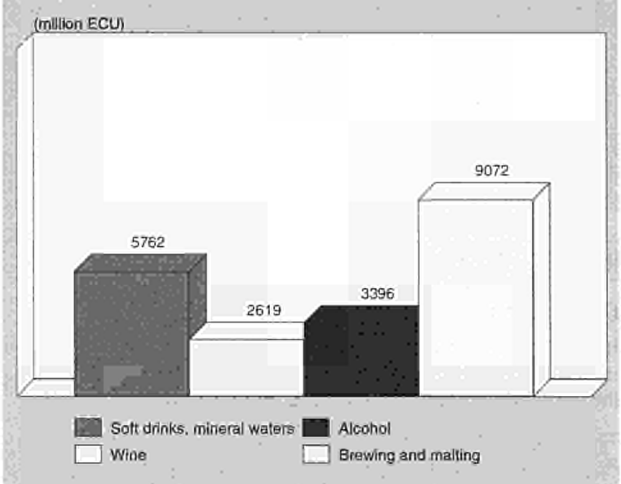
Turning to value added, Germany stands out with approximately 1 600 million ECU, followed by France, the United Kingdom, Spain, and Italy. Germany, France, and the United Kingdom make up a share of approximately 65% of total EU value added.

Recent trends

During the last ten years, consumption and production of soft drinks and mineral waters have grown continuously in volume terms. This growing trend was sharply curtailed from 1990 to 1994 (when average real annual growth rates for consumption and production were respectively 0.23% and 0.54%), in comparison with the 1985-90 period (with corresponding values of approximately 9%). However, the data for 1993-94 indicates a sharp recovery (growth rates of approximately 7%).

The sector of soft drinks and mineral waters has held up rather well in comparison to total manufacturing. Production in the sector grew more quickly than total manufacturing until 1990. During the following years, the trend remained substantially in line with total manufacturing.

Figure 1: Soft drinks, mineral waters
Value added in comparison with related industries, 1994



Source: DEBA GEIE

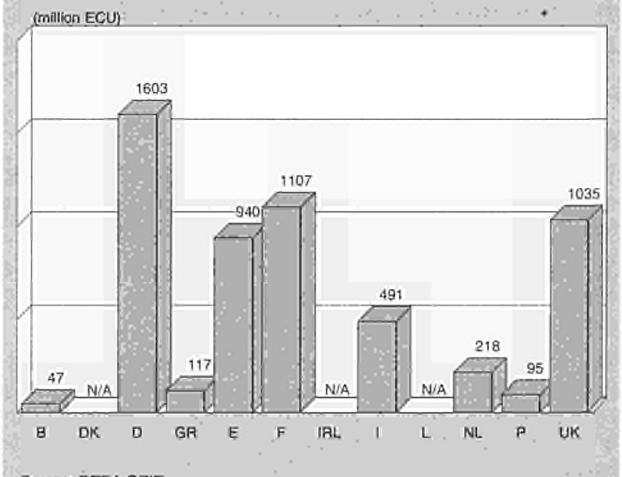
The generalised drop in the number of employees which affected the EU economy also took place in the sector of soft drinks and mineral waters. Employment in the sector reached the lowest value of the decade in 1994. Thus, the increase in employment during previous years was completely eroded. In fact, up to 1990, the sector was characterised by stronger increases in comparison to total manufacturing.

Since 1985 the value of exports has doubled (586.1 million ECU at current prices in 1994 compared with 232.4 million ECU in 1985). This value, however, represents a negligible share of total European production.

International comparison

During the last ten years the international situation has changed completely. In 1985, production at current prices in the USA reached values that were a little higher than today's (25 410 million ECU). The EU and Japan followed at great distance: production in these countries reached values equal to approximately 1/3 and 1/4 respectively of the US values. Nowadays, while production levels remain practically unchanged for the USA, they have consistently grown in the EU and Japan.

Figure 2: Soft drinks, mineral waters
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Soft drinks, mineral waters
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	9 256	15 040	16 925	17 470	18 210	17 719	19 165	19 511	20 968	22 450	24 100	25 930
Production	9 462	15 279	17 196	17 822	18 526	18 078	19 564	19 951	21 449	22 970	24 660	26 540
Extra-EU exports	232	308	341	422	393	451	586	542	520	570	640	700
Trade balance	205.6	239.2	271.8	352.4	315.8	359.6	398.7	440.5	481.1	520.0	560.0	610.0
Employment (thousands)	91.5	99.6	101.4	101.9	99.0	94.8	91.2	88.0	93.9	90.0	90.0	90.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Soft drinks
Main indicators by Member State, 1994

(million litres)	DK	D	IRL	I	NL	A	P	FIN	S
Apparent consumption	391.1	7 310.0	292.0	2 585.0	1 197.2	724.0	430.1	228.9	703.8
Exports	15.5	77.0	N/A	31.5	467.9	268.0	2.0	16.7	20.3
Imports	11.3	345.0	60.0	26.6	126.7	32.0	27.5	6.1	21.0
Production for home market	379.8	6 165.0	232.0	2 589.9	1 070.5	692.0	402.6	222.8	682.8
Consumption per capita (litres)	76.0	87.8	83.4	48.3	77.7	90.5	43.7	45.1	80.5
Number of enterprises (units) (1)	N/A	236	N/A	N/A	9	. 27	40	12	13
Employment (units)	N/A	24 000	2 100	N/A	2 371	2 056	2 120	1 200	1 900

(1) Enterprises with 20 or more persons employed.
Source: Unesda

Table 3: Mineral water
Main indicators by Member State, 1994

(million ECU)	B	D	E	F	I	IRL	NL	A	P	UK
Consumption (litres/head) (1)	105.4	102.6	56.0	82.6	124.0	9.0	15.7	76.0	30.4	7.9
Production (million litres) (2)	726.5	7 300.0	2 280.8	5 300.0	6 980.0	31.5	124.6	609.5	303.8	462.0
Extra-EU exports (3)	10.4	6.2	4.1	173.5	19.9	0.3	1.3	N/A	2.8	3.5
Trade balance (3)	. 10.3	1.1	4.1	173.3	19.0	0.3	1.1	N/A	2.8	3.1

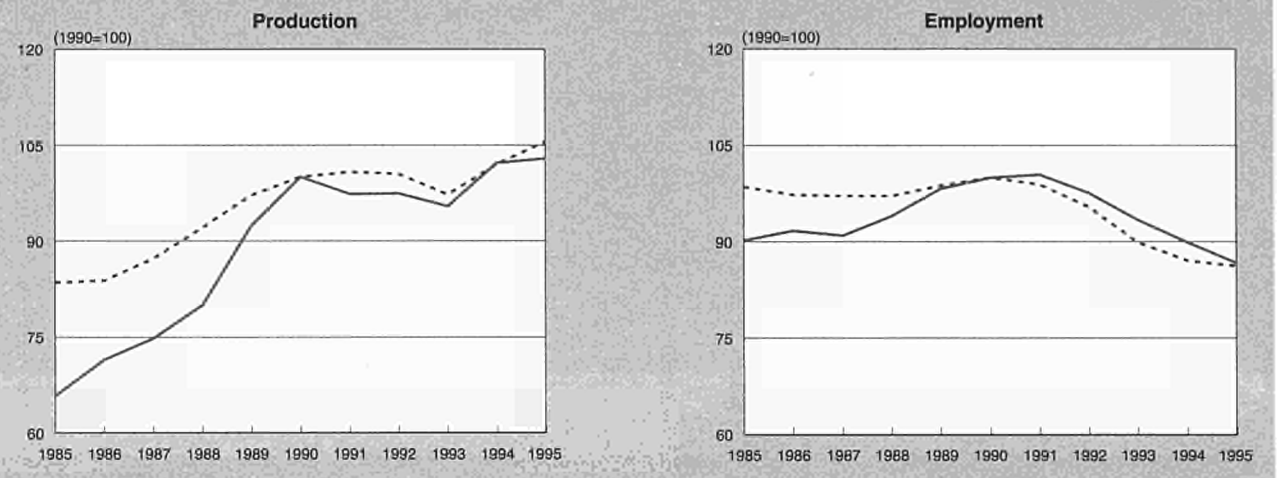
(1) France, estimates.
(2) Belgium and France, provisional figures.
(3) Belgian data includes Luxembourg.
Source: GISEM - UNESEM, Eurostat

Table 4: Soft drinks, mineral waters
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	8.80	0.23	4.91	6.81
Production	8.74	0.54	5.02	7.11
Extra-EU exports	7.24	16.26	11.16	26.59
Extra-EU imports	18.73	17.96	18.39	66.12

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Figure 3: Soft drinks, mineral waters
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

reaching values of approximately 20 000 million ECU in the EU and exceeding 17 000 million ECU in Japan.

The growth in production in the EU and Japan is confirmed in volume terms until 1990. In the following years, growth rates oscillated between positive and negative. Growth has resumed in the USA since 1990, after a short period of negative growth.

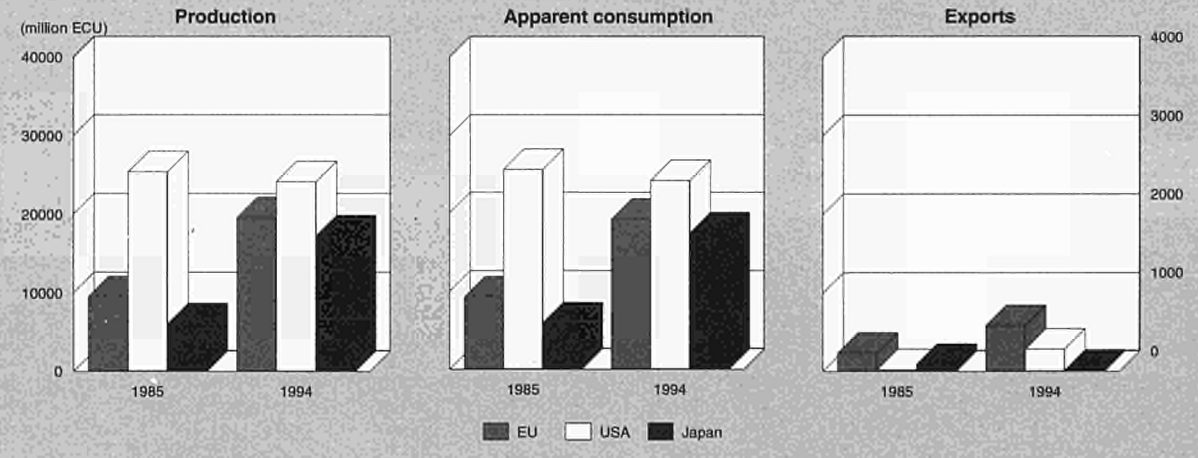
Foreign trade

In the last few years, extra-EU trade of soft drinks and mineral waters has been more lively. In spite of this, the volume of trade remained marginal in comparison to domestic production and consumption levels. This is confirmed by the very low values of both export intensity (around 3%) and import penetration (less than 1%). A sudden increase in imports took place during 1993-94 with a change in the growth rate of the import penetration ratio of 90.2%.

Throughout the last decade, the trade balance has always remained positive and approached values of nearly 400 million ECU in 1994. The EU's margin of self-sufficiency in the sector of soft drinks and mineral waters should consolidate following the entry of the three new Member States. In fact, the entry of Austria into the EU will mean the absorption of the EU's main commercial partner for imports: in 1994. About 62% of extra-EU imports came from this country. Also, the role of Switzerland is significant as it represented 17.7% of extra-EU imports.

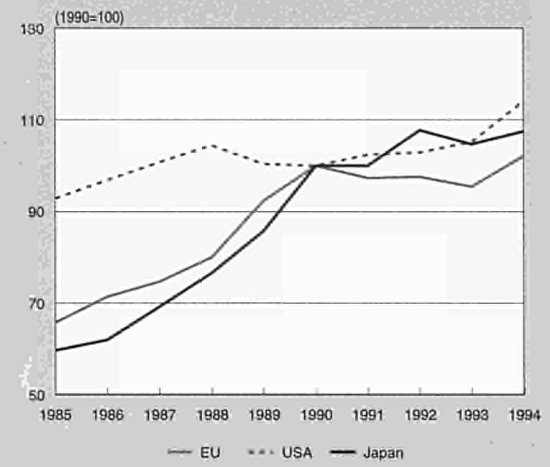
The picture on the extra-EU export market is more varied. The importance of the USA as a destination of extra-EU exports has decreased (18.5% of total exports in 1994 compared to 35.7% in 1989). In addition, Switzerland and Canada have given way to Russia (17.6% of total exports in 1994), and Japan (8%).

Figure 4: Soft drinks, mineral waters
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Soft drinks, mineral waters
International comparison of production in constant prices



Source: DEBA GEIE

MARKET FORCES

Demand

The composition of the consumption of soft drinks and mineral waters varies by country, both in terms of quantity and of quality. The analysis of the main European markets points to a first distinction between countries that consume mainly mineral waters and countries in which the consumption of soft drinks has a larger share. The first group is made up of France and Italy. The United Kingdom, the Netherlands and Spain are instead characterised by a definite preference for soft drinks. The situation in Germany is more equilibrated although German consumers have a definite preference for fruit juices.

Even though the soft drink market is becoming progressively more globalised, this differentiation reflects the persistence of profound differences in taste. While the colas are generally the dominant soft drink almost everywhere, the situation is more varied when the focus turns to other popular soft drinks. Orange and lemon-lime drinks make up a considerable segment in Italy and an appreciable segment in Germany, Belgium, the Netherlands, and Spain. In the United Kingdom concentrates, still fruit drinks, cordials, and lemonade are dominant over the colas. The French prefer tonics, bitters, and carbonated fruit drinks. In Italy there has been a large increase in the consumption of iced tea in the last few years, in line with consistent consumption levels in Switzerland and Austria.

In the latest generation of products, the position of light drinks (sweetened by non-sugar products) is stable. However, the importance of other alternative drinks is growing. Sports drinks seem to have overcome the product launch phase and started a consolidation phase. The products declared free from chemical additives (for example, caffeine-free diet cola) and the energy drinks (with the addition of taurine, caffeine, guarana, and ginseng) respond to more specific targets. Presently they are products that occupy niches, but it is possible to forecast a progressive increase in their market share.

In the mineral waters segment, still waters are consumed especially in Spain, France, Italy, Belgium, and the United Kingdom. Instead, consumption of sparkling waters is considerably higher in the Netherlands and Germany. Sparkling mineral waters often acquire the status of a premium product and are sold for prices that are considerably higher than those of still waters.

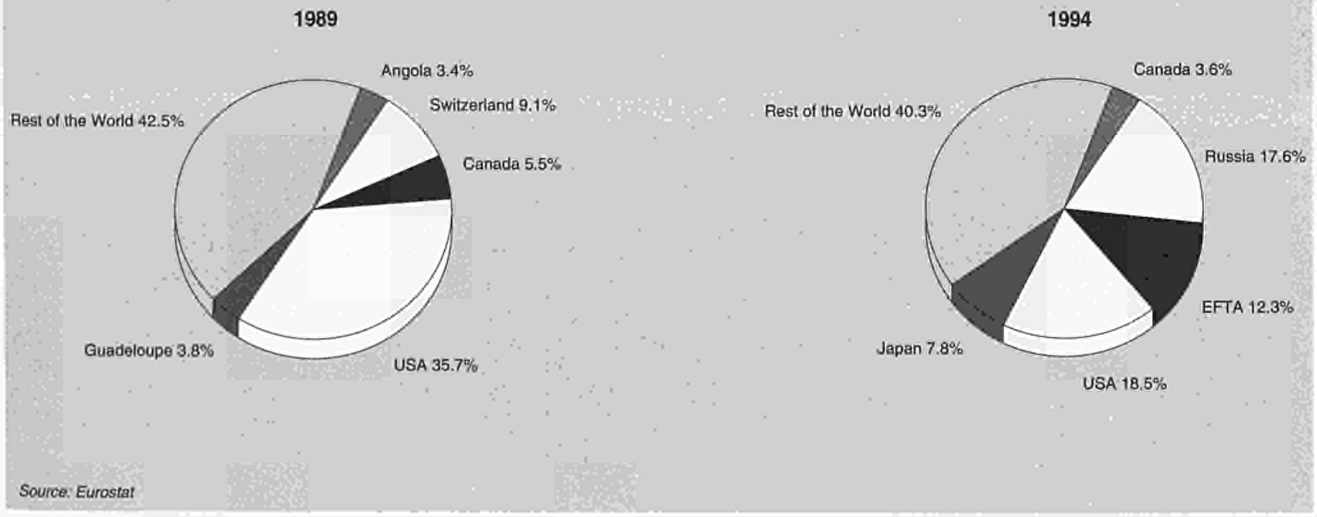
In general, all the national markets in the EU are characterised by a progressive growth in consumption. There are various factors that influence this increase, such as the reduction in the consumption of alcoholic beverages, which has been reinforced by the recent recession; the related general preference towards healthy eating habits (the effects of which are partially limited by the strong competition from fruit juices); the distrust of tap water, particularly strong in some countries; and targeted marketing campaigns. We can also mention the following factors which had a significant influence: the increase in meals eaten outside of the home, strong product innovation. Furthermore, the widespread availability of PET plastic containers has increased growth in "take-home" sales.

Finally, it is necessary to point out the new connotation taken on by mineral waters: smaller PET bottles sold in multipack format are being increasingly consumed as an alternative to traditional soft drinks and are stimulating outdoor consumption.

Supply and competition

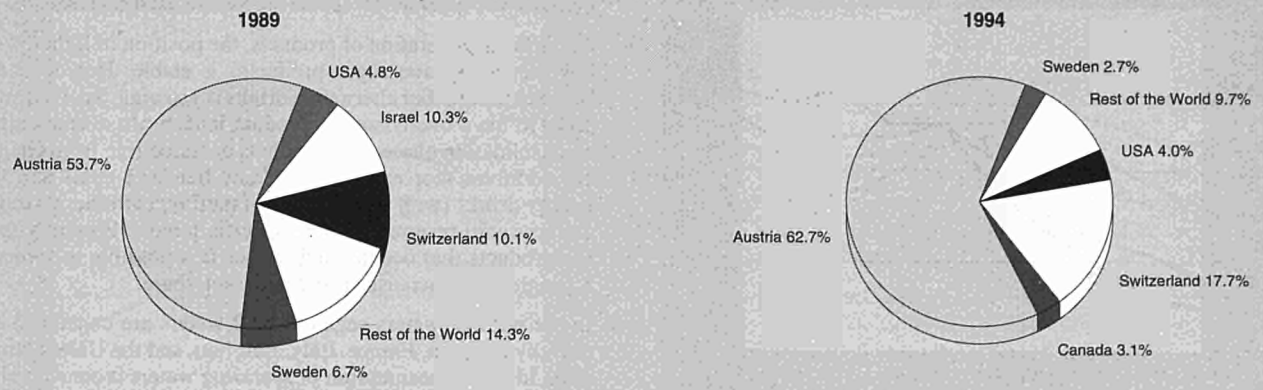
A typical feature of the sector of soft drinks and mineral waters is the almost complete satisfaction of consumption by

Figure 6: Soft drinks, mineral waters
Destination of EU exports



Source: Eurostat

Figure 7: Soft drinks, mineral waters
Origin of EU imports



Source: Eurostat

Table 5: Soft drinks, mineral waters
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	232.4	229.0	231.7	245.6	307.9	341.3	421.8	393.4	450.7	586.1	541.9	520.3
Extra-EU imports	26.8	30.7	32.2	44.4	68.7	69.5	69.4	77.7	91.1	187.4	101.4	39.1
Trade balance	205.6	198.3	199.5	201.2	239.2	271.8	352.4	315.8	359.6	398.7	440.5	481.1
Ratio exports / imports	8.7	7.5	7.2	5.5	4.5	4.9	6.1	5.1	4.9	3.1	5.3	13.3
Terms of trade index	106.2	101.1	109.6	95.7	89.9	100.0	97.6	87.1	81.3	67.5	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 6: Soft drinks, mineral waters
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	72.9	77.8	82.2	85.1	94.0	100.0	96.9	99.9	102.1	113.6
Unit labour costs index (3)	102.5	100.1	99.6	101.2	99.2	100.0	111.5	114.4	114.5	104.8
Total unit costs index (4)	84.2	84.7	86.2	90.0	95.9	100.0	107.8	111.2	111.1	110.1
Gross operating rate (%) (5)	14.8	15.6	16.2	15.0	14.1	13.9	13.2	12.9	12.9	13.9

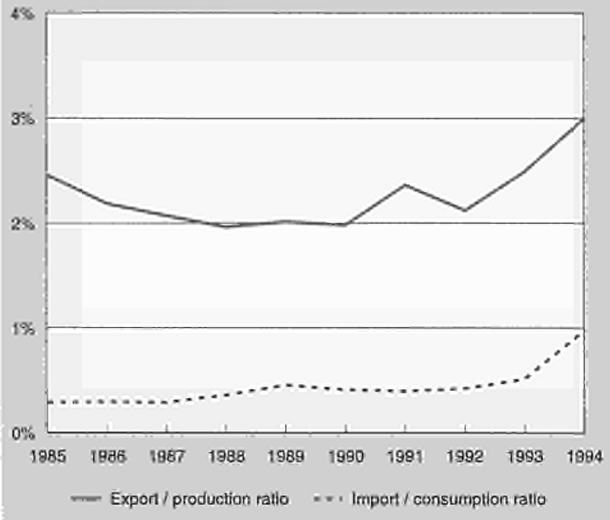
(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 7: Soft drinks
Packaging used, 1994

(%)	DK	D	IRL	I	A	P	FIN	S
Returnable glass / plastic	94.0	71.9	9.1	10.7	39.9	45.7	87.6	59.7
Non returnable plastic (one way)	0.0	0.0	59.2	67.4	26.1	32.2	0.0	10.4
Metal	0.0	11.7	19.2	17.0	14.3	11.1	1.1	13.0
Cardboard	0.0	0.0	0.0	4.2	8.0	1.3	4.2	6.9
Non returnable glass (one way)	0.0	10.1	6.1	3.7	5.1	5.7	7.1	4.2
Pre / post mix	6.0	6.3	6.4	5.1	6.6	4.0	0.0	5.8

Source: Unesda

Figure 8: Soft drinks, mineral waters
Trade intensities



Source: DEBA GEIE, Eurostat

means of internal production. In fact the high cost of transport limits foreign trade to premium products and accounts for the fact that trade is almost exclusively with bordering countries.

The recession in the last few years has reduced sales volumes through the hotels and restaurants channel (except for fast-food restaurants), while large distribution outlets increased their importance due to the growth in domestic consumption of soft drinks and mineral waters resulting from the availability of containers more suited to consumer preferences. In fact, cans' or "tetra-pack" containers' use is usually linked to impulse purchase aimed at quenching thirst; on the other hand, large PET bottles, sold in multipack format are an usual item of the weekly shopping, to be consumed at home.

The improvement in labour productivity was especially large during 1993-94 (+11.29% over the 1992-93 period), mainly as a consequence of the drop in employment levels. Also, the gross operating rate grew (whose annual percentage of change was 8.31 in 1993-94), thus reversing the negative trend that started in 1987. This reversal is mostly due to the stop of the increase of the labour cost.

Production process

The widespread use of polyethylene (particularly PET) has significantly changed the packaging of soft drinks and mineral waters. In every EU country, PET has now almost completely replaced glass, which maintains a share of approximately 10% of packaging.

The case of Denmark, Finland, and Germany is significant: containers in these countries are mostly made up by plastic refillable bottles (PRB) (DK 94%, FIN 87.6% and D 71.9% of all containers) or returnable glass bottles (DK 6%, FIN 7.1% and D 10.1%). The policy of recycling is not yet sufficiently developed in other countries like Italy or Ireland, where non-returnable plastic bottles are still the most used packaging item (respectively 67.4% and 59.2% of the total).

Metal packaging, essentially represented by aluminium cans, is being less used (also as a result of the recent price hike of aluminium), and accounts, for example, for 17% of soft drinks' packaging in Italy, 13% in Spain and 11.7% in Germany.

INDUSTRY STRUCTURE

Companies

The largest companies that operate in the sector of soft drinks in Europe are PepsiCo Inc. (US), Coca Cola Co. (US), Coca Cola and Schweppes Beverages -CCSB- (UK), Pernod Ricard (F), San Benedetto (I), La Casera (E), Britvic Soft Drinks Ltd. (UK).

The European leaders in the sector of mineral waters are Perrier Vittel (F), Danone Group (F), San Benedetto (I), San Pellegrino (I), Gerolsteiner Brunnen Gmbh & Co. (D), Mineralbrunnen Uberkingen-Teinach AG (D), Vichy Catalan (S), and Highland Spring (UK). In both segments, the first two producers (PepsiCo Inc. and Coca Cola Co. for soft drinks and Nestlé Source Int. and BSN for mineral waters) have a turnover that is considerably higher than that of their other competitors.

In the case of mineral waters it is necessary to emphasise that production is very closely related to the location of the springs and creates a high fragmentation of the supply. The majority of enterprises that operate in this sector are small and have regional reference markets. Less frequently, they are medium-size companies that operate on a national and international scale. The situation is reversed in the case of soft drinks, where the degree of market fragmentation is lower. Large economies of scale are achieved during bottling.

Strategies

M&A activity in 1995 strongly increased with respect to the previous year: major operations doubled from 10 to 21. Generally, the bidder's country and the target country were one and the same. France and the United Kingdom were the most lively markets. The Nestlé Group was especially active, making four acquisitions in different countries.

Soft drinks and mineral waters are characterised by high transport and storage costs in relation to the value of the product. Imports and exports, therefore, make up a small part of the market and are mainly limited to bordering countries. Usually, large soft drink manufacturers operate by means of a franchise system, under which one or more indigenous manufacturers produce a particular product under license for the domestic market. However, Coca Cola and PepsiCo have lately been increasing their direct involvement in some European markets by cutting out their licenses and building their own manufacturing and bottling plants.

Marketing policies are important for survival on the market. Advertising and sponsoring play a big role, in particular for multinationals (for example, the sponsoring of important sporting events by Coca Cola and by Pepsi Cola), followed by product differentiation, increasing the product line, and packaging. With regard to packaging, increases in consumption were achieved through the introduction of larger bottles (1.5 litres) and multipacks.

The most recent product innovations (sports drinks, diet drinks, and energy drinks) allow new enterprises to penetrate the market. The attention gained by these products has also caused the large groups to concentrate on increasing their own range of products so as to completely cover the market demand.

In the case of mineral waters the progressive acquisition of premium status by sparkling waters must be emphasised. They are increasingly becoming direct competitors to soft drinks (witness the cases of Perrier, San Pellegrino, and Ty Nant). Also mineral waters have recently undergone product differentiation: flavoured waters (with peppermint, citrus, etc.) appeared on the market, and are experiencing a certain success, especially in France.

Table 8: Soft drinks, mineral waters
Acquisitions

1994 Bidder	Country	Target	Target country
MD Foods Amba	Danmark	Rynkeby Mosteri	Danmark
BSN	France	Aquaterra	Canada
Bad Brambacher Mineralquellen	Deutschland	Bad Brambacher Sprudel	Deutschland
Gerolsteiner Brunner & Co	Deutschland	Terme di Sant'Andrea	Italia
Pasquali	Italia	San Bernardo	Italia
Nordic Capital Svenska	Sverige	Falcon AB (Unilever)	Sverige
Nestlé	Switzerland	Sources du Col-Saint-Jean	France
Nestlé	Switzerland	CFHR (San Pellegrino)	Luxembourg
Orchid drinks	United Kingdom	Callitheke soft drinks (grand Met)	United Kingdom
Woodland Licensing	United Kingdom	HP Bulmer Holdings - Kiri Soft Drink Range	United Kingdom

1995 Bidder	Country	Target	Target country
Pago	Österreich	Oesterreichische	Österreich
Carlsberg	Danmark	Ringnes Beverage (Orkla)	Norway
Electricite et Eaux	France	Maurel & Prom	France
Holding Curinier - Eaux de Vals	France	Eaux de Pioule	France
Intermarche	France	Eaux de Sainte-Marguerite	France
Nestlé Source International	France	Aquas Minerales de Penaclara	España
Sofco	France	Cie Thermale de Dax-Spa Water	France
Unilever France (Unilever)	France	Jerome	France
Ballygowan Spring Water (Allied Lyon's)	Ireland	Aquaporte	Ireland
Campari	Italia	Bols Wessanen	Nederland
Garma Gourmet Group	Italia	Quaker Chiari e Forti Italia	Italia
Ringnes Beverage Co (Orkla)	Norway	Pripps Bryggerier AB	Sverige
Vichy Catalan	España	Fuentes de Mondariz	España
Spira	Sverige-United Kingdom-Nederland	Branded consumer products	Sverige
Nestlé Sources Int.	Switzerland	Hidden Spring	Philippines
Britannia Soft Drinks (Bass)	United Kingdom	Colman's of Norwich-Robinsons	United Kingdom
Cadbury Schweppes	United Kingdom	Dr Pepper Seven Up	USA
Cott Retail Brands	United Kingdom	Crystal Drinks	United Kingdom
Investor Group	United Kingdom	Soc. Eaux Saint-Alban-Les-Eaux	France
Kristal Fountain Water (NMC)	United Kingdom	Water Express (NMC)	United Kingdom
PepsiCo	USA	Ind. Veneta Imbott. (San Benedetto)	Italia

Source: Nomisma

ENVIRONMENT

The environmental problems of the sector of soft drinks and mineral waters are essentially linked to packaging. The use of a huge amount of polyethylene, which has almost completely replaced glass, has created problems with the disposal of plastic waste. Some countries, for example, Germany, with growing ecological worries has encouraged a return to the use of returnable glass.

REGULATIONS

Council Directive 80/777, as amended by Directives 80/1276 and 85/7, is the cornerstone of existing regulation in the sector of natural mineral waters. Such regulation concern waters extracted from the ground of a Member State and are recognised as natural mineral waters by the responsible authority as well as waters imported into the Community from a third country. The Directives define the characteristics of natural mineral waters, the treatments and additions which may be made to them and the condition of exploitation of springs. Only waters complying with these provisions may be marketed as natural mineral waters. Very precise rules on the labelling and packaging of natural mineral waters have been introduced by means of these Directives.

Packaging norms are of extreme importance to the sector: Directive 85/339 represented a first attempt to lay down rules on the use, recycling and disposal of containers for consumable liquids. This directive has now been replaced by the horizontal Directive 94/62, whose provisions will probably affect in the future the whole soft drinks and mineral waters industry, as well as other consumable goods. As far as taxation is concerned, the harmonisation of VAT within EU countries has to be considered the main priority for this sector.

OUTLOOK

The analysis of the sector of soft drinks and mineral waters points out to a continuing growth trend for both production and consumption in the next few years. Particularly, a progressive trend towards the globalisation of consumption can be foreseen, even though differences in taste will persist in the various countries.

Stronger consumption of soft drinks will consolidate the expansion of retail sales as opposed to the channel of hotels

and restaurants. In the sector of mineral waters, the market will split along two main product lines: still waters and sparkling waters (including the flavoured waters) which have become products that demand a premium price.

Greater attention to the environment should encourage the tendency towards the use of recyclable materials (both plastic and glass). The most recent product innovations (energy drinks, diet drinks, and sports drinks) as well as own-label brands will continue to gain larger market share.

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Tobacco
NACE (Revision 1) 16

The progressive increase in consumer awareness of the negative effects of smoking and of corresponding limiting measures (such as price increases and smoking bans) adopted by many EU countries all add to the stagnation in consumption of tobacco products.
The phenomenon is particularly evident in the north European markets which are, with some exceptions, characterised by lower and lower per capita consumption and a more pronounced recessive trend than elsewhere in the EU. The southern European countries, on the contrary, show stability in consumption and historically higher per capita consumption levels. The Spanish market, in particular, shows positive growth.
Finally, the EU share of world raw tobacco production, already quite low, is destined to decrease.

INDUSTRY PROFILE

Description of the sector

The tobacco industry includes all manufacturing activities inherent to tobacco, with the exception of agricultural cultivation and harvesting.

Among the products intended for the end market, over 90% of consumption is via cigarettes, with comparatively small consumption of cigars, pipe tobacco, and chewing and sniffing tobacco.

In 1994, total production was worth about 45 billion ECU and essentially directed towards the manufacture of around 700 billion cigarettes. This production is almost entirely conducted by a restricted group of producers.

The European market shows a low level of commercial integration with third countries. In fact, the incidence of exports and the balance of trade on total consumption usually oscillates around 2%.

Finally, in the ranking according to value added, the United Kingdom maintains an orientation towards tobacco production at high added value with almost 1.9 billion ECU, while Spain, driven by the liveliness of the domestic market, stands in second place. Germany falls back to third place although remaining by far the major European cigarette manufacturer.

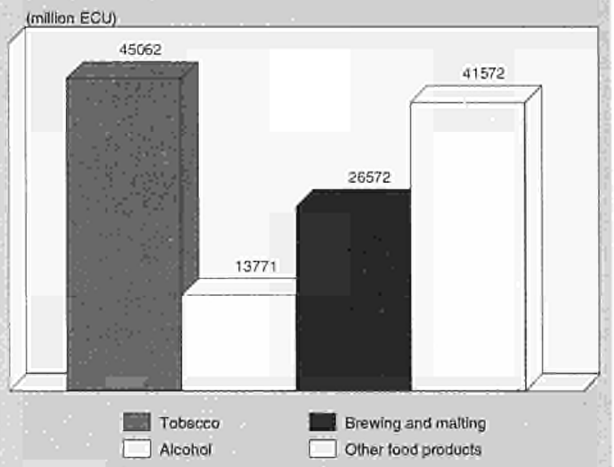
Recent trends

Cigarette consumption on the European market is in a phase of advanced maturity, characterised by a gradual but steady decline with an annual average decrease in volume terms of 2.5% during the last five years. A significant exception is represented by Spain, where growth in per capita income and female emancipation favour continuing growth in consumption.

Apparent consumption decreased from an average annual growth of -2.1% in the period 1985-90 to -2.8% in 1990-94. This development, much more pronounced if expressed in volume terms, was mitigated by the shift in demand towards qualitatively superior and thus more expensive products.

The fall in domestic consumption has greatly affected employment. In the last ten years, the number of employees in the sector decreased by almost 40%, a much steeper fall than the average for the entire manufacturing industry. In this context, additional reasons for the fall in employment have been the production rationalisation, and increased imports, which, although limited in absolute value, show an average growth of 30% per annum during the last decade.

Figure 1: Tobacco
Production in comparison with related industries, 1994



(1) Eurostat estimate.

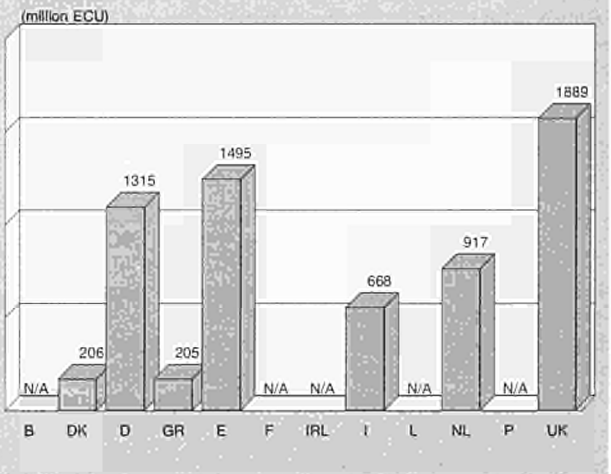
International comparison

World production of raw tobacco in 1995 was estimated at 7.24 million tons, an increase of around 11% over the preceding year. The major producers are China (45% of world production), the USA (10%), India (7%), Brazil (6%) and the EU (with around 5%).

Concerning the industrial transformation phase, world cigarette production amounted to around 5 235 billion pieces in 1994, a slight increase over to the preceding year. Once again, the People's Republic of China was the major producing country with nearly a third of world production, while the USA and the EU contributed with around 13% of the world total. It is interesting to note that Japanese tobacco production has increased in volume terms by about 40% in the last ten years, spurred by strong domestic consumption.

Concerning end markets, China is not only the largest agricultural and industrial producer, but also by far the largest consumption market (31% of world consumption). In 1994, apparent consumption of processed tobacco products reached 13.7 billion ECU in the USA and 22.6 billion ECU in Japan.

Figure 2: Tobacco
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Tobacco
Main indicators in current prices (1)

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)
Apparent consumption	31 998	31 051	33 138	33 481	35 206	36 925	40 562	39 468	40 424	44 898	43 702	47 034
Production	32 594	31 387	33 386	33 830	35 665	37 497	41 303	40 409	40 992	45 062	44 451	46 449
Extra-EU exports	712.6	611.3	594.1	647.6	739.0	889.3	1 211.3	1 423.6	1 510.0	1 062.3	1 400.3	1 448.4
Trade balance	596.0	336.3	248.1	348.9	459.3	572.7	741.5	940.8	567.8	163.9	952.5	964.3
Employment (thousands)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Tobacco
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	-2.03	-2.46	-2.22	5.79
Production	-2.07	-2.76	-2.37	3.40
Extra-EU exports	2.17	2.53	2.33	-29.39
Extra-EU imports	30.41	28.95	29.76	56.49

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Tobacco
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	712.6	611.3	594.1	647.6	739.0	889.3	1 211.3	1 423.6	1 510.0	1 062.3	1 400.3	1 448.4
Extra-EU imports	116.6	275.0	346.0	298.7	279.7	316.7	469.8	482.8	942.2	898.4	447.8	484.0
Trade balance	596.0	336.3	248.1	348.9	459.3	572.7	741.5	940.8	567.8	163.9	952.5	964.3
Ratio exports / imports	6.1	2.2	1.7	2.2	2.6	2.8	2.6	2.9	1.6	1.2	3.1	3.0
Terms of trade index	64.2	68.6	76.2	90.2	92.5	100.0	102.4	147.1	64.4	105.4	N/A	N/A

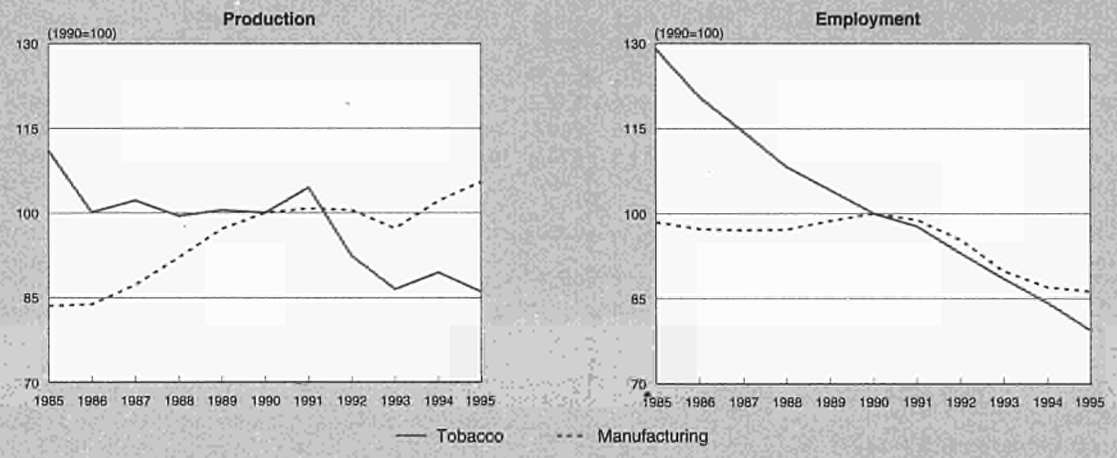
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Tobacco
Cigarette production

(millions)	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)
EUR12	651 767	654 569	661 401	698 924	729 684	719 074	677 624	696 618	688 672
Belgique/België, Luxembourg	26 877	27 046	25 884	25 977	25 419	27 885	25 492	24 300	20 750
Danmark	11 162	11 144	11 205	11 387	11 407	11 439	10 980	11 448	11 500
Deutschland	190 340	191 322	189 551	204 651	221 111	222 399	207 714	221 116	220 000
Ellada	28 853	28 780	28 533	29 430	29 100	29 100	28 800	28 400	28 200
España	80 500	78 400	79 500	82 500	86 904	89 500	77 474	81 930	79 000
France	54 160	53 307	54 225	55 495	60 311	53 312	47 912	48 726	48 000
Ireland	7 700	7 750	7 800	7 850	7 850	7 850	7 850	7 850	7 850
Italia	70 339	66 486	67 759	61 746	57 642	53 704	54 890	55 138	55 300
Nederland	52 335	61 724	68 849	78 345	87 078	81 440	84 251	88 000	90 000
Portugal	14 966	14 610	14 595	15 526	15 659	15 757	15 476	15 360	13 772
United Kingdom	114 535	114 000	113 500	126 017	127 203	126 538	116 785	114 350	114 300
USA	689 400	694 500	677 200	709 700	694 500	718 500	661 000	725 600	716 500

(1) Estimates.
Source: FAO

Figure 3: Tobacco
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

The EU is the leader in international trade of cigarettes, being the main import (196 billion cigarettes) and export (258 billion) market in 1995. On the import front other important countries are Russia (77 billion) and Japan (70 billion); Saudi Arabia, Colombia and Korea follow at a distance. On the export front, US exports (250 billion) nearly reach EU exports, and are notably higher than those of the following countries. In third and fourth place are Bulgaria with 41 billion cigarettes and Switzerland with 24 billion.

Finally, newly industrialised countries, particularly China, Eastern Europe, Russia and the Philippines, are enjoying progressive growth in domestic tobacco consumption as a consequence of the increase in per capita income and the introduction of western consumption models. On the contrary, industrialised countries, such as the USA and the EU (with some notable exception, such as Spain or Japan) are characterised by falling demand as a result of the increasing restrictions and bans on smoking and, more generally, of the progressive disappearance of the status significance implicit in the consumption of tobacco.

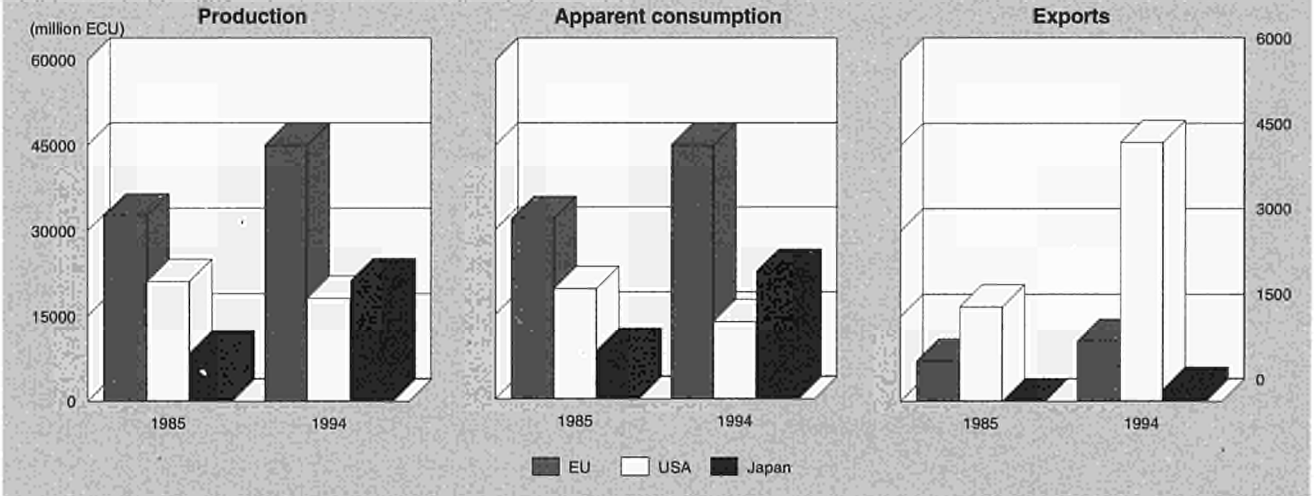
Foreign trade

In 1994, the EU processed tobacco industry had a net trade surplus of around 164 million ECU and extra-EU exports close to 1 063 million ECU. In particular, the EU is the main world importer and exporter, not only of cigarettes, but also of raw tobacco for a negative balance in 1994 of around 288 000 tons.

Concerning the end markets of European exports, it must be noted that from 1989 to 1994 the level of geographical distribution increased; in fact, the share of the top five markets has fallen from 40% to 27%. Russia is the largest market with a share of over 7% while Hong Kong, Switzerland and Taiwan stand at over 5%. High exports to small countries in the Far East (Hong Kong and Taiwan) are probably a result of illegal imports into the Chinese market. Exports to the Middle East area have drastically decreased in the 1989-94 period, undermined by the competition of cheaper products from US multinationals.

On the import side, the share of the Canary Islands - stable at around 70% of total - is a result of on-the-spot trading activities carried out by the multinationals. The other countries

Figure 4: Tobacco
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Table 5: Tobacco
Cigarette consumption, 1994

(billions)	Total	Number of smokers (millions)	Per smoker (cigarettes / day)
EUR15 (1)	612.0	96.7	17.3
Belgique/België, Luxembourg	16.2	2.6	17.1
Danmark	8.7	1.6	14.9
Deutschland (1)	136.5	24.0	15.6
Ellada	28.2	3.7	21.2
España	87.6	9.6	25.0
France	90.1	15.0	16.5
Ireland	6.0	0.7	22.1
Italia	90.6	12.8	19.4
Nederland	16.5	4.5	10.1
Österreich	14.1	1.6	24.1
Portugal	15.8	2.0	21.6
Suomi/Finland	5.7	0.9	18.4
Sverige	8.7	2.0	11.9
United Kingdom	87.3	15.8	15.1

(1) Including former East Germany.
Source: CECCM

Table 6: Tobacco
Cigarette external trade

(billions)	1989	1990	1991	1992	1993	1994	1995 (1)
Imports							
World	405.6	461.4	525.5	567.9	601.0	620.9	629.0
EUR12 (2)	122.9	129.8	135.6	145.5	156.4	188.7	196.3
Five largest non-EU importers							
Former Soviet Union	55.5	77.7	96.5	91.5	85.4	92.1	76.6
Japan	45.7	51.8	55.4	57.1	58.7	66.9	70.0
Saudi Arabia	18.0	18.5	19.0	19.0	19.5	20.0	20.0
Colombia	14.0	13.4	13.9	14.1	10.9	12.2	13.3
South Korea	N/A	4.2	5.3	5.5	7.3	8.4	9.6
Exports							
World	506.5	623.6	712.1	804.4	780.1	885.5	969.4
EUR 12 (2)	172.3	196.9	238.1	249.0	217.7	249.1	257.7
Five largest non-EU exporters							
USA	141.7	164.3	179.4	205.6	195.5	220.2	250.0
Bulgaria	68.8	61.2	60.6	39.1	22.6	40.1	41.4
Indonesia	9.9	14.4	15.1	23.1	22.7	15.8	14.3
Switzerland	12.5	15.4	16.9	18.2	17.8	24.1	24.4
Former Soviet Union	0.0	2.5	2.5	2.0	5.2	11.5	5.2

(1) Estimated.
(2) Including former East Germany from 1991 onwards.
Source: FAO

supplying the EU are the USA with about 8%, Switzerland (6.5%) and Cuba (3.9%), mainly for cigars.

From 1989 onwards, a drop in imports from the USA and Cuba has emerged, partially due to the progressive replacement with European-made tobacco products and the decrease in the consumption of cigars.

MARKET FORCES

Demand

The European processed tobacco market is in a phase of profound transformation. The consumption of cigarettes no longer responds to the dominant lifestyles, especially among youth, and is starting to lose its connotation as element of social emancipation among women.

Significant phenomenon is the shift towards extra-mild, low-tar cigarettes, caused by concerns over health, together with government legislation. In Germany, for example, low-tar cigarettes were the best performers between 1989 and 1993, with sales increasing from 3% to 11% of total volume sales.

Another significant shift has been the move towards American-blend cigarettes or blondes. In France they now account for about 70% (61% in 1989), in Spain the share is around 60% (54% in 1989). This growth has been accelerated by focused advertising, be it direct or indirect.

Sales of filter cigarettes have also grown in recent years, to the extent that they now account for 95% or more of volume sales in the UK, German and Italian markets. France, where sales of cigarettes without filters make up nearly 17% of the market, is the only main exception in this respect.

Table 7: Tobacco
Tobacco leaf external trade

(thousand tonnes)	1990	1991	1992	1993	1994 (1)
Imports					
World	1 458.3	1 628.8	1 698.0	1 662.6	1 628.7
EUR12 (2)	627.8	692.2	676.5	550.6	619.4
Five largest non-EU importers					
USA	198.8	266.7	324.9	359.7	264.4
Japan	80.1	101.4	117.0	118.7	135.5
Egypt	48.5	42.0	46.8	44.1	47.7
Indonesia	26.5	28.5	25.1	30.2	40.3
Former Soviet Union	36.4	35.0	35.0	112.0	35.0
Exports					
World	1 509.9	1 644.9	1 681.2	1 676.9	1 644.9
EUR12 (2)	340.8	351.8	312.1	326.5	330.5
Five largest non-EU exporters					
Brazil	188.1	190.4	243.0	243.5	275.5
USA	229.8	228.9	263.4	211.8	200.1
Zimbabwe	115.8	126.1	150.5	184.3	198.8
Turkey	94.8	136.6	76.5	91.4	103.7
Malawi	87.4	98.2	97.3	95.7	99.7

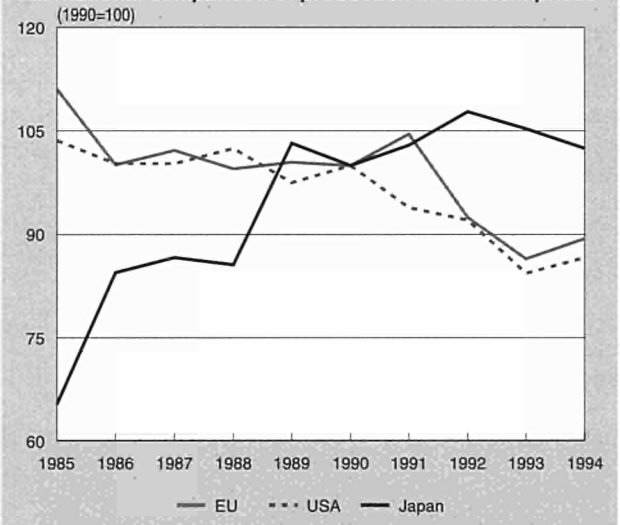
(1) Estimates.
(2) Including former East Germany from 1991 onwards.
Source: FAO

From the geographical division of consumption, it emerges that the largest European market is Germany with over 136 billion cigarettes sold and 24 million smokers, while France, Italy, Spain and the United Kingdom all show consumption levels of nearly 90 billion.

Turning to per capita cigarette consumption, however, the leadership of Spain emerges with an average of 25 cigarettes a day per smoker. Above 20 cigarettes are also Austria, Ireland, Greece and Portugal. At the bottom of the ranking, one can find the Netherlands, Sweden and Denmark.

In conclusion, although the sector is moving towards a progressive reduction in volumes consumed, some elements tend to mitigate this decline. First of all, there is the emergence of a preference for (higher-priced) better-quality products. Secondly, while the north European countries, and particularly the Scandinavian countries, show a low per capita consumption, the countries in the Mediterranean belt show contradictory signs. Spain, for example, is a market in counter-trend where consumption by females and youth is still developing and would appear to have positive growth also in the future.

Figure 5: Tobacco
International comparison of production in constant prices



Source: DEBA GEIE

Supply and competition

The processed tobacco sector is characterised in its industrial transformation phase by a high degree of concentration. The

Table 8: Tobacco
Acquisitions

1994 Bidder	Country	Target	Target country
Tchibo Holding SUB Reetsma	Deutschland	N/A	Ukraine
1995	1995		
Bidder	Country	Target	Target country
Tabacalera	España	General Cigars Company	USA
Financiere Richmond	Switzerland	Rothman's International	United Kingdom
BAT	United Kingdom	PWT	Poland
Loews (1)	United Kingdom	BAT	United Kingdom

(1) Brand acquisition
Source: Nomisma

Table 9: Tobacco
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.46	0.37
Danmark	2.02	1.68
Deutschland	0.92	0.94
Ellada	1.92	2.71
España	0.66	1.16
France	0.39	0.36
Ireland	1.19	0.97
Italia	0.94	0.98
Luxembourg	N/A	N/A
Nederland	N/A	1.56
Portugal	0.57	1.24
United Kingdom	1.73	1.60

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

competitors in this industry may be divided into two different strategic groups. On the one hand, the state monopolies (such as in Italy, France and Spain), with a significant share (around 50%) of the domestic market and with a multi-plant structure within the national territory. On the other hand, the remaining part of the market is solidly in the hands of a group of diversified multinationals, of Anglo-American culture, which manage the European business as a part of a world-wide portfolio of markets.

In perspective it may be predicted that a continuing diminished role of state monopolies in this sector and, on the other hand, a progressive industrial de-localisation by private competitors to areas with better growth prospects such as Eastern Europe or the Far East in the medium-long term. In fact, the changed attitudes of the consumer, the increase in tax burden, the decline in the agricultural production of tobacco and the high cost of labour could make a European localisation of this business less attractive. The drastic reduction in the number of employees and the general trend to decrease the level of industrial involvement (through licensing, productive concentration, etc.) appear to confirm this process.

Finally, the distribution channels are strongly conditioned by the presence of the state monopolies. In France, Spain, Italy and Austria the single-product retail (the tobacconists) hold a monopolistic trading position. In these countries all sales must pass through this channel and only subsequently can they be sold by other establishments like bars and restaurants. On the other hand, in the United Kingdom, Germany and the Benelux countries, tobacco products may be sold in various points of sale from food shops to vending machines or petrol stations.

Production process

The production process is characterised by the trend to increase the level of automation which allows, on the one hand, to increase labour productivity and, on the other, to improve quality control on the products.

The product innovation, however, mainly concerns American-blend tobacco preferred by the consumer. The lower nicotine and tar content is obtained thanks to the use of filters, "expanded tobacco" and through the improvement of the paper ventilation properties. In particular, "expanded tobacco" is made out of chopped leaves which undergo thermodynamic treatment to cause expansion which increases the yield in volume and decreases the relative nicotine content.

INDUSTRY STRUCTURE

Companies

In France, Spain and Italy the presence of a state monopoly ensures a market share of over 50% for the public companies (Monopoli di Stato in Italy, SEITA in France and Tabacalera in Spain). The rest of the market is firmly in the hands of American and British multinational groups.

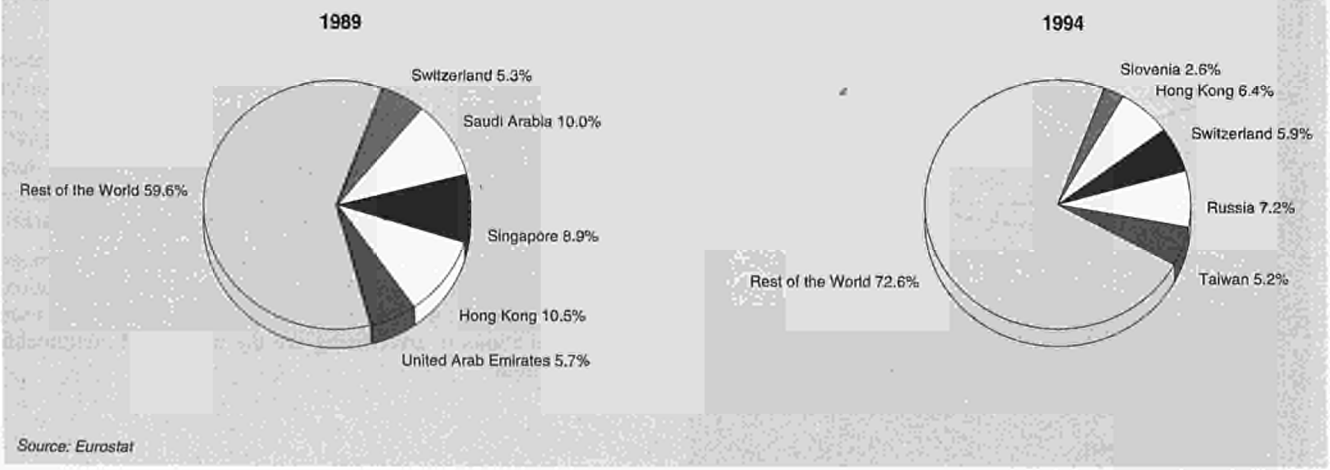
Among these, Philip Morris (US) is of prime importance and is among the three top firms in the majority of European markets, with the exception of the United Kingdom, with its brand Marlboro . The same firm ranks among the world's largest food & drink groups, is the top American cigarette producer and operates in the processed tobacco market of 107 countries.

RJR Nabisco (US) is another multinational operating in both tobacco and food. In Europe, it has a significant share in France, Germany and Spain, mainly with its brand Camel.

BAT (US/UK) is a conglomerate mainly active in the tobacco sector and financial services. In Germany it covers around 20% of the market and holds significant positions in the USA and Japan.

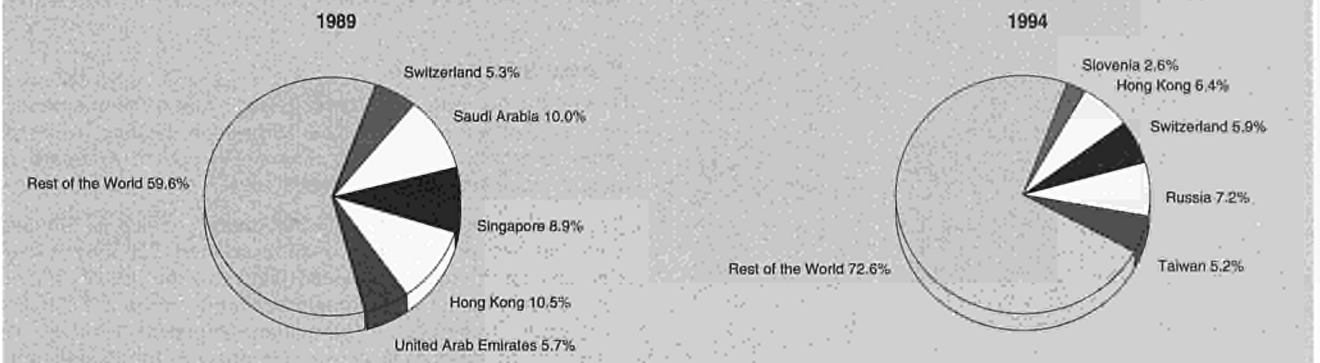
Gallather is the absolute leader in the Anglo-Saxon market with a share of around 45%, with its brands Benson & Hedges, Berkeley and Silk Cut.

Figure 6: Tobacco
Destination of EU exports



Source: Eurostat

Figure 7: Tobacco
Origin of EU imports



Source: Eurostat

The second largest competitor on the UK market (with a share of around 35%) is Imperial Tobacco with the brands Superkings, Embassy, Regal and John Player Special.

Finally, Rothmans has a significant position on the British, French and German markets. Furthermore, some recent acquisitions ensure leadership positions in Ireland, the Netherlands and, above all, Belgium.

Strategies

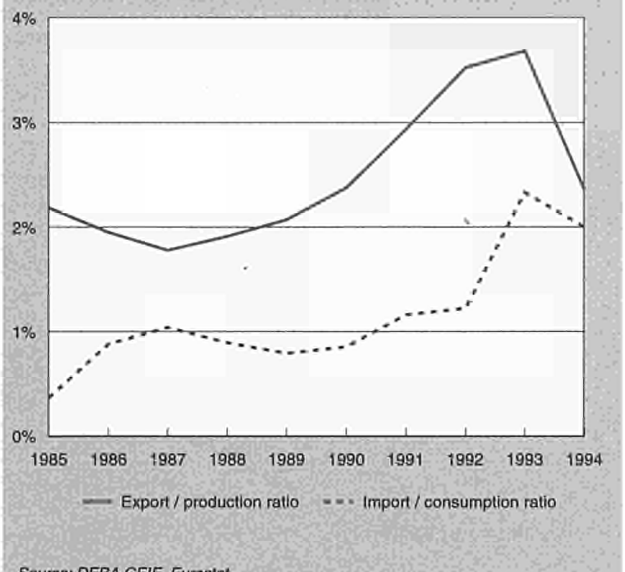
The stagnation in tobacco consumption has produced some structural adjustment processes in the sector. The mergers and acquisitions mentioned illustrate how the strategies of the European companies are guided by two basic principles.

First of all, the principle of international growth aimed at Eastern Europe; the companies have, since some years now, launched a production re-localisation process aimed at establishing direct presence in these emerging markets.

Secondly, concentration among European competitors appears to be aimed above all at the industrial and strategic re-settlement, typical of the sectors in an advanced stage of maturity. As a confirmation of this trend, the habit of the companies in this sector to make non-equity agreements must be emphasised, such as concession of brands under licence, production agreements with third parties and distribution agreements.

Finally, it is interesting to note that the operations assessed are realised for the major part by multinationals located in the United Kingdom while Tabacalera, pushed by the livelihood of the Spanish market, is the only dynamic state monopoly at international level.

Figure 8: Tobacco
Trade intensities



Source: DEBA GEIE, Eurostat

REGULATIONS

Reg. (EEC) 1727/70, which established the Common Market Organisation, has been replaced with effect from 1993 harvest by Reg. (EEC) 2075/92. Relevant modifications concern the premium system as well as the stabilisation mechanism. The new regulation abolishes intervention and refunds and introduce a supervisory agency for the scheme.

A global production ceiling is fixed for the entire EU, split between the 42 varieties of tobacco and between Member States. The purpose of these measures is to stabilise production and to orientate it towards the varieties most demanded on the market.

Reg. (EEC) 2075/92 has been recently amended by Reg. (EEC) 711/95 which modified the production quota system for 1995, 1996 and 1997 harvest. Reg. (EU) 1066/95 implemented this regulation by introducing the possibility of paying premiums directly to producers from the 1994 harvest onwards. In accordance with the new system of production quotas, Reg. (EEC) 3478/92 laying down detailed rules for the application of the premium system for raw tobacco, was amended by Commission Reg. (EU) 1067/95.

As far as approximation between Member States legislation is concerned, the Council adopted Directive 92/84 in order to implement the harmonisation process between EU countries with respect to indirect taxation,. Starting from January 1995, the Council shall examine every two years the rates of duty on manufactured tobacco and shall adopt the necessary measures to promote the proper functioning of the internal market.

Public health protection in the EU has been addressed through a series of policies aimed at limiting tobacco consumption. Severe taxation, information campaigns on health-education and limitations in advertising are the most used instruments in this field.

OUTLOOK

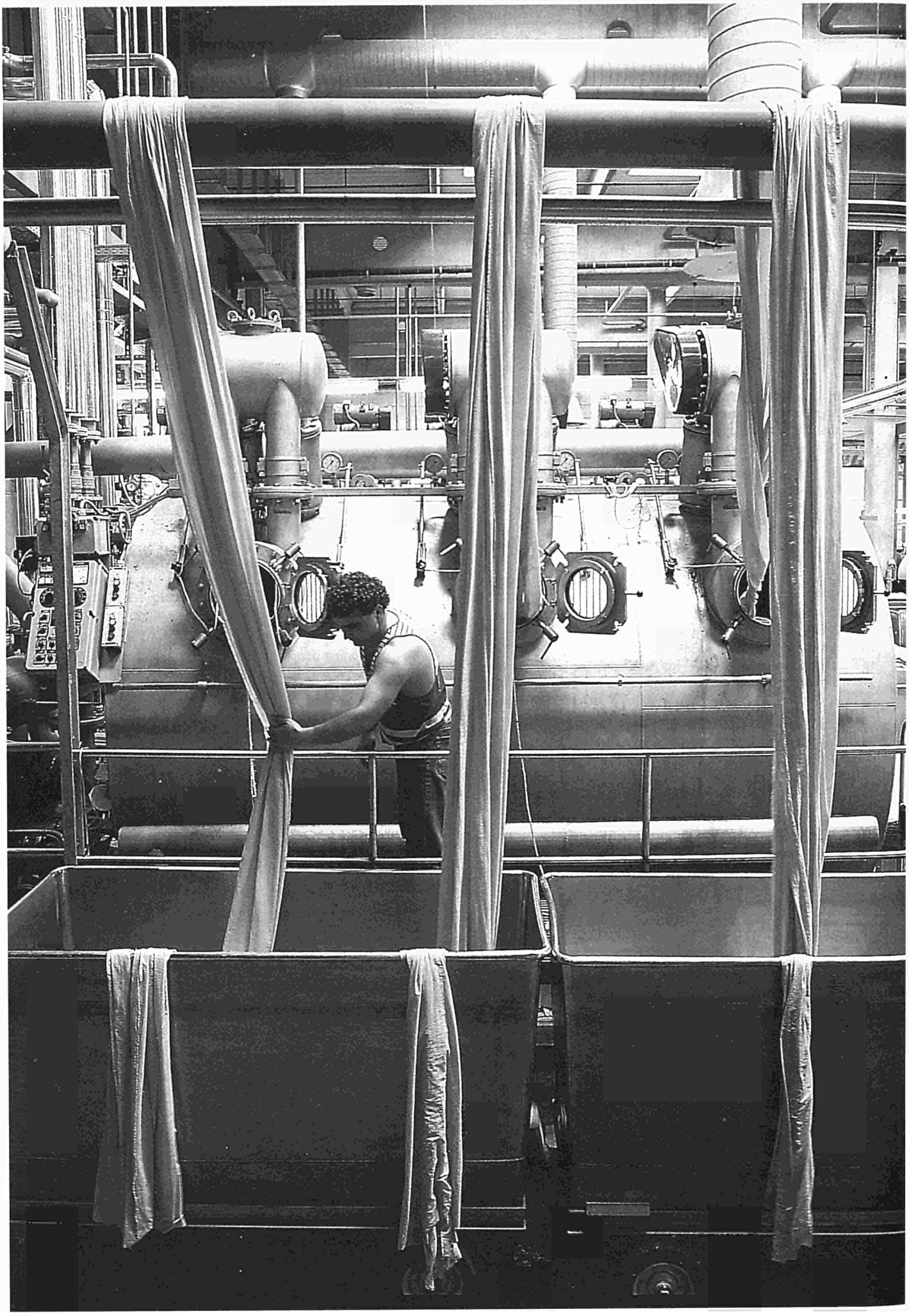
In the next few years, sales of cigarettes are expected to fall in most European markets. Governments will continue to raise tax levels on cigarettes, introduce further bans on smoking in public places and diminish or eliminate tobacco advertising in an attempt to reduce consumption. The new Scandinavian entries into the EU will likely boost EU proposals to ban all advertising.

Low-tar, blonde, premium-price cigarettes will continue to increase their market share, at the expense of more traditional hard, dark tobacco products.

Manufacturers are likely to pursue their effort to establish operations in extra-European markets (e.g. Eastern Europe, Russia) and to diversify their product range.

The fall of trade barriers will likely increase tobacco smuggling and force governments to tighten measures.

Written by: NOMISMA



Overview

NACE (Revision.1) 17, 18, 19

These four industries represent the traditional core of consumer goods manufacturing. While the upstream industries (textile and leather) produce mainly raw materials, the downstream industries (clothing and footwear) produce consumer goods. The links between the industries are very close, as the textile industry delivers almost half of its production to the clothing industry, and the leather industry is in the same position regarding the footwear sector.

Together, the four industries accounted for almost 6% of the EU manufacturing industry value added in 1994, and employed almost 2 million people (in enterprises with more than 20 employees). The textile and clothing industries, however, represent more than 85% of the production and value added of the four industries, and therefore dominate the developments of this industry grouping. The industries are largely concentrated in Italy, Germany, France and the UK, where 78% of their value added is generated.

In recent years, the production and employment sectors have developed less favourably than the manufacturing sector as a whole. Consumption increased steadily during the late 1980s, declined in tandem with the EU economy in the early 1990s, and after a considerable fall in 1993, it is once again on the verge of recovery. Continuously increasing EU exports, during the last five years or more, have been offset by the much higher rate of growth in imports. The traditional trade deficit of this group of industries has almost tripled in the last five years, to more than 14 billion ECU in 1994.

The main export markets of the four industries are other developed countries, such as the USA, Switzerland and Japan. After the accession to the EU, Austria, Sweden and Finland, which are considered to be important markets, have become part of the internal EU market. On the other hand, most of the imports to the EU are concentrated on a limited number of important supplier countries led by China, Turkey, India and Hong Kong, which accounted for one-third of EU imports in 1994.

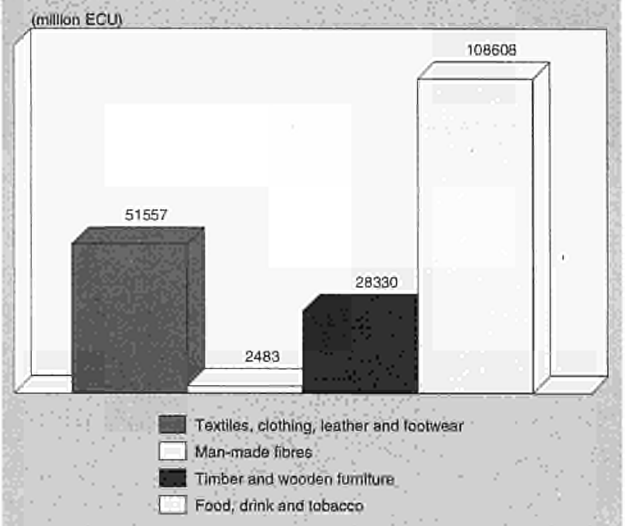
The four industries share the need to improve their competitiveness in the EU and world markets. Factors of strength, such as fashion, quality and brand names, the proximity of the world's biggest markets, greater export-orientation after the conclusion of Uruguay Round trade negotiations, new cooperation and sourcing strategies, as well as new structures of distribution, all these will be further developed. With the EU economy emerging from recession, prospects for these consumer goods industries will improve. However, opportunities and possibilities will not be the same in the different industries, in the sub-sectors, and in the different EU regions.

INDUSTRY PROFILE

Description of the sector

The textile, clothing, leather and footwear industries under review are defined by NACE (Rev.1) 17+18+19, which correspond to the former NACE 43+455 (textiles), 453 (clothing), 441 (leather) and 451 (footwear). The following data continue to be based on NACE 70, because available data have not yet been revised according to the new system. Also data for the three new EU Member States is not yet included. But this does not have much influence on the analysis, since their share in the four industries is rather small.

Figure 1: Textiles, clothing, leather and footwear
Value added in comparison with related industries, 1994

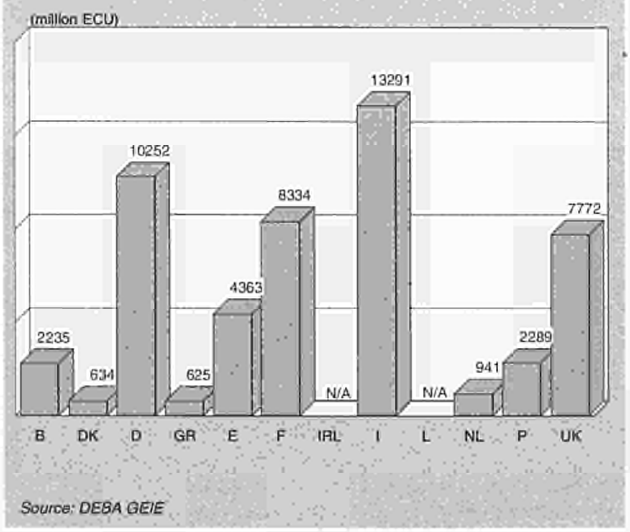


Source: DEBA GEIE

The consumer goods sector, represented by the four industries, is clearly dominated by the production of textiles and clothing, which together account for more than 85% of the sectors' production, value added and also employment.

The textile and clothing industries cover all production processes required for the manufacture of garments, from fibre preparation, spinning, weaving and knitting to cutting, assembly and finishing of clothing. The textile industry also covers the manufacture of household and technical textiles. The leather industry covers the tanning and finishing of hides and skins and their transformation into leather, which then as an intermediate industrial product finds numerous applications in downstream segments of the leather industry itself, as well as other consumer goods industries. However, the most important is the footwear industry.

Figure 2: Textiles, clothing, leather and footwear
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Textiles, clothing, leather and footwear
Main indicators in current prices (1)

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	133 870	133 811	143 531	151 500	162 136	172 816	180 434	177 841	164 833	169 313
Production	133 951	133 941	139 691	146 020	157 403	165 266	166 545	164 455	150 677	155 640
Extra-EU exports	24 631	23 077	22 619	23 411	27 519	28 367	28 198	29 275	30 961	35 149
Trade balance	81	130	-3 840	-5 480	-4 734	-7 550	-13 889	-13 386	-14 156	-13 673
Employment (thousands)	2 617	2 563	2 561	2 504	2 461	2 451	2 371	2 224	2 092	2 010

(1) Some country data for apparent consumption, production and employment have been estimated.
Source: DEBA GEIE, Eurostat, Cotance

Table 2: Textiles, clothing, leather and footwear
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Textiles	89 810	86 496	20 115
Clothing	55 857	44 808	8 135
Leather tanning and finishing	6 438	7 185	1 726
Footwear	17 208	17 151	5 173

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat, Cotance

Table 3: Textiles, clothing, leather and footwear
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.8	-0.4	1.9	3.2
Production	2.2	-1.2	0.7	3.5
Extra-EU exports	0.7	4.9	2.6	12.0
Extra-EU imports	9.2	7.0	8.2	8.1

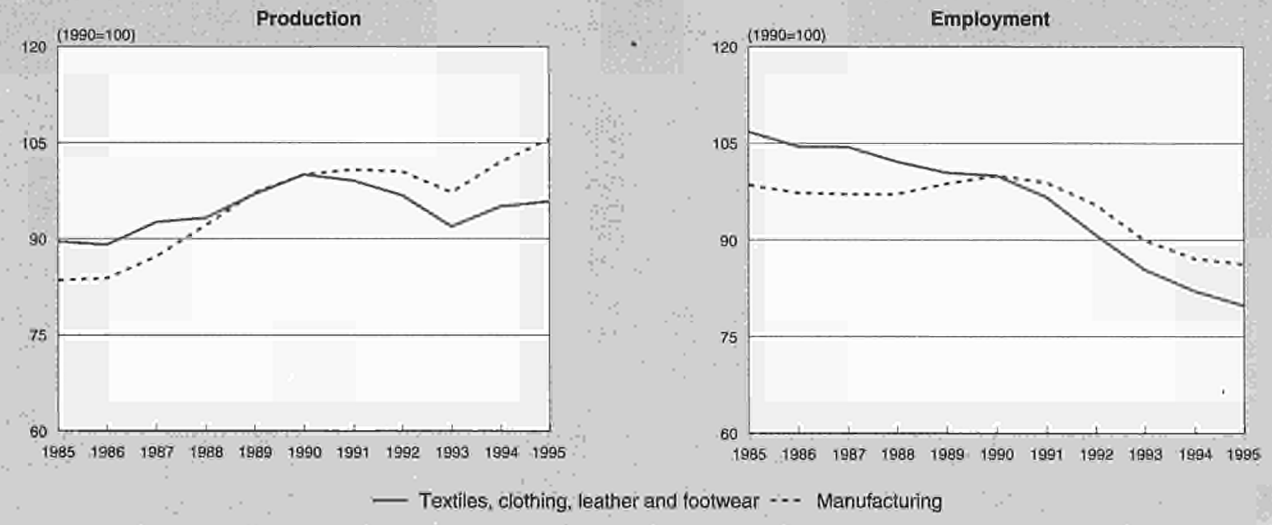
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat, Cotance

Table 4: Textiles, clothing, leather and footwear
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	24 631	23 077	22 619	23 411	27 519	28 367	28 198	29 275	30 961	35 149	37 169	34 261
Extra-EU imports	24 550	22 946	26 459	28 891	32 252	35 916	42 087	42 661	45 117	48 822	48 537	49 892
Trade balance	81	130	-3 840	-5 480	-4 734	-7 550	-13 889	-13 386	-14 156	-13 673	-11 368	-15 632
Ratio exports / imports	1.0	1.0	0.9	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.8	0.7
Terms of trade index	84.8	93.5	95.2	97.2	97.3	100.0	99.5	100.1	97.2	98.5	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat, Cotance

Figure 3: Textiles, clothing, leather and footwear
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

The production processes in most of these industries, apart from the capital intensive processes in the textile industry, are rather labour intensive, which makes them vulnerable to imports from low-cost developing countries. Another common characteristic for being competitive and successful in these industries is the importance of creativity, fashion and brand names.

Together, the four industries accounted for almost 6% of EU manufacturing industry value added in 1994, and employed almost 2 million people (in enterprises with more than 20 employees). Italy is the EU's most important location for these industries, with a share of 26% in total value added, followed by Germany (20%), France (16%) and the UK (15%). But industrial specialisation in these product sectors is sometimes higher in other Member States, such as Greece, Portugal and Spain.

Recent trends

The four industries heavily depend on general economic developments in the EU and world-wide. Moreover, the share of clothing and footwear in total consumer expenditure tends to decrease with growing income. Apparent consumption of textile, clothing, footwear and other leather goods, in current prices, increased steadily until 1991, but then showed a negative trend. In real terms, consumption increased from 1985 to 1990 by an average annual growth rate of 3.7%, but fell to an average annual 0.4% in the period from 1990 to 1994. In 1994, however, consumption increased again by 3.3%.

Production followed this development, but at a lower rate. Compared to an average real annual growth rate of consumption of 1.9% from 1985 to 1994, the average increase of production was only 0.7%. The reason was a much higher annual growth rate of imports (8%) than that of exports (2.6%) during the same period. The four industries, which had a trade deficit of only 0.4 billion ECU in 1985, were confronted with a trade deficit of 14.3 billion ECU in 1994.

The virtual stagnation of production, accompanied by increases in productivity in the period under consideration, has led to a continuous loss of employment in these industries. The number of employees, in enterprises with more than 20 employees, dropped from 2.6 million in 1985 to under 2 million in 1994, or by 23% in nine years. For the textile and clothing industry alone, and for all sizes of firms, the loss was even higher (-25%).

International comparison

The production, consumption and export of goods manufactured by the four industries are increasingly gaining importance in low-cost developing countries, particularly in China and other Asian countries, while production is declining in developed countries. Especially in footwear, the USA and Japan, with shares in world production of no more than 2 and 3% respectively, are no longer of great significance.

As compared with the USA and Japan, the EU is still the largest producer and exporter in the four industries, and has also the highest consumption. Based on value in ECU, the EU's apparent consumption of textile, clothing, footwear and leather products, in 1994, was 18% higher than that of the USA, and 58% higher than that of Japan. The EU's predominance in production, in the same year, was even more evident: it was almost 50% above the US level, and two-thirds above Japanese production. EU exports in 1994 were 3.3 times those of the USA, and 6 times those of Japan.

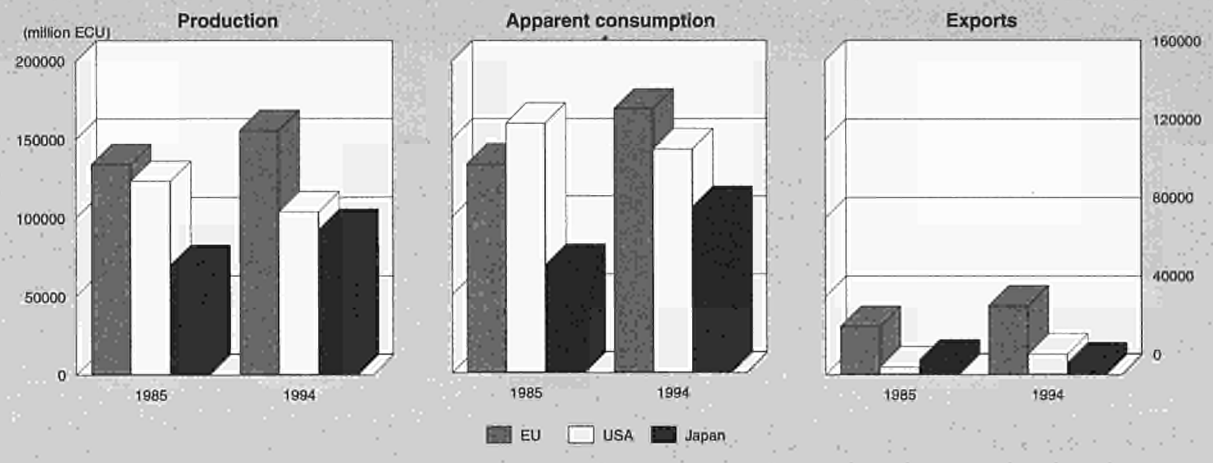
However, in the period 1985 to 1994, in current prices based on ECU, Japan showed the biggest increases in consumption and production, but a decrease in exports. On the other hand, the USA registered decreases in the first two areas, while exports more than tripled. For the EU there were increases in all three areas.

Foreign trade

Developments in the EU textile, clothing, leather and footwear industries very much depend on international trade. In 1994, imports reached 30% of EU apparent consumption, while exports represented 23% of EU production. The four EU industries as a whole saw consistent increases in imports and exports between 1985 and 1994, with a higher average annual increase in imports. During the first half of this period, the average real annual growth rate had been 9% for imports, while it was less than 1% for exports. Also from 1990 to 1994, the average rate was higher for imports (7%) than that for exports (4.8%), although the difference had diminished. After 1991, the annual growth rate for imports started to be reduced in relation to that for exports. In 1994, the real growth of EU exports was more than 12% as compared to an import growth of just 9%.

The four industries as a whole have an increasing trade deficit which reached a peak of almost 14.5 billion ECU in 1993, but decreased slightly in 1994. Within this group of industries,

Figure 4: Textiles, clothing, leather and footwear
International comparison of main indicators in current prices



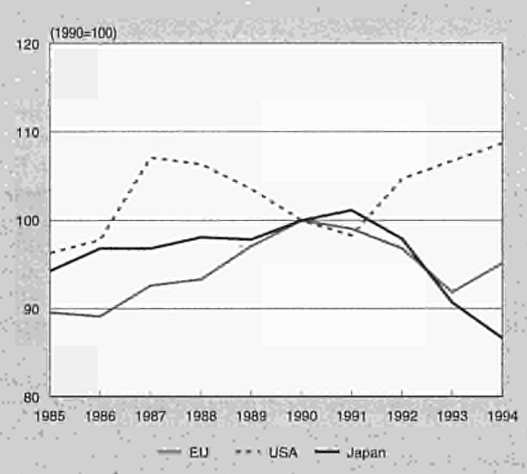
Source: DEBA GEIE, Cotance, Eurostat

however, the EU leather industry, which is still the world's largest supplier of leather, had a positive trade balance. The footwear industry has lost its trade surplus only since 1991, and the textile industry is on the margin of losing it, if the import of raw material is excluded, and exports for outward processing are fully counted.

For all four industries the majority of imports come from developing countries with low labour costs, and mainly from the same sources. The four biggest suppliers (China, Turkey, India and Hong Kong) took one-third of EU 12 imports in 1994, while the ten biggest exporters to the EU increased their share from 48% in 1989 to 55% in 1994. China has particularly strengthened its dominant position, but India, Indonesia and the neighbouring countries of the EU have also increased their shares in recent years.

On the export side, only three countries, USA, Switzerland and Austria, took almost one-third of EU 12 exports in 1994, followed by Japan and Hong Kong. The share of the biggest ten countries in EU exports has remained 60% in the last five years. In recent years, Russia and Poland, the latter on account of the outward processing operations of the EU clothing industry, have come up as important new markets for the EU.

Figure 5: Textiles, clothing, leather and footwear
International comparison of production in constant prices



Source: DEBA GEIE

MARKET FORCES

Demand

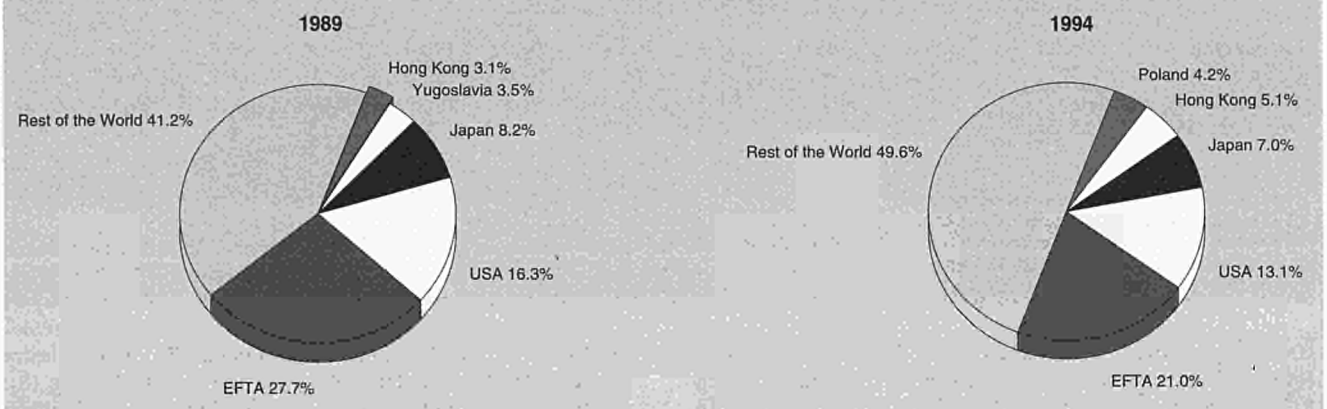
The textile, clothing, leather and footwear industries, as suppliers of consumer goods or their intermediate products, heavily depend on individual consumers, their incomes, and their preferences in spending it. In the EU the share of clothing and footwear in total consumer expenditure has been falling with rising income, from 8.4% in 1980 to around 7% in 1994. Overall apparent consumption, in current prices, for the products under consideration, after a difficult period until 1986, grew continuously in the EU from 1987 to 1991, but fell again in 1992 and particularly in 1993. Since then a certain recovery can be registered. This development confirms that spending on these products is cyclical, i.e. it is reduced or deferred during recession, with a compensating increase during economic recovery. The demand for the intermediate products of the textile and leather industries depends on these developments. The textile industry supplies almost half of its output to the clothing industry, which also takes approximately 20% of all finished leather produced in the EU. Half of leather production is delivered to the EU footwear industry.

Faced by sluggish demand in the EU markets, which may persist in the long-term, the textile industry supplies almost half of its output to the clothing industry, which also takes approximately 20% of all finished leather produced in the EU. Half of leather production is delivered four industries have undertaken additional efforts in order to increase the number of fashion cycles, to develop niche markets, to create new materials and brands, and also to serve the overseas export markets. While apparent consumption in the EU only increased by an average real annual growth rate of 1.9% in the last ten years, the increases have been, and are expected to be, much higher in the newly developing markets in Asia.

Supply and competition

The main feature for most of the four industries in the EU is the relatively high labour cost content of their production. Generally, only the textile industry's processes, such as, spinning, weaving, including the manufacture of carpets, and knitting are capital intensive. Another characteristic is that the industry is composed mainly of small and medium sized enterprises. However, while this is usually regarded as an advantage in quickly changing fashion markets, high labour costs are clearly a disadvantage in international competition, in particular with developing countries.

Figure 6: Textiles, clothing, leather and footwear
Destination of EU exports



Source: Eurostat

Therefore, the industry has started rather early and intensively to reduce production costs by improving productivity. In general, these four industries have seen a higher growth in labour productivity, measured in terms of value added per employee, than manufacturing industry as a whole. This is particularly true for the footwear and textile industries, where labour productivity increased by more than 47% and 43% respectively from 1985 to 1994, as compared with 38% in the four industries together and with 31% in the clothing industry. The enterprises in the clothing industry, in view of their more limited possibilities to increase productivity, have applied another strategy in order to keep their costs of production within competitive limits. This was the increasing use of outward processing.

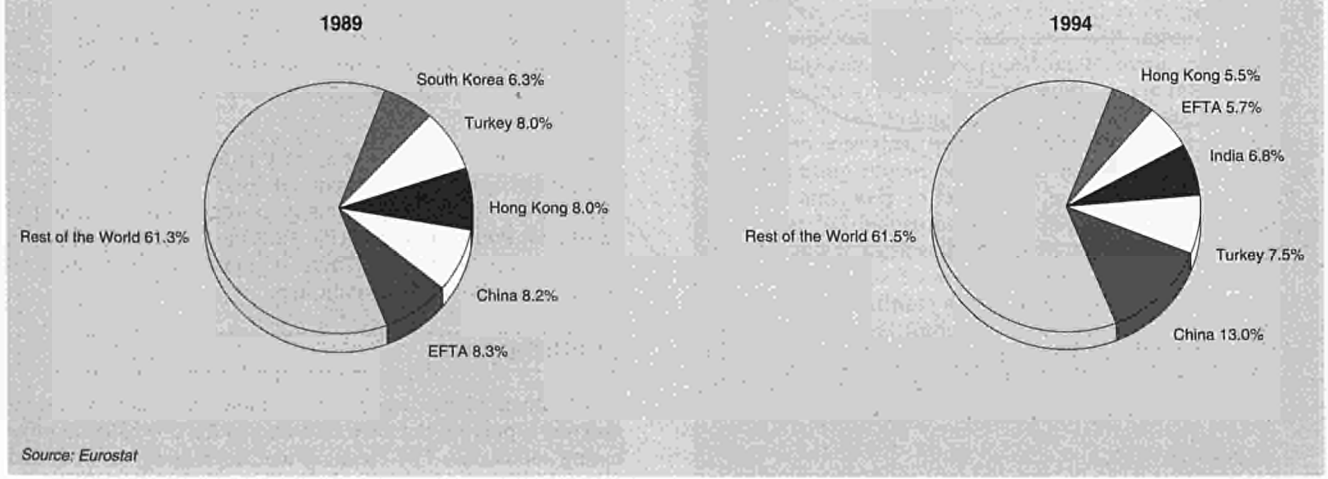
While the supply of intermediate products of the textile and leather industries to their customers (the clothing and footwear industries) is organised between industrial partners, the distribution of home textiles, clothing, footwear and leather goods to individual consumers is normally taken over by the trade. The structure of the distributive trade has developed over the years, but is still largely different among EU Member States. In particular, in the northern Member States of the EU, the traditional small independent retailers have been replaced more and more by multiple chains, department stores, mail order houses, and supermarkets. This concentration in the distributive sector has also created problems for smaller manufacturers, who may become economically dependent on big traders. On the other hand, the industry has started to engage itself directly in the distribution of its products, through its own chains and factory outlets.

Production process

There are generally two types of production processes applied in the four industries. One is capital intensive, as for example spinning and weaving in the textile industry. The other is labour-intensive, as for example sewing in the clothing industry, or 'clicking' and 'closing' in the footwear industry. Production processes have seen immense mechanisation and automation, as well as technological developments improving speed, precision, quality, and flexibility. Computer Aided Design (CAD), Computer Aided Manufacture (CAM) and Computer Integrated Manufacture (CIM) have allowed the reduction of costs per product, and also the development of new strategies, such as quick response or just-in-time.

New information and telecommunications technologies are likely to change production processes even more, and also the relationship between manufacturers, upstream and down-

Figure 7: Textiles, clothing, leather and footwear
Origin of EU imports



Source: Eurostat

Table 5: Textiles, clothing, leather and footwear
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	84.1	85.5	88.8	91.4	96.8	100.0	102.4	106.6	107.6	116.0
Unit labour costs index (3)	95.0	96.5	96.2	98.4	99.6	100.0	104.8	106.2	103.6	97.7
Total unit costs index (4)	90.9	90.7	91.4	94.8	99.8	100.0	103.0	104.1	100.4	99.2
Gross operating rate (%) (5)	9.5	9.9	10.3	9.9	9.0	9.1	8.8	8.7	8.3	9.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

stream, and between manufacturers and their customers. New forms of cooperation are going to be developed, of which EDI (Electronic Data Interchange) is only one example. In this context, there is an additional advantage of a very competitive machinery manufacturing industry in the EU.

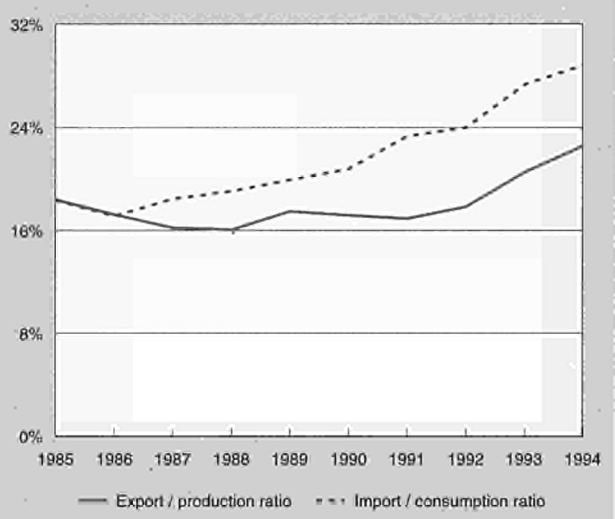
The clothing industry, however, in view of its very labour-intensive production and the existing limits to the automation of its production processes, has developed another approach to production. By means of subcontracting, the manufacturers have transferred certain labour intensive parts of the production process to subcontractors, in particular in neighbouring low-cost countries, in order to save costs and improve their competitiveness. This so-called outward processing trade (OPT) has increasingly been used over the years.

INDUSTRY STRUCTURE

Companies

There is an estimated number of about 137 000 enterprises in the EU textile, clothing, leather and footwear industries, with a clear majority of about 60 000 each in the textile and clothing sectors, and 14 000 in the footwear industry. Most of these firms are small or medium sized, with no more than 20 employees each. A relatively small number of larger companies covers, however, some 70 to 80% of the industry's workforce as well as its turnover, in particular in the textile sector. The total number of enterprises continues to decline in all the four industries.

Figure 8: Textiles, clothing, leather and footwear
Trade intensities



Source: DEBA GEIE, Eurostat

In 1994, the three largest companies in the EU textile industry were Coats Viyella (UK), Beaulieu (B) and Mölnlycke (S); in the clothing industry Levi Strauss Europe (B), Triumph (D) and Benetton (I); and in the footwear industry Arithmos (S), Salamander (D) and Romika (D).

Strategies

The strategies of the enterprises in the four industries differ mainly according to company size, product and location within the EU. A common feature is the continuous effort of enterprises to adjust to competitive conditions in European and world markets, which are characterised by strong competition from developing low-cost countries, and third country markets which are difficult to penetrate.

Enterprises have traditionally concentrated on rationalisation strategies in order to reduce their production costs. They used subcontracting and outward processing as well as international sourcing strategies. Newer strategies tend to be concentrated on marketing. Enterprises develop new products, qualities, brand names, and services, in order to find additional markets, including in third countries. Certain companies transfer production facilities to lower labour cost locations, in order to reinforce their cost competitiveness, or to other countries in order to better serve new markets. Many manufacturers are increasingly developing their own distribution in order to be in direct contact with consumers or to improve their returns. The integration of retailing and manufacturing is regarded as an important feature for maintaining international competitiveness. Co-operation strategies, strategic alliances, as well as mergers and acquisitions, are also used in this context.

REGIONAL DISTRIBUTION

In most of the four sectors, a large share of the industry is concentrated in certain geographic regions of the EU, although the textile and clothing industry at least is relatively widely spread throughout Europe. The main EU textile regions are Lombardia (I), Cataluna (E) and Norte (P); the main clothing regions are again Lombardia (I), Veneto (I) and Bavaria (D). Very often textile and clothing industries are organised around specific product groups, e.g. knitwear, carpets or technical textiles.

The EU leather industry is largely concentrated in Tuscany, Veneto and Campania (I) and in Catalonia, Valencia and Murcia (E), while the footwear industry is regionally concentrated in Averio, Porto and Braga (P), Valencia (E) and the Marches, Tuscany and Veneto (I). These regions often have little alternative employment possibilities.

ENVIRONMENT

Environment issues are generally more important in the industries supplying raw materials than in the downstream processing industries. The cleaning and degreasing of wool and

Table 6: Clothing
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	316 658	92.3	34.2	31.1
20-99 employees	21 530	6.3	25.5	24.1
100 or more employees	4 732	1.4	40.4	44.7

(1) Estimates for EUR15. NACE 43, 44 and 45 (NACE 1970).
Source: Eurostat Enterprises in Europe

the tanning of hides and skins are examples of relatively high pollution, while the manufacture of clothing virtually produces no pollution. Therefore, the environment problem is of different importance in the various segments of the four industries.

As the growing number of pollutants in the environment, including those connected with the four industries, are increasingly made subject to legislative control on discharges to water, emissions to air, and waste production, by active regulatory bodies at national and EU level, enterprises have to give much attention to different aspects of the problem. EU tanners' environmental costs, for example, are estimated at about 5% of their turnover. In order to reduce these costs, tanners in the EU have largely integrated ecological considerations into their management strategies. In textiles and clothing, dyeing and printing, as well as certain processes to obtain easy-care properties, flame retardancy etc., tend in particular to create environmental problems, which the industry has to avoid

Further problems for the industry, including the footwear sector, are caused by the existence of differences regarding the standards of national legislation (for example the use of azo-dyes) and also in the Member States' application of EU directives (for example on PCP). The lack of standardised testing methods exacerbates the situation.

Discussions in the EU regarding eco-labelling schemes for textiles, clothing, shoes and leather goods are ongoing. The creation of these labels, whereby products whose manufacture meets certain environmental criteria may bear an EU eco-label, may contribute to a reduction in the environmental impact of manufacturing in the four industries.

REGULATIONS

Generally, the textile, clothing, leather and footwear industries are covered by the rules and regulations governing the EU industry as a whole. These include standards concerning the production process, and in particular legislation in the health, safety and environmental field.

However, when it comes to trade policy, and the problem of imports from low-cost developing countries, the textile and clothing industry is regarded as one of the most sensitive sectors of EU industry. Therefore EU import restrictions, and export restricting agreements and arrangements, between the EU and certain important textile exporting developing countries, have traditionally been included in the EU's trade policy. Under the new WTO Agreement on Textiles and Clothing of the Uruguay Round, a considerable number of quantitative restrictions in favour of the EU textile and clothing industry will still be applicable until the end of 2004. Until then, they will have to be gradually phased out and integrated into the normal WTO system. A first group of products has already been integrated at the beginning of 1995, and a second group will follow at the beginning of 1998. The selection of products, and the point in time of their integration, will certainly have an impact on import developments in the relevant markets.

Among other trade regulations affecting the four industries, it is worth noting that the new EU scheme of Generalised Preferences (GSP) classifies the textile, clothing, leather and footwear Industries among the sensitive sectors, and determines that the most competitive beneficiaries will gradually be excluded from the granting of preferential access to the EU market.

Only a few other EU regulations specifically apply to one or more of the four industries under consideration. The textile and footwear labelling directives are the most significant examples. While the labelling of the fibre content of textile products was made obligatory in the EU already in 1971, the EU directive concerning the labelling of materials used in the main components of footwear, only entered into force in March 1996.

Table 7: Textiles, clothing, leather and footwear
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	N/A	N/A
Deutschland	0.7	0.6
Ellada	2.3	2.4
España	1.1	1.1
France	0.9	0.8
Ireland	N/A	N/A
Italia	1.8	2.1
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	N/A	N/A
United Kingdom	0.8	0.8

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

OUTLOOK

The textile, clothing, leather and footwear industries in the EU will continue to face economic problems, although there are also encouraging factors which need to be mentioned. In general, prospects for the industries will improve with the EU economy emerging from recession. However, consumption is not expected to improve significantly, and in the framework of the new WTO trading system, imports to the EU are not expected to lose their impact on the EU market. Therefore, with increasing import penetration both production and employment are likely to fall in the medium term. Enterprises in the four EU industries will have to continue their rationalisation and modernisation efforts. Also in future they will have to make maximum use of their creativity, know how and servicing qualities. And also engage in new cooperative strategies and new forms of organising for their sourcing, production, marketing and servicing, in order to improve their competitiveness.

The future prospects of the four industries will be influenced by the Customs Union with Turkey, and the forthcoming trade

liberalisation vis-à-vis the Central and East European countries, and in particular also by the progressive opening up of third country markets, following the application of the Uruguay Round results. This offers a new challenge to the EU industries, and enterprises will have to engage actively in the new possibilities for exporting to third countries, and expanding within these developing markets.

Written by: Observatoire Européen du Textile et de l'Habillement (OETH).

Textiles
NACE (Revision 1) 17

The textile industry covers the preparation, spinning, weaving and knitting of natural and man-made fibres, textile finishing, the production of made-up textiles (such as bed and kitchen linen), of carpets and of some knitwear products. It accounted for 3.2% of the value added generated by the EU manufacturing industry in 1994, with an employment of about 1.3 million people.

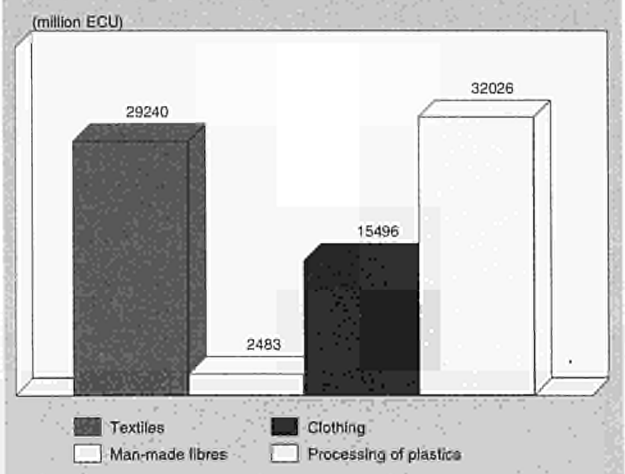
In recent years production and employment in the textile industry have developed less favourably than in the manufacturing sector as a whole. The main reasons for this have been the sluggish development of consumption in the EU and the further growth of imports of textile and clothing products from low-cost developing countries. Production in current prices, which had been falling from 1990 to 1993, recovered again by 6% in 1994. This was due to rising apparent consumption of textiles, while extra-EU imports and exports were steadily growing over recent years. In constant prices, however, apparent consumption stagnated over the last nine years, while production dropped by an average 0.8% per year. Employment was reduced year after year, but the loss of employment in 1994, amounting to 50 000 jobs, has only been about half that of the annual losses in preceding years.

The industry's largest market is the EU, but exports are becoming more and more important, in particular to other developed countries such as the USA, Switzerland and Japan. A growing proportion of textiles is exported to Eastern Europe and the Mediterranean rim, for subsequent processing into clothing for re-import into the EU (known as outward processing trade). Most imports of textile products come from a limited number of big supplier countries, with a rising share coming from China, Turkey, India, Indonesia and Pakistan. In the last 5 years, the ten largest supplier countries accounted for almost 60% of EU textile imports.

As a supplier to the clothing industry, the textile industry has had to adjust to production and marketing strategies such as quick-response and just-in-time, as these are increasingly adopted by clothing producers and distributors. The increasing use of outward processing and international sourcing strategies also represents a major challenge for textile producers, who are interested in maintaining the use of EU-produced textiles in garments assembled within or outside the EU.

With the EU economy emerging from recession, prospects for the textile industry as a whole will improve. Estimates for 1995 indicate that production remained more or less stable, in real terms, a trend which is projected to continue for the following years. Prospects are, however, not equally positive for all segments of the industry. Much depends on the health of the EU's clothing industry, which itself has been depressed, on the further development of still growing segments of the EU textile industry such as technical textiles, and on the export success of the sector, following the progressive opening of third countries' markets.

Figure 1: Textiles
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

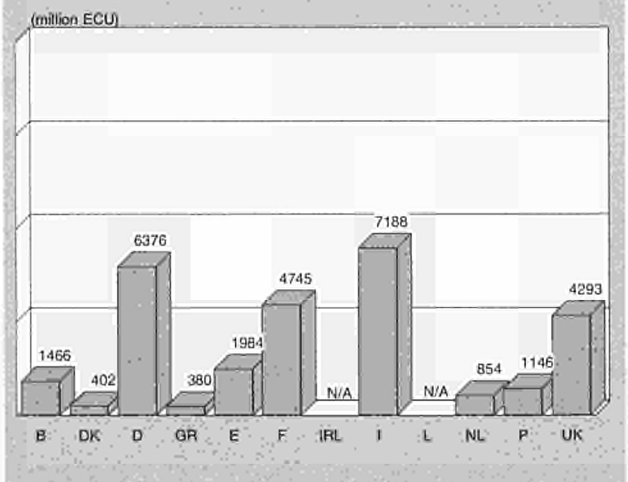
Description of the sector

The textile industry, as defined by NACE (Rev. 1) 17, covers the preparation, spinning, weaving and knitting of natural (wool, cotton, silk, linen, flax, ramie, jute) and man-made fibres (synthetic or cellulosic). It also covers the process of textile finishing, the production of made-up articles such as bed and table linen and blankets, the manufacture of carpets, and the production of a few knitwear products, such as pantyhose, stockings, and pullovers under NACE (Rev. 1) 17.7. The industry produces intermediate products such as yarns and fabrics for the clothing industry, industrial textiles for other industries and sectors, and made-up products for the final consumer.

As compared to the definition of textiles in former NACE 43+455, the new system classifies the sub-sectors mainly by textile products and no longer on the basis of the type of fibre used. The main improvement, however, is a higher comparability of data between EU Member States. However, since data have not yet been revised according to the new system, the following data will continue to be based on NACE 70. The same applies to the three new Member States of the EU, whose data are not yet included in the report. But this does not change the analysis very much, because the share of the three countries in the industry is below 5%, with Austria accounting for more than half, followed by Finland and Sweden.

The textile industry accounted for 3.2% of the EU manufacturing industry's value added in 1994, which is about double that of the EU clothing industry and similar to that of the

Figure 2: Textiles
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Textiles
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	78 082	95 409	97 744	95 688	86 894	89 810	87 932	93 579	96 060	99 210	102 560
Production	78 996	94 144	94 036	91 881	83 334	86 496	86 299	90 390	92 440	95 190	98 080
Extra-EU exports	14 160	16 338	16 400	16 967	17 996	20 115	21 304	19 736	20 560	21 470	22 590
Trade balance	914	-1 265	-3 708	-3 807	-3 560	-3 314	-1 633	-3 189	-3 620	-4 020	-4 480
Employment (thousands)	1 363	1 228	1 177	1 100	1 024	990	970	1 013	990	980	960

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Textiles
Breakdown by product line, 1994

(thousand tonnes)	Apparent consumption	Production	Extra-EU exports	Extra-EU imports
Yarns, of which	3 663.0	3 300.9	376.6	738.7
Cotton	1 127.9	869.8	54.6	312.7
Wool	236.9	245.7	10.7	1.9
Synthetic yarns	1 808.9	1 763.8	295.5	340.6
Artificial yarns	489.3	421.6	15.8	83.5
Woven fabrics, of which:	1 504.4	1 336.7	506.1	673.8
Cotton	773.4	622.5	214.7	365.6
Wool	148.4	204.8	64.8	8.4
Synthetic fabrics	457.3	394.2	145.6	208.7
Artificial fabrics	125.3	115.2	81.0	91.1
Made-up articles, of which	1 105.6	1 257.4	403.2	251.4
Carpets and floor coverings	752.3	1 023.2	366.9	96.0
Bed linen	168.2	116.3	22.2	74.1
Towels, kitchen linen	185.1	117.9	14.1	81.3
Knitted goods (thousand pieces/pairs), of which	3 614.3	2 880.2	451.2	1 185.3
Pullovers, cardigans (thousand pieces)	888.8	605.3	87.9	371.4
Panty hose, stockings (thousand pairs)	2 725.5	2 274.9	363.3	813.9

Source: European Commission (DG III), CITH

Table 3: Textiles
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	1.3	-1.7	-0.1	3.1
Production	0.4	-2.3	-0.8	3.3
Extra-EU exports	1.2	4.5	2.6	10.4
Extra-EU imports	7.4	7.1	7.2	8.4

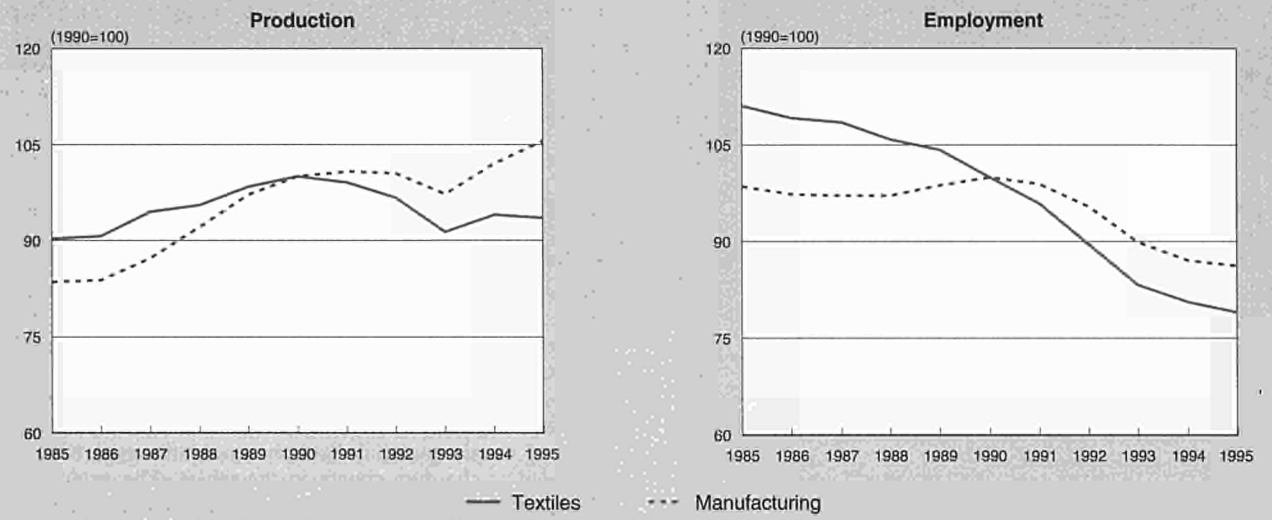
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Textiles
External trade in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	14 174	16 338	16 400	16 967	17 996	20 115	21 304	19 736
Extra-EU imports	13 523	17 604	20 107	20 774	21 556	23 429	22 936	22 925
Trade balance	651	-1 265	-3 708	-3 807	-3 560	-3 314	-1 633	-3 189
Ratio exports / imports	1.0	0.9	0.8	0.8	0.8	0.9	0.9	0.9
Terms of trade index	83.8	100.0	100.5	101.3	100.9	101.9	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Textiles
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

processing of plastics. Although employment has decreased strongly in recent years, the industry still employed 1.3 million people in 1994. The industry is largely concentrated in Italy, Germany, France and the UK, which accounted for over 76% of the value added of EU textile production in 1994. Italy alone, the biggest producer, generated almost 34%. However, the importance of the textile industry for the national economy is much bigger in countries like Portugal or Greece. The specialisation on textile production in 1994 as compared to 1985 has, however, increased only in Belgium, Italy and the Netherlands.

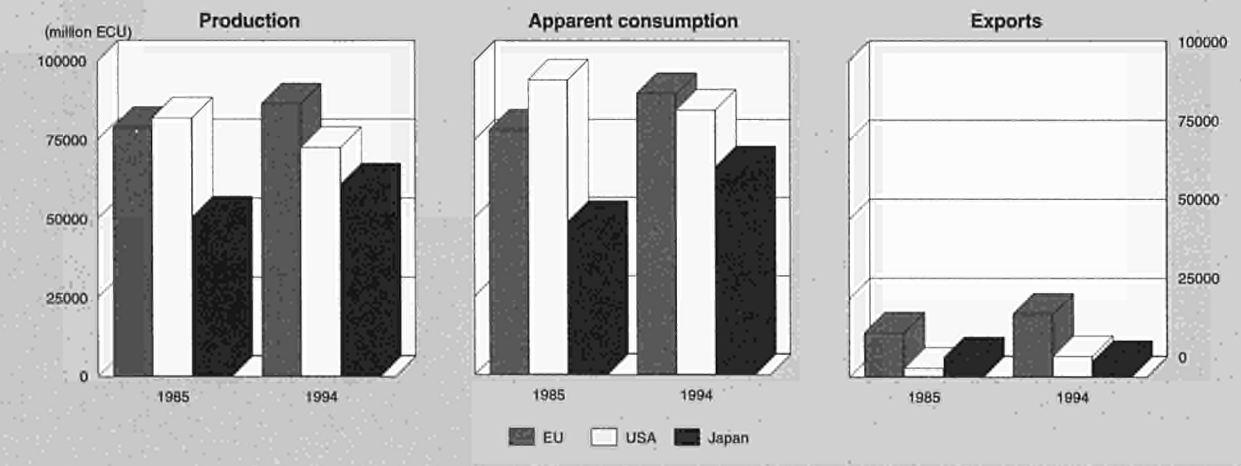
Recent trends

Apparent consumption of textile products in the EU, in real terms, has practically been stagnant over the last nine years. After a slight increase during the first half of the period, a corresponding decrease followed in the second half. In current prices, 1993 stands out as a very difficult year for the textile industry, with a fall in apparent consumption of more than 6% while the estimated 1995 level has again reached that of 1991.

Between 1985 and 1994, production in the textile industry has followed the consumption trend. In real terms, it fluctuated around an average annual growth rate of 0.4% from 1985 to 1990, but decreased at an average annual rate of 2.3% in the period 1990 to 1994. The decrease in production started in 1990 and has become more obvious since then. In 1993 production fell by more than 6% in constant prices and increased again by 3% in 1994. This development has to be placed in the context of the general economic recession and the temporary recovery in 1994. Preliminary figures for 1995 indicate a new fall of production of around 1% in real terms. In current prices, production in 1995 is estimated to have been similar to that in 1990.

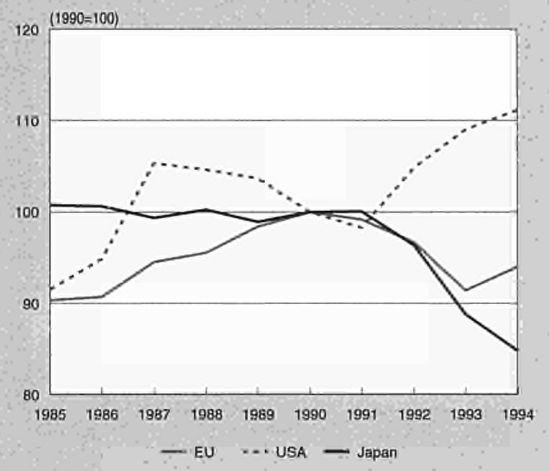
As output in the textile industry has fallen, employment has also declined. But the textile industry has also undergone a process of restructuring in recent years in order to reduce costs, increase productivity and improve competitiveness. This has contributed to important reductions in employment, reinforced by the effects of the economic recession towards the end of this period. In the last 10 years the industry lost nearly 500 000 jobs (-27%). After losses of more than 100 000

Figure 4: Textiles
International comparison of main indicators in current



Source: DEBA GEIE, Eurostat

Figure 5: Textiles
International comparison of production in constant prices



Source: DEBA GEIE

(or between 6 and 7%) in 1992 and 1993, 50 000 jobs were lost in 1994 (-4%). Estimates indicate that a further 30 000 job losses occurred in 1995.

The EU trade balance in textiles (including raw materials) reached a maximum deficit in 1992 of an estimated 3.8 billion ECU. Since then, the trade balance has improved steadily and has reached an estimated deficit of 2.6 billion ECU for the EU12 in 1995. For the EU15 it is expected to be more than 4 billion ECU.

International comparison

Compared to the other big industrialised countries, the EU had the highest apparent consumption of textiles in 1994, based on ECUs, almost 25% more than the USA and almost 60% more than Japan. However, between 1985 and 1994 apparent consumption, in current prices, expanded most in Japan (+36%), while in the EU and the USA consumption increased only by 17 and 16% respectively.

EU total textile production in 1994, also in ECU, was 40% higher than in the USA and 67% higher than in Japan. Between 1985 and 1994 textile production in current prices increased most strongly in Japan (21%), followed by the USA (19%), while production in the EU increased by only 12%.

Among the three, the EU exported over three times more textile products than the USA and almost four times more than Japan in 1994. Export growth, however, was highest in the USA, over the decade from 1985 to 1994, followed by the EU. In Japan, exports to third countries actually decreased by 17% during the same period.

However, the biggest increases in textile production and exports have occurred in the group of textile exporting developing countries, such as China, India, Indonesia and Pakistan.

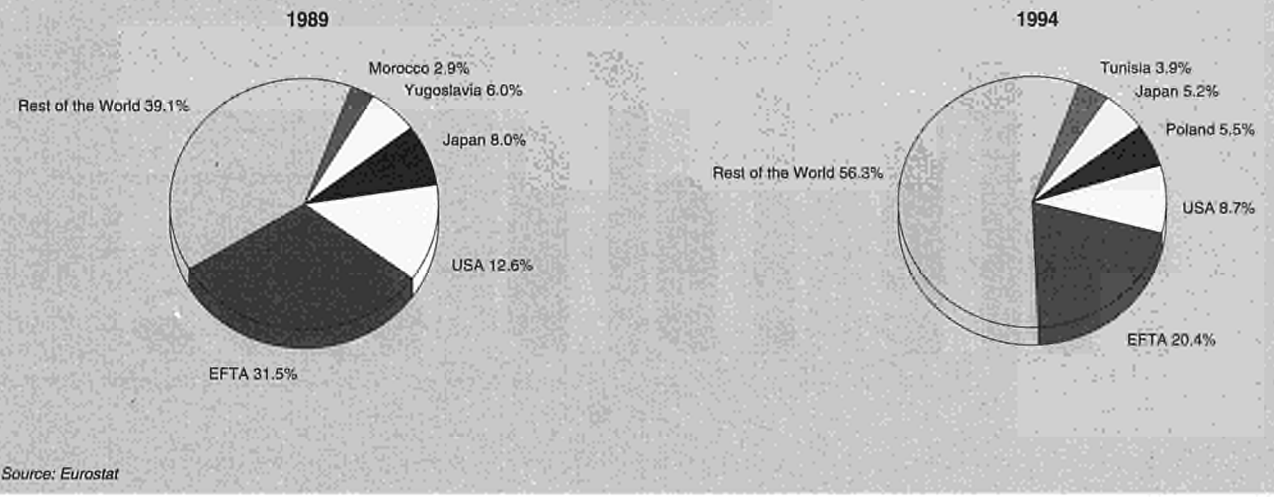
Foreign trade

Extra-EU imports as well as exports of textiles in current prices expanded continuously between 1985 and 1994, although imports grew much faster (77%) than exports (42%). This trend translated into a growing trade deficit which reached 3.8 billion ECU in 1992 and has been decreasing again step by step since then. The EU textile industry has to import most of its raw materials (cotton, wool, silk, etc.) which are included in the data shown in the tables. The exclusion of this trade shows that the EU textile industry has a much smaller trade deficit in manufactured textile trade. In 1994, the trade balance in EU exports and imports of textiles (excluding natural fibres) amounted to a deficit of only 0.7 billion ECU. Excluding also knitwear, the EU trade balance in textiles even showed a surplus of 3.4 billion ECU, with rising tendency.

Although EU textile imports grew much more than exports for most of the period from 1985 to 1994, this pattern started to change in 1992, when exports began to grow faster than imports. Between 1992 and 1994, EU textile exports increased by more than 18%, compared with only about 13% for imports. Accordingly, the export/import ratio has improved, without however reaching the level of the years earlier than 1990. During the period 1985 to 1994 the export share in EU production increased from 15.6 to 19.7%, while the import share in EU consumption increased from 14.7 to 22.2%.

The largest export markets for EU12 textiles were the USA, Switzerland and Austria with export shares between 8% and 11% in 1994. They are followed by Poland, Japan, Tunisia and Morocco. Apart from Japan, these three export markets draw their importance from outward processing trade. EU companies export textiles to these countries to be processed into garments which are then re-imported into the EU. Between 1989 and 1994, the share of the major ten destinations for the EU12's overall textile exports remained at a level of almost 60%.

Figure 6: Textiles
Destination of EU exports



Source: Eurostat

Table 5: Textiles
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	81.4	83.1	87.1	90.3	94.3	100.0	103.4	108.0	109.7	116.6
Unit labour costs index (3)	93.5	94.6	94.4	96.6	99.3	100.0	104.3	106.0	104.4	100.1
Total unit costs index (4)	93.0	91.2	91.6	95.1	100.1	100.0	101.9	102.0	98.2	97.8
Gross operating rate (%) (5)	10.0	10.9	11.4	10.8	9.6	9.6	9.0	8.9	8.4	9.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Imports of textiles are equally concentrated, as the ten major countries of origin for EU12 textile imports represented 59% of all textile imports in 1994. The principal supplying countries , accounting for one-third of EU textile imports in 1994, were China, Turkey, India and Austria. Between 1989 and 1994, China, Turkey, India, Indonesia and Pakistan increased their import shares, while Austria, Switzerland, USA, and also Hong Kong and South Korea, lost shares in EU imports.

MARKET FORCES

Demand

Especially since 1992, the EU textile industry has faced decreasing consumption in most of its markets. Apparent consumption of clothing, which accounts for about half of textile end-use, decreased by nearly 4.3% in current prices from 1992 to 1994. Also the consumption of certain household textiles and carpets showed a declining tendency. All this is due to the fact that in recent years the share of household expenditure on clothing has decreased, increasing imports have replaced European products, and the generally rather depressed economic situation did not favour a rise in incomes.

As a supplier to the clothing industry, the EU textile industry has had to adjust to modern production and marketing strategies of the clothing producers and distributors, such as quick-response and just-in-time, which are increasingly adopted. The growing utilisation of outward processing, and international sourcing strategies, also represent a major challenge for textile producers, to maintain the use of EU-produced textiles in garments assembled inside and outside the EU.

Besides the production of intermediate products for the clothing industry and of household textiles and carpets, about one quarter of EU textile production consists of so-called technical textiles. They include special fibres and fabrics for industrial and technical applications as well as non-woven goods. Technical textiles are increasingly used in sectors such as transportation, geotextiles, technical garments, health care and medicine, and building and environment protection. The market volume for technical textiles is not only determined by demand, but also by the development of new applications and uses on the supply-side.

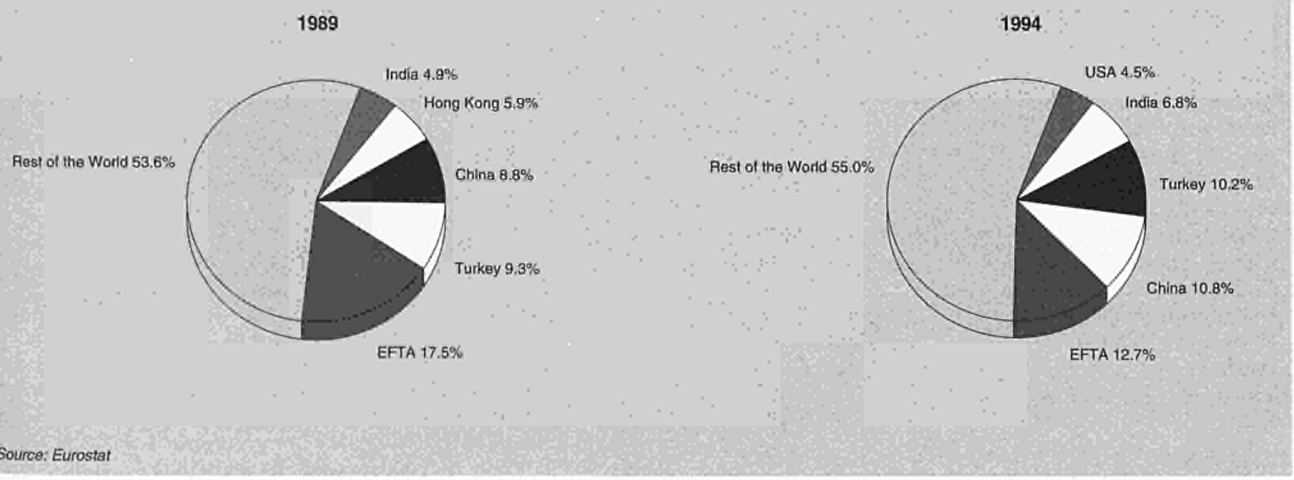
Technical textiles form part of the intermediate consumption of textiles by other industrial sectors, such as the automobile, furniture, building, pharmaceutical, or electronic industries, as well as by service industries, such as hotels or retail services. This consumption has been recently estimated for the first time to represent a market of almost 30 billion ECU at the EU15 level in 1993.

Supply and competition

The textile industry is relatively capital-intensive as compared with the clothing industry. The labour content in manufacturing costs, however, varies widely between different products. While the share of labour costs in the production of certain yarns and machine-made carpets is below 10%, it can account for 50% or even more in the dyeing, printing and finishing of fabrics. Labour cost differences within the EU and around the world, therefore, are of differing relevance to the competitiveness of the different segments of the textile industry.

After several years of sustained growth, the value of investment in the EU textile industry has shown a steep fall in recent

Figure 7: Textiles
Origin of EU imports



Source: Eurostat

Table 6: Textiles
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	83 274	89.4	24.2	25.6
20-99 employees	7 513	8.1	23.4	23.6
100 or more employees	2 365	2.5	52.4	50.8

(1) Estimates for EUR15.
Source: Eurostat Enterprises in Europe

years. Investment decreased by an annual average of nearly 6% between 1990 and 1993, in current prices. In 1994 investment was up again by an estimated 6%. This increase, however, was not shared by all EU Member States.

While the industry reduced investment in new machinery and lost employment in recent years, it succeeded in raising labour productivity continuously between 1985 and 1994 by more than 40% in constant prices. More important for the competitiveness of the EU industry however, appears to be the permanent search for new markets, including promising niche-markets, the improvement of product quality and the development of new fashion and trade marks, as well as an extension of the servicing of customers.

Production process

In the spinning and weaving processes, the quantity of installed textile machinery and its geographical location world-wide have changed significantly over the years. In the past twenty years, the EU spinning industry has reduced the number of spindles installed by more than 15%, while the number of open-end rotors, which are judged to be 5 times more productive than spindle machinery, increased from 24 000 in 1973 to 525 000 in 1993. World-wide, the EU textile industry only accounts for 7% of open-end rotors, while most of the capacities are to be found in Eastern Europe, Asia and the USA. As the EU is one of the largest wool processors in the world, and as this type of machinery is mainly used for fibres others than wool, open-end rotors are relatively less important in the EU than in other regions. In this context also the quality aspect plays an important role.

In weaving machinery, the EU textile industry mainly uses shuttleless looms (76% of all looms in the cotton sector in 1993) which are the most modern machinery used in the weaving process. The number of looms installed in the EU has decreased in recent years, while in Asia capacity has expanded strongly. In the cotton sector, Asia now accounts for 35% of shuttleless looms and 76% of shuttle looms world-wide, compared to 10% and a little over 1% respectively in the EU.

INDUSTRY STRUCTURE

Companies

In 1994, the EU textile industry was made up of about 60 000 firms, of which 75% were firms with less than 20 employees. These smaller firms employed 19% of the total workforce (1.3 million employees) and generated about 15% of total turnover. From the early 1980s, small textile firms increased their share of both employment and turnover in all major EU countries. In the case of employment, this pattern is explained by the fact that the reduction in employment has been greater in larger companies.

In terms of turnover, the ten largest textile companies account for about 11% of the EU textile industry's total turnover in 1994. The five largest companies alone account for 7.7% of the total (Coats Viyella, Beaulieu, Courtaulds, DMC and Marzotto). Among these, Coats Viyella, Courtaulds and Marzotto also produce clothing products. Within the EU(15) there is a new name in the list of the top ten, which is Mölnlycke of Sweden, now in third place.

Strategies

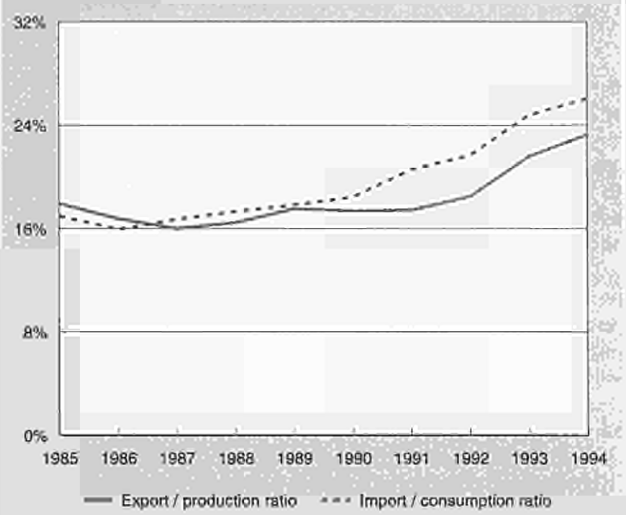
EU textile firms apply various strategies depending on their place in the so-called textile chain. For example, producers of cotton yarn do not operate in the same competitive environment as producers of knitwear. Their strategies also differ according to company size and location within the EU. Textile companies in the EU have reduced capacities continuously over recent years, but invested in extensive technological mod-

Table 7: Textiles
The fifteen largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Coats Viyella	GBR	2 817.9	71.0	76.2
Chargeurs	F	1 494.3	52.3	9.7
DMC-Dollfus-Mieg & Cie	F	1 211.7	-22.8	9.7
DLW	D	794.2	2.7	6.8
Akzo Nobel Faser	D	755.5	27.7	7.1
Scapa Group	GBR	570.6	37.7	6.7
Bremer Woll - Kaemmerei	D	458.1	3.9	1.1
Dawson International	GBR	428.5	-3.8	7.8
Pfersee-Kolbermoor	D	307.6	14.6	10.3
Zucchi Vincenzo	I	307.5	2.4	3.5
Readicut International	GBR	306.4	11.9	3.3
Investment ab Latour	S	302.3	28.1	2.5
Hartstone Group	GBR	284.5	6.0	2.2
Verseidag	D	268.5	3.5	1.7
Kunert	D	265.2	-3.5	4.4

Source: DABLE

Figure 8: Textiles
Trade intensities



Source: DEBA GEIE, Eurostat

ernisation measures and in production plants in third countries. They tend to specialise in a limited number of production processes, relying partly on subcontracting in some segments of the industry. A growing number of EU textile companies have also tended to develop strategies capable of safeguarding their position as suppliers to an increasingly delocalised EU clothing industry. Of growing importance in the future will be more aggressive export strategies, in order to find new markets in third countries. All these strategies result in a change of company organisation and management methods, in order to maintain or to strengthen the firm's competitiveness.

REGIONAL DISTRIBUTION

A large share of the EU textile industry is concentrated in certain geographic regions, where textile industries are often organised around specific product groups (knitwear, technical textiles, carpets and the like), and also uses local subcontracting.

The main textile regions of the EU can be classified by size of employment. According to Euratex data, the most important regions, employing 100 000 or more, are Lombardia (I), Cataluna (E) and Norte (P). The next largest textile regions, employing between 50 000 and 100 000, are both in Germany (Baden-Württemberg and Nordrhein-Westfalen). These 5 largest regions represent nearly 30% of total EU employment in textiles.

ENVIRONMENT

The textile industry uses natural vegetable fibres as well as man-made fibres (cellulosic and synthetic). The basic element in producing cellulosic fibres is wood pulp, while synthetic fibres are produced from oil derivatives. The production process uses also water and natural colours, and also different forms of energy and chemicals, particularly in the field of dyeing, printing and finishing of yarns and fabrics. Depending on the particular product and process, the use of these resources can be considerable.

For example, wool during processing has to be cleaned and degreased, and cotton has to be washed. Chemical applications are used in the processing of both man-made and natural fibres, to dye or print the products according to fashion, or to obtain easy-care properties, fast colour, stain and crease resistance, handle, flame retardancy etc. Some of these processes tend to create environmental or health problems which have to be avoided as far as possible.

The growing level of pollutants in the environment, including those connected with the textile industry, are increasingly made subject to legislative control on discharges to water, emissions to air, and waste production, by active regulatory bodies at national and EU levels. There has been much EU legislation, for example on emissions to water, which has particularly affected the textile industry. Other examples which give concern to the industry are ongoing discussions regarding the utilization of azo-dyestuff and the problem of inflammability of upholstery furniture.

According to Euratex, the industry is giving much attention to the different aspects of the environment problem. In particular, the voluntary eco-auditing scheme of the EU Commission's Fifth Framework Programme for the Environment is regarded as the key to continuing the reduction of the environmental impact of textile manufacturing over and above legislative requirements.

REGULATIONS

The textile and clothing industry is regarded as one of the most sensitive sectors when it comes to imports from low-cost developing countries. Therefore, EU import restrictions, and export restricting agreements and arrangements between the EU and a number of important textile exporting developing countries, have traditionally been included in the framework of the EU's trade policy. The EU's bilateral textile agreements under the GATT Multi Fibre Arrangement (MFA) expired at the end of 1994, but were at the same moment replaced by administrative arrangements under the new WTO Agreement on Textiles and Clothing of the Uruguay Round, which will be in force until the end of 2004. During the ten year period all quantitative restrictions, existing at the end of 1994, will have to be phased out and liberalized, by integration of the products concerned into the WTO system. A first group of products (16% of the EU import volume in 1990 of textiles and clothing) has already been integrated at the beginning of 1995, a second group of products (17%) has to follow at the beginning of 1998. The selection of products to be integrated will certainly have an impact on import developments in the relevant markets.

Only a few other EU regulations specifically apply to the textile sector. The most important is the legislation since 1971 on the indication (labelling) of the fibre content of textile products and on the relevant testing methods. Efforts to establish certain safety requirements regarding the inflammability of fabrics for upholstered furniture are still under discussion. Other legislation covering all industrial sectors, also includes textiles, sometimes in a specific way. This applies for example to the new EU scheme of Generalized Preferences (GSP), which takes into account the sensibility of the sector, or to the RETEX programme of the EU, which supports entrepreneurial initiatives for diversification, in those regions which are strongly dependent on the textile and clothing industry.

OUTLOOK

As the EU economy emerges from recession, prospects for the textile industry as a whole will improve. Apparent consumption, after 1996, is expected to increase at an annual rate of 2 to 3% in current prices, with extra-EU exports expanding at a rate of 4 to more than 5%. Production in current prices is forecast to increase by an average annual rate of 1 to 2% until 1998. Estimates in real terms, however, indicate that production stagnated again in 1995. Imports (including raw materials) are expected to increase more than exports;

Table 8: Textiles
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.5	1.7
Danmark	0.8	0.7
Deutschland	0.7	0.7
Ellada	3.0	2.9
España	1.0	0.9
France	0.9	0.9
Ireland	0.8	0.7
Italia	1.7	1.9
Luxembourg	N/A	N/A
Nederland	0.5	0.6
Portugal	3.3	3.0
United Kingdom	0.8	0.8

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

this will result in a further worsening of the trade balance. This, however, is not necessarily the case when the impact of raw materials is excluded.

The EU industry will have to face continuing competition from lower-cost countries outside the EU, reinforced by the gradual liberalisation of the textile and clothing trade. Prospects are, however, different regarding the segments of the textile industry and the regions of the EU. The delocalisation of EU clothing production, mainly to locations close to the EU, which will be favoured by the Customs Union with Turkey and the liberalisation of textile trade with Central and East European countries in 1998, will also pose new problems to textile manufacturers, who are traditional suppliers to the EU clothing industry. Textile production with a relatively high content of labour (as in the low to medium quality production of fabrics) is expected in particular to experience decreasing market shares, as competition from lower-priced imports will continue for some time to be concentrated in this market segment. However, the results of the Uruguay Round, and the continuing efforts for a further opening-up of third country markets, will at the same time offer new challenges to the EU textile industry.

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Clothing
NACE (Revision 1) 18

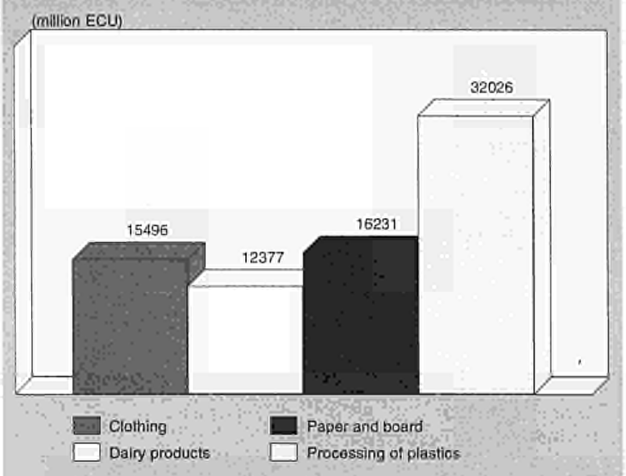
The EU clothing industry covers the manufacture of woven and knitted garments and clothing accessories, excluding the manufacture of some knitwear mainly made directly from yarn (such as panty-hose, stockings and pullovers). It is an important employer with 970 000 employees or about 4% of total EU manufacturing employment in 1994. It generates 1.8% of manufacturing industry's value added. Many of the industry's inputs are supplied by the textile industry.

Over recent years EU clothing manufacturers have faced on the one hand, weak levels of domestic demand for their output, and on the other hand, increasingly fierce competition from imports from developing countries. Therefore, clothing production and employment have been declining in recent years. Between 1990 and 1994 the volume of production fell by 14%, in constant prices. Employment has fallen by 21% over the same period. The industry has a substantial trade deficit, amounting to over 11 billion ECU in 1994, over four times its level in 1985.

Clothing exports have also increased in recent years, but from a much lower level and at a more gradual pace than imports. The main export markets for EU producers are other developed countries. Most third country markets are, in reality, still inaccessible for European products because of high tariffs and other trade barriers. The EU industry has developed a number of strategies in order to improve its competitiveness. Important features in this context are the increasing use of outward processing (OPT), whereby more labour-intensive processes are transferred to lower-cost countries close to the EU borders, the growing international sourcing of finished products, and an increasing involvement in distribution.

In the near future, the industry expects to improve on the performance of the last two years, although production volume and employment are likely to continue to fall. As domestic demand strengthens with economic recovery, the downward trend in the industry should become more modest.

Figure 1: Clothing
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

The clothing industry, as defined by NACE (Rev.1) 18, covers the manufacture of woven and knitted garments and clothing accessories. Like former NACE 453 it does not include the production of some knitwear which is mainly produced directly from yarn (fully fashioned) such as panty-hose, stockings and pullovers, which are reported under NACE (Rev.1) 17.7. The following data, however, continue to be based on NACE 70, because available data have not yet been revised according to the new system. Also the data for the three new Member States is not yet included, but this has not much influence on the analysis, since their share in the EU clothing production is rather limited.

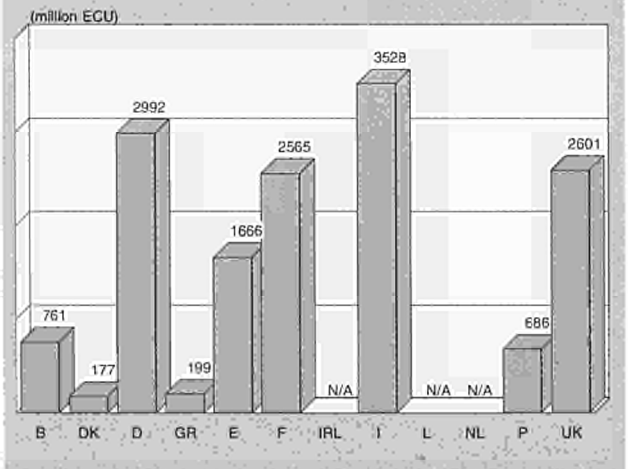
The industry's products are classified in a number of ways, for example, into men's, women's and children's wear, outerwear and underwear, formal and casual or sportswear, or low, medium or high quality wear.

The production of clothing involves a number of different stages: design (styling, prototyping, development of collections), sourcing of fabrics, planning of cutting, manufacture (cutting, sewing, assembly, pressing, finishing), and packing. The manufacturing process in the clothing industry has remained relatively labour intensive. The industry employed 970 000 people in 1994 or about 4% of EU manufacturing employment. In 1994 the clothing industry's value added was 15.5 billion ECU or 1.8% of total value added by the EU manufacturing industry. Three quarters of this, in 1994, were generated by the four largest producing countries in the EU which were Italy (23%), Germany (19%), the UK and France (17% each).

Recent trends

The EU clothing industry is continuing its restructuring process in order to consolidate its international competitiveness, in particular regarding developing third countries. The volume of its production, in real terms, has fallen continuously from a peak in 1986. The decline accelerated in 1993, bringing the volume of production in 1994 to 23% below its peak level of eight years before. This is a somewhat different development to that followed by the value of production measured in current prices, which rose gradually to a peak in 1992 before falling in 1993 and stabilising again in 1994. The difference between the two can be explained in part by improvements in the quality of EU production, which is not fully reflected in the price index used as a deflator.

Figure 2: Clothing
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Clothing
Main indicators in current prices (1)

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (2)
Apparent consumption	36 421	37 328	41 184	43 578	48 189	53 494	58 294	58 725	54 991	55 857	55 734
Production	33 888	34 579	36 792	38 275	42 470	46 442	48 294	48 986	44 091	44 808	44 785
Extra-EU exports	5 138	5 132	5 039	5 093	6 218	6 731	6 685	6 853	7 109	8 135	8 643
Trade balance	-2 532	-2 750	-4 393	-5 303	-5 718	-7 051	-10 000	-9 739	-10 900	-11 048	-10 759
Employment (thousands)	868.4	851.5	863.1	854.7	838.1	880.6	860.0	812.7	777.8	740.7	714.1

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
Source: DEBA GEIE, Eurostat

Table 2: Clothing
Breakdown by product line, 1994

(thousand pieces)	Production	Extra-EU exports	Extra-EU imports	Apparent consumption
Shirts	545 292	144 912	1 276 136	1 676 516
Pullovers (1)	605 315	87 877	371 410	888 848
Blouses	179 176	42 554	287 452	424 074
Skirts	138 082	18 821	90 520	209 781
Dresses	113 119	14 258	94 697	193 558
Trousers (2)	396 866	68 034	423 878	752 710
Men's coats and raincoats (2)	8 058	3 548	26 300	30 810
Women's coats and raincoats (2)	46 946	13 301	60 260	93 905
Men's suits and ensembles	16 499	6 454	34 387	44 432
Women's suits and ensembles	41 499	14 372	52 796	79 923

(1) Only knitted.
(2) Only woven.
Source: European Commission (DGIII), CITH

Table 3: Clothing
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.4	0.3	3.1	2.5
Production	3.4	-1.4	1.2	2.5
Extra-EU exports	3.8	5.1	4.3	14.3
Extra-EU imports	13.4	7.7	10.9	7.3

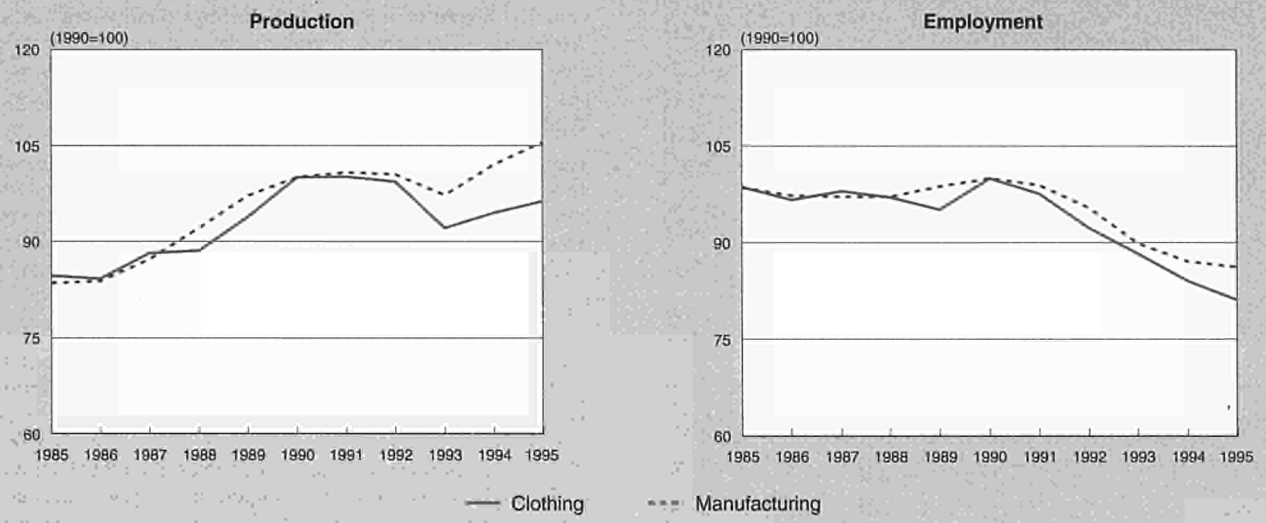
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Clothing
External trade in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	5 138	6 731	6 685	6 853	7 109	8 135	8 643	7 695
Extra-EU imports	7 671	13 782	16 685	16 592	18 009	19 183	19 402	20 461
Trade balance	-2 532	-7 051	-10 000	-9 739	-10 900	-11 048	-10 759	-12 766
Ratio exports / imports	0.7	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Terms of trade index	87.9	100.0	98.8	100.7	95.0	95.8	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EU15.
Source: Eurostat

Figure 3: Clothing
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

In current price terms, apparent consumption also fell after a peak in 1991 and 1992, but grew much more strongly than production in the period 1985 to 1992, when rising imports replaced EU production.

EU trade in clothing, already in deficit since the seventies, moved further into a deficit of about 11 billion ECU in 1994 as, over the period, growth in imports exceeded growth in exports. From 1985 to 1994 the deficit increased by more than four times, while exports only increased by 58%. Imports grew continuously, but the growth slowed down after 1992, as compared to the period 1986 to 1991. Also in real terms, EU imports from 1990 to 1994 increased much more slowly than in the preceding five year period, while EU exports have tended to grow faster in recent years.

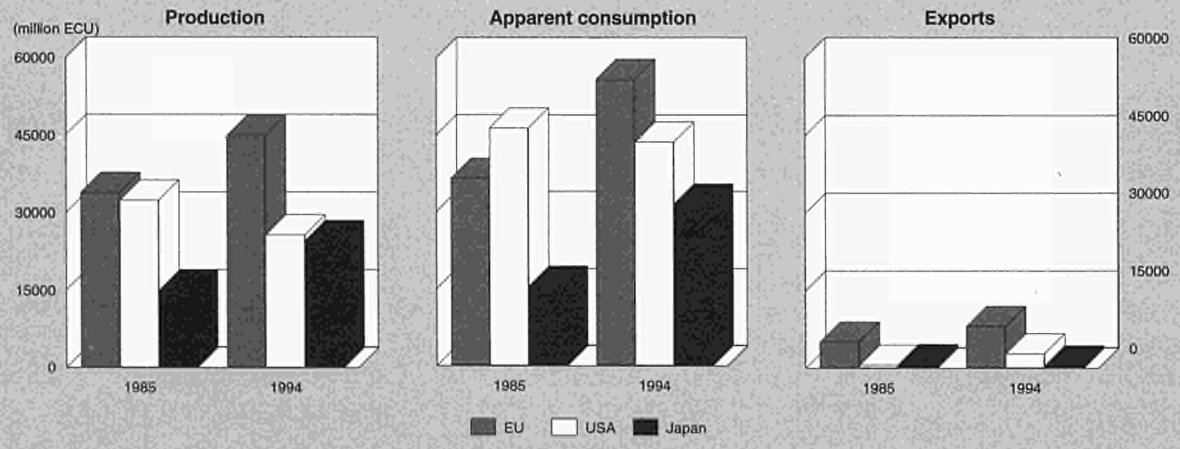
There have been significant job losses in the EU clothing industry over recent years. Between 1985 and 1994 about 320 000 jobs were lost, a fall of almost 25%. After the biggest loss of more than 90 000 jobs in the sector in 1993, the number of employees dropped by around 40 000 annually in 1994 and 1995. This development has been the result, not only of the reduction and de-localisation of production in the face of foreign competition and of the general economic recession, but also of gradual improvements in productivity.

International comparison

The largest clothing producers and exporters with growing importance are the developing countries led by China. The EU, when compared with the USA and Japan (in current ECU prices) is by far the largest clothing producer and exporter, and also has the biggest clothing consumption. Its production, in 1994, was greater than that of the USA and Japan combined. The EU's clothing exports to third countries in 1994 were almost 3 times those from the USA, and almost 16 times those from Japan. The EU also exported a greater proportion of its production than the USA and Japan.

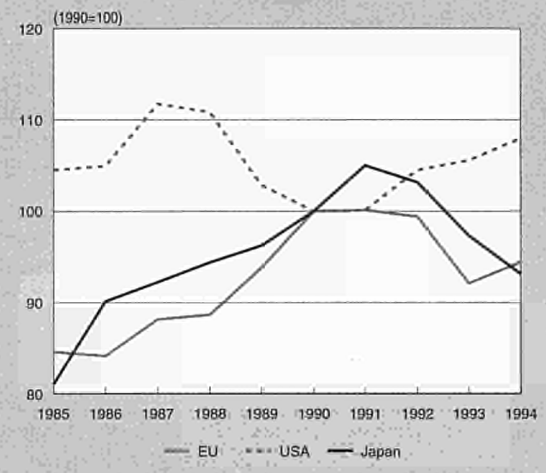
Production in the EU, measured in constant prices, fell continuously since 1987, while in the USA production started to decrease one year later, but increased again after 1991. Japan reached its peak in production in 1991, however, since then it has been decreasing. In current ECU prices, production

Figure 4: Clothing
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Clothing
International comparison of production in constant prices



Source: DEBA GEIE

rose in the EU and much more in Japan between 1985 and 1994, but fell in the USA. Likewise, apparent consumption, in current ECU prices, grew significantly in the EU and doubled in Japan, while it decreased in the USA.

However, the recent export performance of the USA has been much stronger than that of the EU and Japan. US exports, from a rather low level, in current prices, increased by almost four times between 1985 and 1994, compared with an increase in exports of 58% for the EU and a fall of 34% for Japan. This can partly be explained by the weakening dollar during the second half of this period.

Foreign trade

The EU has seen consistent increases in both imports and exports of clothing between 1985 and 1994, although imports have grown 2 1/2 times faster than exports. Compared with an average real annual growth rate in exports of 4% between 1985 and 1990 and 5% between 1990 and 1994, imports grew at average annual rates of 15% and almost 8% over the same two periods. The result has been a widening in the trade deficit to over 11 billion ECU in 1994, over four times the level in 1985. The export/import ratio has fallen from 0.7 to 0.4 (million ECU).

The EU clothing industry has faced considerable competitive pressure from low-cost countries, mainly in the Far East, the Mediterranean rim and Eastern Europe. This has been particularly severe in the low and medium quality segments of the market. The terms of trade index, comparing the prices received for exports to those paid for imports, increased between 1985 and 1992 by almost 15% before falling again slightly.

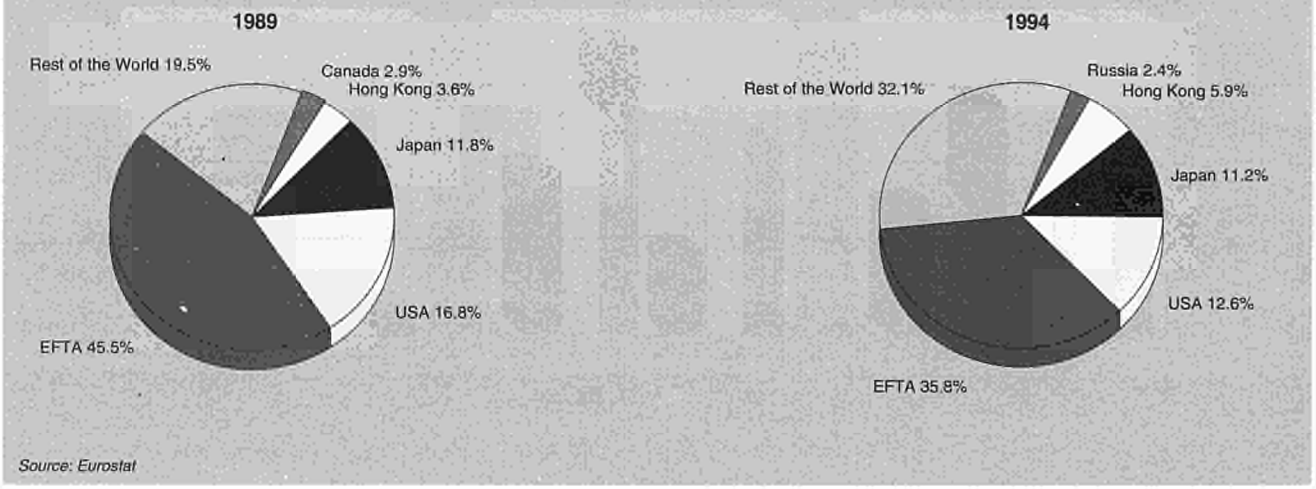
The main destination for EU12 clothing exports are other developed countries. The main customers in 1994 were Switzerland (14%), the USA (13%) and Japan (11%). These countries' share of total EU exports, however, has fallen from 46% in 1989 to 38% in 1994. As a result, the share of the EU's top ten customers has also fallen from 79% to 70%, which demonstrates a regional diversification of EU exports.

The major EU suppliers of clothing are low-cost countries in the Far East, the Mediterranean rim and Eastern Europe. The principal exporters to the EU market in 1994 were China (16%), Hong Kong (9%) and Turkey (7%). The origins of EU clothing imports are less concentrated than the destination of its exports. The ten most important suppliers accounted for 66% of clothing imports in 1994, although this has grown considerably from a 55% share in 1989.

The growing concentration of imports in the hands of a smaller number of major suppliers implies that the shares of the traditional main suppliers such as Hong Kong and Turkey have fallen in recent years, while many other exporting countries have increased their shares. Most of the market has been taken by China, which has seen an increase of 84% in its share of EU clothing imports in the last five years. In 1994 China reached a share of almost 16% of EU clothing imports. This was the result of the transfer of production to China, away from Hong Kong and other countries in the region, in response to rising differences in wage costs.

This corresponds to developments in the EU, where production has shifted to neighbouring countries, such as Poland, Tunisia and Morocco. Production of clothing in these countries is often conducted by or on behalf of EU manufacturers. Fabrics are exported from the EU, to be made up into clothing for subsequent re-importation within the framework of outward processing trade (OPT). This practice of international subcontracting has expanded in recent years. In 1994, OPT imports of clothing, in volume, accounted for about 15% of total EU imports of clothing.

Figure 6: Clothing
Destination of EU exports



Source: Eurostat

Table 5: Clothing
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	85.8	87.1	90.0	91.3	98.6	100.0	102.5	107.7	104.3	112.3
Unit labour costs index (3)	97.9	99.3	98.8	101.3	100.9	100.0	104.5	104.8	104.9	98.1
Total unit costs index (4)	87.7	89.9	90.9	94.1	98.9	100.0	104.8	107.0	105.0	102.5
Gross operating rate (%) (5)	8.6	8.1	8.5	8.6	8.6	9.2	8.8	9.1	8.1	9.2

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

MARKET FORCES

Demand

Demand for clothing in the EU, in real terms, has been weakening by an average annual rate of almost 2% since 1990. In 1994 it was 7.4% below the 1990 level. Consumer spending on clothing (and footwear) as a proportion of total consumer expenditure in the EU has fallen gradually from 8.4% in 1980 to about 7% in 1994. It is particularly low in EU Member States such as UK and France, while it is still higher in countries like Italy and Spain. However, the EU level remained above those in the USA and Japan, where the proportions are 5.5% and 6.5% respectively.

The decline in the share of consumer spending on clothing can be partly explained by a certain change in consumer needs and priorities, but also by the downward trend in the relative prices of garments as compared to other consumer goods. Some of the latter is a consequence of the increase in lower priced imports and the increasing consumer priority for lighter and less expensive clothing. It also stems from ongoing changes in the structure of clothing retailing throughout much of the EU. A growing concentration of retailing in the hands of a small number of larger companies in many EU countries seems to favour cheaper prices. As an example, the relative price of clothing has fallen further in the UK, where retailing is more highly concentrated, than in Italy where it remains relatively fragmented.

Over recent years, demand for clothing has required a growing number of fashion changes and new collections each year. This has put much greater emphasis on the speed and reliability of response to orders by retailers. In addition, the maintenance of lower stocks by retailers has increased recourse to repeat orders. The resulting growing importance of speed tends to favour EU production, especially in the form of subcontracting.

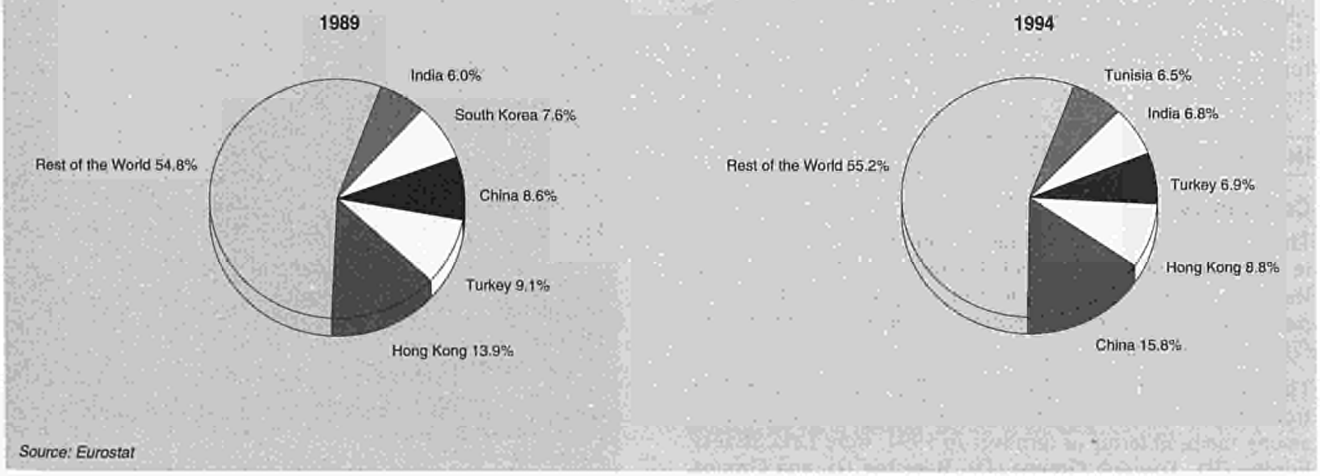
Supply and competition

The EU clothing industry is characterised by very intense competition. Firstly, EU producers face fierce competition from exports of developing countries whose low wage costs give them a considerable competitive advantage. Secondly, it is relatively easy for small firms to enter the industry as investment costs are comparatively low; and finally, increased price pressure has also been exerted by big traders and organised retailers.

The enterprises are reacting to these pressures by consistently improving productivity and by continuously developing new fashions, products and brands in order to create their individual images and markets, and thereby to improve their competitiveness. Labour productivity increased by more than 30% between 1985 and 1994, in comparison to virtually unchanged unit labour costs over the same period.

Another response by EU clothing manufacturers has been either to import directly certain products at the lower half of the quality range, replacing EU production or to relocate a part of the production to low-wage countries close to the EU. In most cases this has taken the form of outward processing (OPT), but there are also investments in joint ventures, allowing the direct control of production or subcontracted production in neighbouring low-wage countries. Outward processing is mostly used in relation to Poland, Romania and other East European countries and to Tunisia, Morocco and

Figure 7: Clothing
Origin of EU imports



Source: Eurostat

Table 6: Clothing
The ten largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Benetton	I	1 477.5	111.4	6.3
Courtaulds Textiles	GBR	1 359.0	44.3	23.3
Manifattura Lane G. Marzotto & Figli	I	1 124.0	13.9	10.0
Damart	F	811.0	35.6	5.4
William Baird	GBR	679.8	21.7	16.4
Gamma Holding	NL	621.5	25.7	6.0
Escada	D	587.3	7.8	3.9
Hugo Boss	D	445.7	27.2	2.0
Cortefiel	E	327.4	29.4	4.2
Dewhirst Group	GBR	318.8	14.6	7.4

Source: DABLE

other Mediterranean countries. Newer developments point to OPT activities in the independent Republics of the former USSR, where labour costs are still even lower or to renew or establish OPT relations with the independent new states of former Yugoslavia.

Production process

The manufacture of clothing involves a number of different stages, from design to packaging of the final product. At the design stage, the utilisation of Computer Aided Design (CAD) systems has become normal in the industry. Significant technological advances have been applied in recent years also in the application of computer technology in controlling pattern layout and cutting, in improving fabric handling, and the management of stocks. Computer Aided Manufacturing (CAM) and all kinds of automation have become widely used, although the clothing manufacturing process still relies essentially on hand labour. Therefore, outward processing (OPT) is more and more used by most of the producers, while international sourcing is not only applied to raw materials, but also extended to ready made garments.

The relatively intensive efforts, begun in the 1980s principally by Japan, to develop totally automated garment mass production has largely been given up. Automation of fabric handling and sewing operations have proved to be more difficult than anticipated. Therefore, greater emphasis has recently been placed on the development of new methods of working, so as to achieve more rapid and flexible production targeted on individual customers (electronic volumetric shaping of human body, objective measurement methods, use of individual customer data, etc.).

New information and telecommunications technologies are likely to be increasingly adopted by the industry, facilitating more direct links between customers, retailers, designers and manufacturers, and supporting Just-in-time and Quick Response strategies. An example is the growing use of EDI (Electronic Data Interchange) systems on the basis of new forms of cooperation between manufacturers or between the industry and distribution.

INDUSTRY STRUCTURE

Companies

There was an estimated number of about 60 000 enterprises in the clothing industry in 1993. The majority (85%) employed less than 20 people, while the remaining larger 9 100 companies were much more important in terms of employment (70%) and turnover (75%).

The existence of returns to scale in the industry is evident from the presence of a number of large companies. The largest among them, in terms of turnover in 1994, were Levi Strauss Europe (B), Triumph Gruppe (D), Benetton (I), and Groupe Damart (F). The ten largest clothing companies in the EU had a share of about 15 % in the industry's turnover. However, such a ranking must be treated with caution. Some companies such as Coats Viyella (UK), producing mainly textiles and therefore being counted in the textile list, manufacture their own fabrics, while others such as Gruppo GFT (I) and Steilmann (D) use mainly bought-in fabrics. For a growing number of companies retailing activities are included in their turnover.

Strategies

Among the production strategies pursued by clothing manufacturers many companies traditionally focus on the production of a range of products for men, women or children, others are specialised in underwear or sportswear. Many companies manufacture a narrowly defined range of products, while again others have diversified into a range of activities, which can also include the production of textiles or consumer articles, such as accessories, leather goods or shoes.

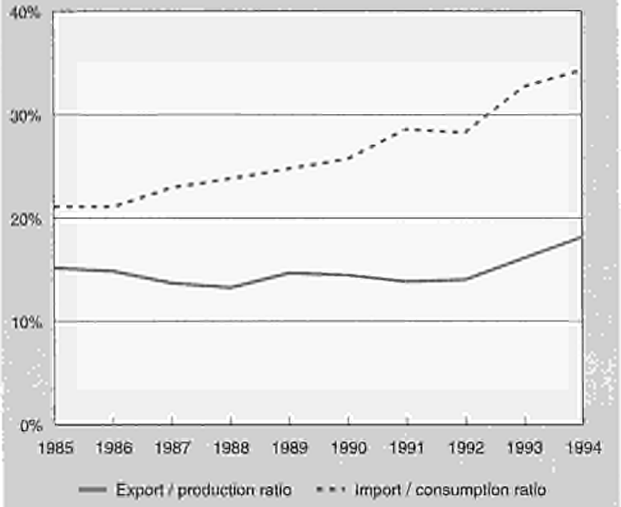
An increasingly important aspect of clothing companies' production strategies over recent years has been the widespread use of subcontracting. Often firms choose to subcontract certain stages of the production process to outside contractors. These can be located in the same region, in other EU countries, as well as in neighbouring or other countries (outward processing). According to a study on subcontracting commissioned by the European Commission, declared workers in subcontracting represented almost 60% of total employment in the clothing industry. Subcontracting has grown rapidly in recent years, largely because the subcontracting relationship confers a number of advantages to both parties. The principal company can achieve lower unit costs, or can offer greater reactivity

Table 7: Clothing
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.8	1.2
Danmark	0.8	0.5
Deutschland	0.8	0.7
Ellada	1.3	2.2
España	1.0	1.5
France	0.9	0.8
Ireland	N/A	N/A
Italia	1.7	1.8
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	N/A	3.5
United Kingdom	0.9	0.8

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Clothing Trade intensities



Source: DEBA GEIE, Eurostat

and flexibility, or special expertise and services. The subcontractor can increase his capacity utilisation by combining his own production with that done on a subcontracted basis. In particular, subcontracting within certain regional limits and on the basis of long-term relationships has favoured the development of a very flexible type of production with short lead times.

Among the strategies applied in the clothing sector, internationalisation or globalisation strategies are of growing importance. Outward processing (OPT) is carried to new countries with lower wages, even if distances tend to be greater. Direct sourcing of EU manufacturers in third countries has become a regular instrument of company policy. New distribution methods are rapidly developing, where manufacturers take over the former functions of traders, e.g. through their own factory outlets or distribution chains.

REGIONAL DISTRIBUTION

The EU clothing industry is relatively widely spread throughout Europe. According to Euratex, the largest clothing producing region in the EU is Lombardia (I) with 75 000 employees, followed by Veneto (I) and Bayern (D) each with between 50 000 and 75 000.

There are other regions with between 25 000 and 50 000 employees, four of which are in Italy. The remainder are Nordrhein-Westfalen (D), Île de France (F), Cataluna (E), Norte (P) and Greater Manchester (UK).

Finally, there are more than 20 regions with 10 000 - 20 000 people employed in the clothing industry. Among these, six are in the UK, four each in Italy, Spain and France, three in Germany, and two in Portugal.

ENVIRONMENT

While the manufacture of clothing gives rise to fewer environmental problems than the manufacture of textiles, the day to day use of clothing has a significant impact on the environment. The pollution caused and the energy consumed in the washing and cleaning of items of clothing can be considerable. Also the final disposal of clothing can give rise to environmental problems, since synthetic fabrics are not biodegradable, although natural and cellulosic fabrics are.

The recycling of clothing is commonplace, especially for woollen garments. Recycled wool does not have to be scoured and may not need dyeing, thereby saving on water and energy.

The EU is introducing a general system of 'eco-auditing', by which firms of all industries can monitor the environmental effect of their production processes. Another scheme which may affect clothing is the European 'eco-labelling' scheme, whereby products whose manufacture meets certain strict environmental criteria may bear the EU eco-label logo, thereby informing the consumer. It remains to be seen to what extent this market instrument will contribute to reducing the environmental impact of clothing manufacture.

REGULATIONS

Specific regulations regarding textiles are mostly also applicable to clothing (see the corresponding section in chapter TEXTILES). However, for outward processing trade (OPT) the EU, already in 1982, established a particular legal framework which was modified by Regulation (EU) No 3036/94, applicable since the beginning of 1995. This new regulation, supplemented by Regulation (EU) No 3017/95, supporting the uniform application in the EU, is intended to ensure that OPT manufacturers use EU fabrics when operating in low-wage countries, and limits operators in the volume of their OPT operations by linking these to their respective EU production. The idea was to maintain a maximum of production and employment in the EU clothing sector. However, this regulation does not apply to the Mediterranean countries and will no longer apply to the Central and East European countries after 1997, where most of the industry's OPT is carried out.

OUTLOOK

The EU clothing industry continues to face difficult economic conditions in Europe and increasing competition from third countries. Consumption of clothing in the EU is not expected to improve significantly, even with recovery in the EU economy as a whole.

Production will continue to be adversely affected by these sluggish demand conditions, but also by the continuation of foreign sourcing and production strategies. However, depending on the success of the market opening process agreed upon in the Uruguay Round the industry should benefit from higher exports. In any case export forecasts are more favourable than those for imports. The average annual increase in exports is estimated at 7 to 8% in current prices, while increases in imports, following developments in consumption, are expected to remain below 5% in current prices between 1996 and 1998. Much, however, will depend on the real opening of third countries' markets and the practical engagement of the EU industry in the utilisation of these new possibilities.

Employment will suffer from the decline in production. With productivity gains expected to continue their present course, employment is anticipated to fall further.

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Leather, tanning and finishing

NACE (Revision 1) 19.1, 19.2

Raw materials continue to be at the heart of the EU tanning sector's concerns. Prospects for a definitive dismantling of protectionism in third countries are still not sufficiently clear, which keeps business prospects within limits. Export orientation, fashion and quality, factors of strength and competitiveness of EU tanners, will have to be further developed in order to achieve a successful enlargement of the EU to the East.

INDUSTRY PROFILE

Description of the sector

Leather is the tanning sector's fundamental output. A natural material with unique properties which has always been present since mankind and has marked modern lifestyles with a touch of exclusiveness. It is an intermediate industrial product which finds numerous applications in downstream sectors of the consumer products industry. For the latter, leather is often the major material input which is cut and assembled into shoes, clothing, leather goods, furniture and many other items of daily use. These different applications require different types of leather. The tanning industry fulfils these needs with the variety of hides and skins available as by-products from the meat industry. Bovine hides and ovine and caprine skins as well as many other animal skins are recuperated from being dumped and processed to useful and fashionable objects.

The valorisation of hides and skins also generates other by-products which find outlets in several industry sectors such as pet and animal food production, fine chemicals including photography and cosmetics and soil conditioning and fertilisers.

Tanning is at the basis of an extensive chain of industries forming a dense tissue of activities all related to the valorisation of hides and skins. This sector often constitutes the principal source for the generation of wealth and employment at local and regional level. Its economic weight goes far beyond the simple consideration of its sole significance.

Italy is by far the leather sector's most important location in Europe in terms of establishments, employment, production and turnover. Spain ranks second and forms with France, Germany and UK for most of the balance in the EU leather industry. Other peripheral European member States also count with a dynamic leather industry of which Portugal's looks particularly promising.

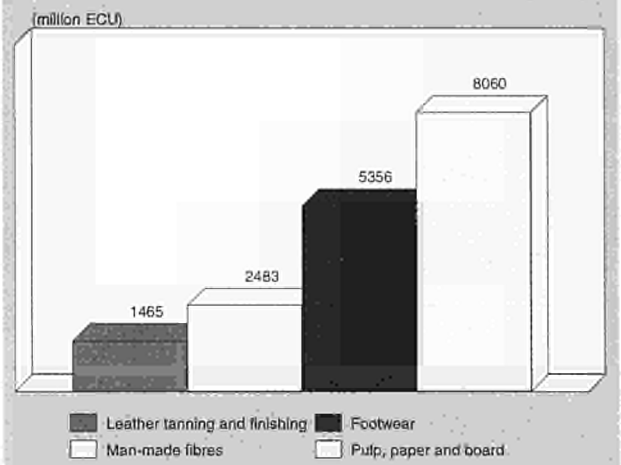
Leather, tanning and finishing is covered under heading 19.1+19.2 of the new NACE Revision 1 classification and former 441 of the NACE 70 registry (Tanning, dressing of leather). Official data based on these classifications present numerous loopholes and some inaccuracies but may partially complement the data compiled by the sector associations.

Recent trends

Production and consumption of leather has taken a growing importance in the economies of developing countries and NICs particularly in Asia. Bulk and standard leather production has shifted to a large extend to those regions where low-cost labour is also widely available. With the development of a wealthy middle-class, these countries also turn into new markets for leather articles. Certain countries in Asia and the Americas have seen their leather industries develop to become important players in the International comparison. The structural adjustment required by these and forthcoming changes in global production and consumption patterns hits European tanners' preponderance in the world's leather industry. They will continue to influence the sector's operators in the long term.

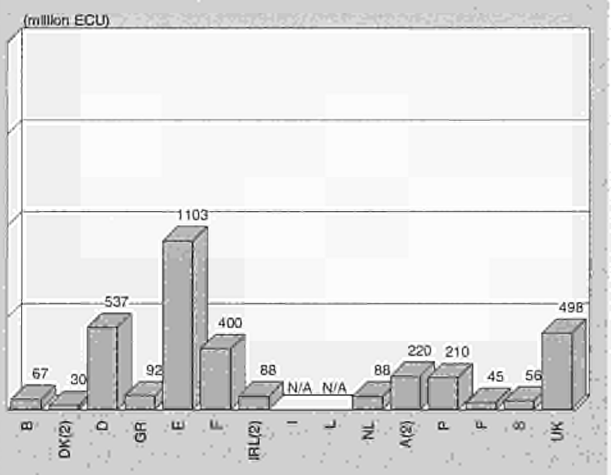
Europe's production trends have experienced a consequent reduction in capacities and quantitative output, but also a slow progressive rise in turnover. While the EU tanning sector has lost over 1000 production units and some 30000 workers since the beginning of the 1980's, its turnover has nearly doubled from some 4000 million ECU to almost 8000 million ECU. Most of the loss in industrial substance has been observed in Northern European countries. Germany has suffered a particularly sharp decline in the number of tanneries. The EU12 sector's employment has contracted to about 50.000 workers in 1995. The accession of the new Member States Sweden, Finland and Austria has no significant influence on the total, as together they account for approximately 2000 workers.

Figure 1: Leather tanning and finishing
Value added in comparison with related industries, 1994



Source: DEBA GEIE

Figure 2: Leather tanning and finishing
Turnover by Member State, 1994 (1)



(1) Provisional data.
(2) Cotance estimates.
Source: Cotance

Table 1: Leather tanning and finishing
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1996 (3)
Apparent consumption	7 041	8 146	6 928	6 447	6 332	6 438	6 912	7 000
Production	7 341	8 132	7 226	6 895	7 069	7 185	7 512	7 600
Extra-EU exports	1 087	1 180	1 173	1 279	1 492	1 726	1 950	1 900
Trade balance	300	-14	298	448	737	747	600	600
Employment (thousands)	78	63	60	55	52	51	50	49

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) Cotance estimates for EUR15.
(3) Cotance forecasts for EUR15.
Source: Cotance, Eurostat

Table 2: Leather tanning and finishing
Breakdown of finished leather products by major product line, 1994

(million square metres)	Apparent consumption	Production	Extra-EU exports
Cattle and calf	183.9	200.0	57.4
Sheep and goats	84.2	79.0	37.7
Other (1)	40.2	10.0	5.1

(1) Cotance estimate for production.
Source: Cotance

Table 3: Leather tanning and finishing
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	1.1	-3.4	-0.9	0.8
Production	0.0	-1.4	-0.6	-0.1
Extra-EU exports	-1.4	6.7	2.1	4.2
Extra-EU imports	7.5	-5.9	1.3	15.4

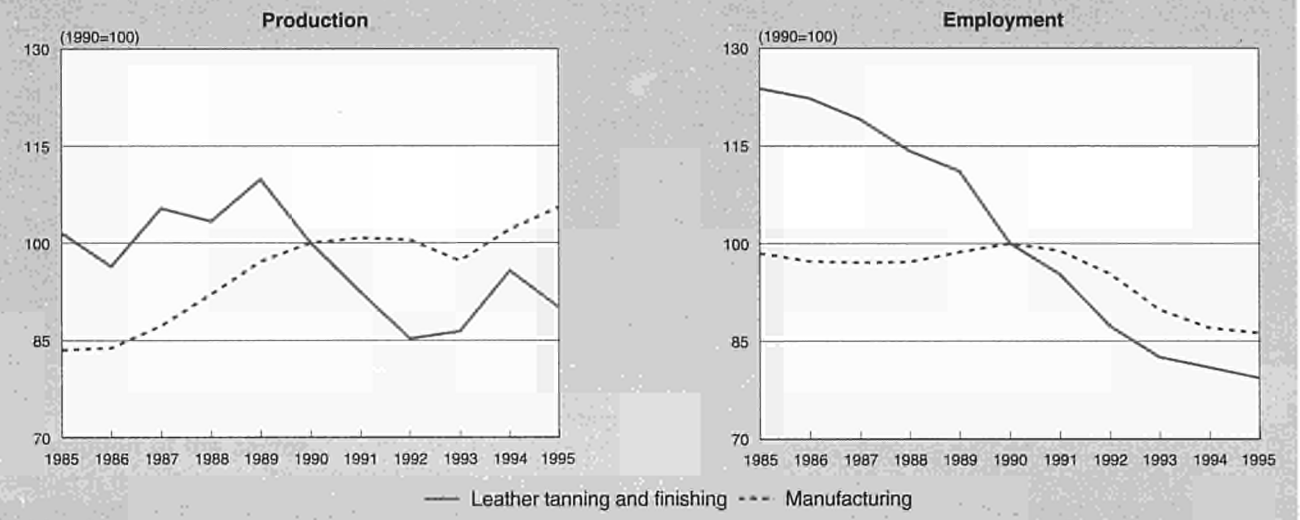
(1) Some country data for apparent consumption and production have been estimated.
Source: Cotance, Eurostat

Table 4: Leather tanning and finishing
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	1 087	936	1 057	1 044	1 344	1 180	1 173	1 279	1 492	1 726	1 850	1 950
Extra-EU imports	787	699	794	808	941	1 194	875	831	755	979	1 150	1 350
Trade balance	300	237	263	236	403	-14	298	448	737	747	700	600
Ratio exports / imports	1.4	1.3	1.3	1.3	1.4	1.0	1.3	1.5	2.0	1.8	1.6	1.4
Terms of trade index	90.8	101.6	97.7	97.7	98.9	100.0	102.2	106.2	108.9	107.6	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Leather tanning and finishing
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: Cotance, DEBA GEIE, Eurostat

The transition from quantity to quality has swept much of Western Europe's leather industry. This adjustment will demand a substantial restructuring in the EU's further enlargement to the CEEC's and cooperation with Southern Mediterranean countries.

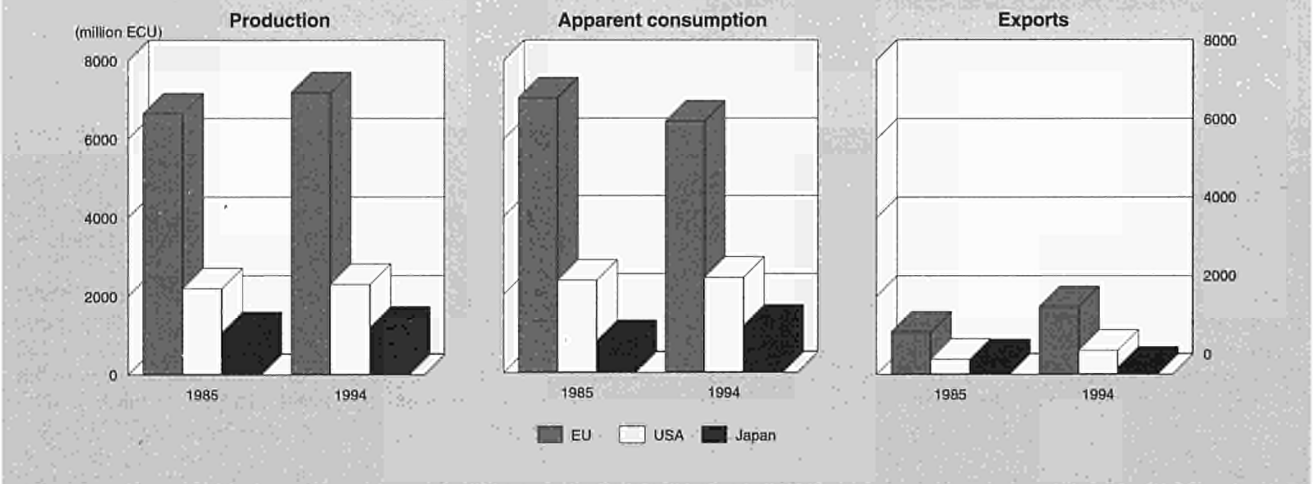
EU tanners are adjusting their productions to fulfil higher quality standards and excel in fashion content of leathers. In certain cases they specialise in some particularly demanding niche markets requiring outstanding technological control of the process or visionary anticipation of market trends.

With the globalisation of the economy, the EU tanning industry can no longer rely on its internal market to use up its production. Many leather articles manufacturers in Europe have vanished under the pressure from low-cost competitors or have relocated their production in emerging economies. Apparent consumption of leather in Europe is losing ground against the emergence of new, rapidly growing markets in other parts of the world. Export orientation has become a key factor in European tanneries looking for the upper end of the leather markets worldwide.

International comparison

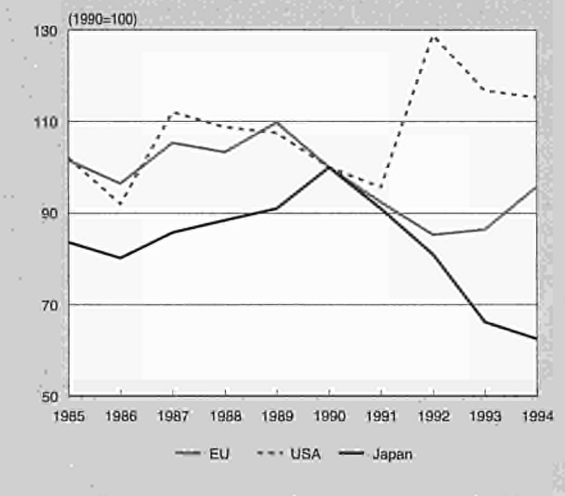
Contrary to the USA which have developed a certain leadership in the production of semi-finished leather and a few finished leather niche markets, the EU has been able to maintain a sensibly large share in the finished leather production. Compared to Japan which supports its tanneries with protective market access mechanisms, the EU has achieved to keep a competitive leather industry in an open market. The EU tanning industry is still acknowledged worldwide as the reference within the sector. Its traditional image of quality and reliability combined with fashion content and consistency in supplies secures the EU tanners a privileged position in the international marketplace. Much of the comparative advantages of the EU tanning industry are however nullified by the fierce price competition from certain important players such as India and Pakistan in Asia, and Argentina and Brazil in the Americas

Figure 4: Leather tanning and finishing
International comparison of main indicators in current prices



Source: Cotance, DEBA GEIE, Eurostat

Figure 5: Leather tanning and finishing
International comparison of production in constant prices



Source: DEBA GEIE

which benefit from artificially reduced costs in their raw material supplies.

Foreign trade

With a positive trade balance of 746,3 million ECU in finished leather, the EU tanning industry successfully resists the gradual increase in imports in quantitative terms. The EU is still the world's largest supplier of leather on the international marketplace. Italy alone represents 14% of the world's cattle and calf leather production, 23% of sheep and goat leather production and 11% of sole leather production. Exports account for some 40% to 90% of the tanning sector's turnover in the different EU member States. Asia's growing economies and in particular the Far East have taken an increasingly important position as markets for EU tanners.

The EU's share on world markets however tends to shrink with the development of the leather industry in other regions of the world such as Asia and the Americas. Extra-EU exports are reaching record peaks in value terms whilst in quantities there seems to be limitations especially in the non-bovine leather area. Some promising markets are out of reach to EU tanners due to competition distorting trade barriers both in the field of access to resources and access to markets. The bulk of extra-EU exports of finished leather concentrate on a relatively limited number of destinations making the EU tanning industry vulnerable to changes in the supply patterns of trade partners. Third country markets' trade and technical regulations are crucial factors influencing the competitive position of European suppliers of leather. Attempts to broaden the range of markets, the EU tanners are often frustrated by the existence of protectionist measures which nullify European leather's competitive position. Access to certain promising markets is restricted either by excessive customs barriers or by dual pricing policies for raw materials. These constitute subtle systems which artificially reduce the costs of raw materials to local competitors giving them an unchallengeable price advantage in the finished leather.

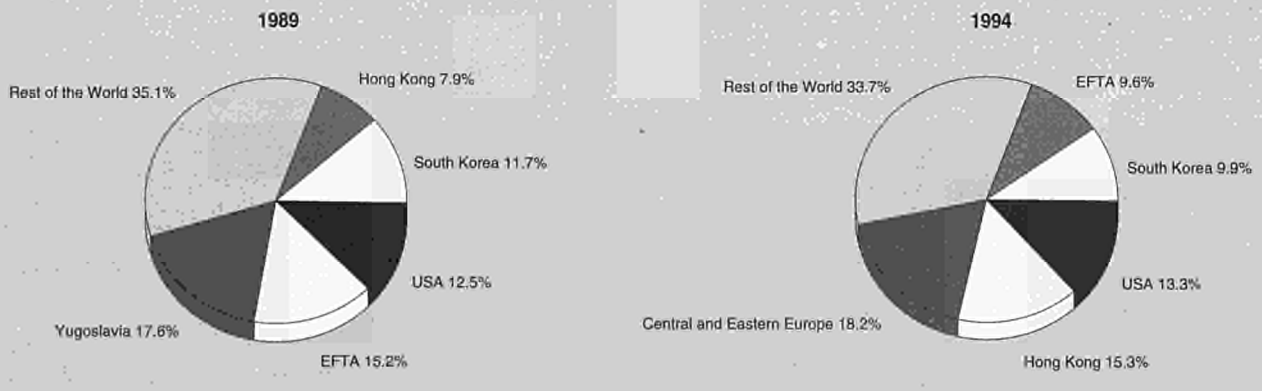
Extra-EU imports have remained relatively stable over recent years, experiencing a slight decline in value terms between 1990 and 1993, but progressively gaining more ground in volume. EU's major suppliers of finished leather are also concentrated in a few countries such as India (18%), Pakistan (9.8%), Argentina (5.3%) and Brazil (4%). Since the fall of the iron curtain CEEC's have gained a substantial share in the EU leather market of 5.7% in value, a 4-fold increase compared to 1989. Imports from these neighbouring countries have somewhat eroded the position of more distant suppliers. The USA have slightly lost ground on the EU market and China has made its first appearance of relative importance.

MARKET FORCES

Demand

Demand for leather depends on a multitude of factors which fundamentally relate to the perception of this material by consumers. These perceptions vary over time and from market to market. Consumer products manufacturers integrate these perceptions into their production strategies and translate them into demand towards their suppliers, the tanners. Footwear remains overall the most important outlet to EU tanners production with a share of 50%. The clothing industry takes approximately 20% of all finished leather produced in the EU. Upholstered furniture consumes some 17% of EU tanners output and the leather goods sector, 13%. These ratios vary widely from one Member State to another and the weighting of the different outlets indicate a certain sector specialisation in the industry. The clothing and leather goods sectors, for instance, have become significantly less important client sec-

Figure 6: Leather tanning and finishing
Destination of EU exports



Source: Cotance, Eurostat

Table 5: Leather tanning and finishing
Destination of output, 1994 (1)

(%)

Footwear industry	50
Clothing industry	20
Furniture upholstery	17
Other industries	13

(1) Provisional figures.
Source: Cotance

tors for Northern European tanners, thereby indicating a specialisation in the production of footwear and furniture leathers.

However unique the properties of leather may be, it may sometimes be substituted with other less satisfactory materials presenting significantly poorer performances. Price therefore plays a fundamental role particularly in the middle and lower end of the market. Higher, more qualitative or fashion oriented leathers are more sensitive to consumer spending patterns than to price.

Western consumer trends towards more natural products is a development which should favour leather against man-made materials. Emerging economies perceive leather either as an essential material for basic outerwear which will be re-exported to wealthier markets or as a status symbol for wealth and success.

Supply and competition

Supply of hides and skins to the tanning industry is independent from tanners' demand. Raw materials occur as a residue from the meat industry whose concern is to satisfy consumer demand for red meat. Due to this circumstance tanners are exposed to the fluctuations in the availability of hides and skins resulting from agricultural policies. However, there are also other important factors influencing the supply of raw materials which rather correspond to the area of industrial policy. It is estimated that between 30 and 50% of the world's availability's of hides and skins are distracted from the international marketplace by these kind of policies. Indeed, an increasing number of extra-EU countries are restricting, through protective measures, foreign access to local supplies. On the isolated market this leads to an oversupply of hides and skins which artificially pushes down the input cost of this essential raw material against the prices on open markets. Considering the fact that hides and skins typically correspond to 50% of the production costs of finished leather, such measures result in a substantial subsidy for the protected tanners. Whereas these policies are generally accepted as support measures for "infant industries", if pursued beyond a limited period of time, they become particularly unfair trade barriers as they consolidate double pricing mechanisms. The more raw materials are distracted from free and open markets through these protectionist measures, the more distorting is their effect on international competition. For the EU tanning industry this constitutes the most important drawback affecting the competitiveness of its operators.

Production process

Progress in analytical techniques combined to ecological concerns have been the most important driving forces in recent technological developments in the EU tanning industry. The compulsory avoidance in production processes of certain traditional substances for which safer substitutes become available forces operators to adapt. Certain member States are particularly prolific in the development of technical regulations. In some cases where the speed of industrial adjustment has been overestimated by governments, these can be a source of considerable trade disruption. EU tanners are however better prepared than other sector operators to integrate novelties in the production chain due to their technological advance. Innovation is precisely one of the EU tanning sector's most renown competitive advantage both in the field of technology and in the area of fashion.

INDUSTRY STRUCTURE

Companies

Despite the enlargement of the EU to Sweden, Finland and Austria, the total number of tanneries continues to decline. The new Member States have added some 20 enterprises to the EU sector's total, but the closures in the rest of the Community have exceeded this number. There are at present slightly over 3 000 tanneries in the EU and about 50 000 workers. Over the last decade the tanning sector has lost 1/4 of its industrial substance and 1/3 of its work force. Tanneries in Europe are SMEs of which only 10 are reckoned to employ more than 200 people. In the range of 101 to 200 employees, one finds only 1% of the sector's companies, and 8.5% in the category of firms employing between 21 and 100 people. Companies are generally family businesses transmitted from generation to generation and some can proudly show a centenary tradition.

Strategies

Mergers and acquisitions are not common features in the EU tanning industry. Strategic alliances may be developed on key foreign markets with the objective of better servicing client industries.

REGIONAL DISTRIBUTION

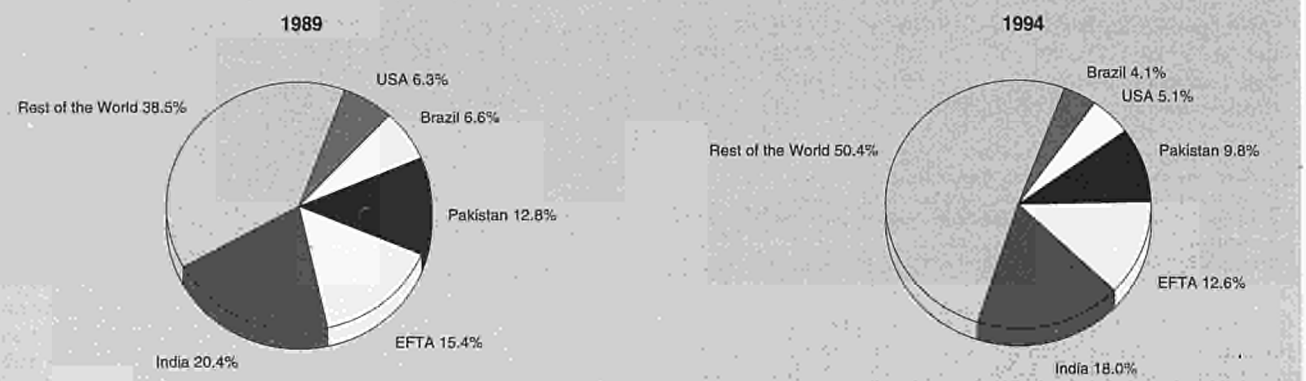
Certain regions within EU Member States present characteristic concentrations of tanneries and municipalities whose local socio-economic life heavily depends on this sector's activity. These are more frequent in Southern European countries and in particular in Italy where Tuscany, Veneto and Campania concentrate most of the EU tanning sector's operators. In Spain, tanners are usually located in Catalonia, Valencia, Murcia and Madrid. Midi-Pyrénées in France, Centro in Portugal and Athens in Greece are other smaller tanning regions.

Table 6: Leather tanning and finishing
Breakdown by size of enterprise, 1992 (1) (2)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	22 925	93	49	41
20-99 employees	1526	6.2	28.1	30.6
100 or more employees	209	0.8	22.5	28.8

(1) Estimates for EUR15.
(2) NACE 44 (NACE 1970).
Source: Eurostat Enterprises in Europe

Figure 7: Leather tanning and finishing
Origin of EU imports

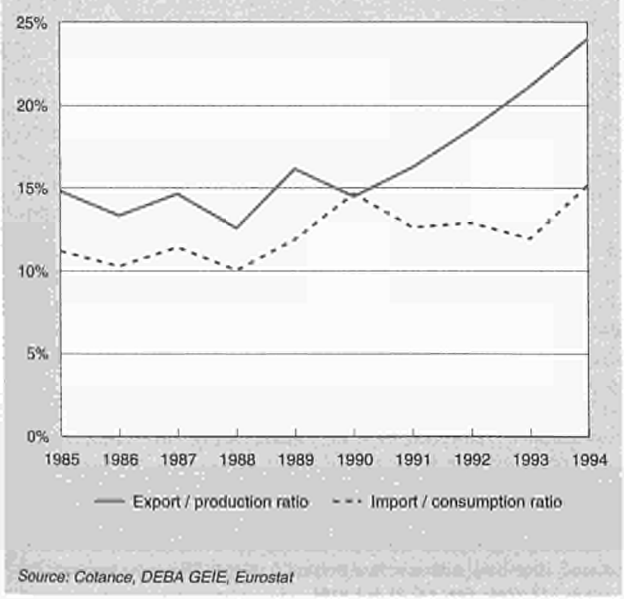


Source: Cotance, Eurostat

ENVIRONMENT

Historically tanneries have been the target of public concern in the field of environment mainly due to ignorance. Allegations on the polluting nature of the industry have been far too often based on superficial considerations which generally do not take into account scientific evidence nor the positive aspects of the trade. Indeed, the tanning industry considerably reduces the environmental impact of the meat industry, which would otherwise face a major waste disposal problem. Tanners recover their hides and skins, a residual by-product carrying a substantial load of intrinsic pollution which ultimately appears in the liquid and solid residues of tannery operations. However, the abattoir's problem is effectively transferred to the tanning industry, with only one-fifth by weight of raw material being converted into saleable leather. The pollution generated by the tanning process as such is marginal compared to the imported one and has been efficiently brought under control through clean technologies and other pollution abatement techniques developed over the years. EU tanners' environmental costs which are estimated at about 5% of their turnover concern only marginally the clean up of their own contamination and mostly the one imported from the agricultural sector. In order to reduce these costs, tanners in the EU have largely integrated ecological considerations in their management strategies. They strive to valorise further the remains of hides and skins which does not go into leather by finding profitable outlets to by-products gained out of the residual material. However, existing legislation aiming a wider use of secondary raw materials does not sufficiently encourage recycling or recovering operations in the tanning industry. New developments in the waste management policies in the EU risk to put a severe strain on tanners if more and more of their by-products are classified as waste.

Figure 8: Leather tanning and finishing
Trade intensities



Source: Cotance, DEBA GEIE, Eurostat

REGULATIONS

Only a few EU regulations specifically apply to the leather sector. The footwear labelling directive is the most significant example. It sets EU standards for labelling shoes to be sold to consumers throughout the Community and warrants their free circulation without needing to change tags or indications. This directive defines the parts of the shoe to be labelled and the materials used. The use of the term "Leather" is restricted to the material defined as such by the trade and in particular by the International Council of Tanners (ICT).

Tanning can be covered by the complex and comprehensive set of rules governing industry on a trans-sectoral basis. The latter include standards concerning the production process and in particular the use of certain substances and preparations, emission limits into the environment, quality objectives of certain by-products for their use in the agri-food industry, etc. EU legislation on Integrated Pollution, Prevention and Control (IPPC) and on Volatile Organic Compounds (VOC) contains, in its annexes, specific requirements for the tanning industry.

Raw hides and skins have also been matter of attention to EU regulators within the context of the "balai" directive which aims the setting of health and safety standards for the trade of a series of animal products with a particular focus on the avoidance of the spread of pathogens.

Among trade regulations affecting the leather sector it is worth noting that the new EU scheme of generalised preferences (GSP) classifies the leather industry among the sensitive sectors and that the most competitive beneficiaries, such as Argentina, Brazil, India and Pakistan, will be gradually excluded from the granting of preferential access to the EU internal market.

Table 7: Leather tanning and finishing
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	90.0	86.8	92.5	93.2	103.3	100.0	98.2	96.9	105.9	117.9
Unit labour costs index (3)	81.7	88.6	86.0	91.3	88.8	100.0	109.7	117.1	102.9	93.5
Total unit costs index (4)	91.6	91.5	93.0	97.6	101.0	100.0	98.0	100.4	92.3	92.5
Gross operating rate (%) (5)	8.3	8.3	8.4	7.3	7.4	6.7	8.4	6.8	8.0	9.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Cause of concern to the tanning industry are rather national regulations affecting the sector's products on the internal market. Leather and leather products have recently been subject to some technical regulations in Germany concerning prevention of mould growth and dyestuffs which have caused great disarray within the industry as their implementation has not taken sufficiently into account the adjustment capacity of foreign operators.

OUTLOOK

Recent issues affecting the supply of hides and skins are putting an additional threat to the EU tanning industry. The embargo on British beef as a response to the BSE affair has led to a deterioration of consumer confidence in red meat all over Europe. The consequent drop in slaughterings has worsened the already poor availability of raw materials for the sector and the outlook for EU tanners. The current sluggishness I demand for leather on world market hides the gravity of the situation. Many EU tanners relying at present on small business with low profitability will face difficulties in the procurement of raw materials at rapidly escalating prices.

However, the future prospects of the tanning industry will be influenced by the forthcoming enlargement of the EU to the East. CEECs have been investing in the restructuring of their tanning industry so as to maintain most of the sector's industrial substance since the fall of the iron curtain. Their integration into the Community will not be without problems for both sides in particular because the EU's next enlargement will be accompanied by a wider opening to the Mediterranean and possibly the conclusion of free trade agreements with a number of countries with a very competitive tanning and leather industry.

Table 8: Leather tanning and finishing
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	0.2
Danmark	N/A	N/A
Deutschland	0.4	0.3
Ellada	1.5	1.1
España	2.4	1.9
France	0.5	0.3
Ireland	N/A	N/A
Italia	2.7	3.7
Luxembourg	0.0	0.0
Nederland	0.4	0.5
Portugal	3.3	N/A
United Kingdom	0.8	0.7

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Written by: BLC
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Footwear
NACE (Revision 1) 19.3

The EU is one of the world's largest footwear markets. Consumption declined in tandem with the EU economy in the early 1990s, after having increased steadily through the late 1980s. Despite sharp growth in the last two years overall production growth in the 1990s has been very moderate and employment continues to fall. Increased extra-EU exports has generally been offset by rapid growth of extra-EU imports and the EU now runs an overall net deficit on trade in footwear. Italy accounts for almost half of the value of EU production and over half of extra-EU exports. Increased competition from low-labour cost locations has encouraged relocation of EU manufacturing facilities to third countries. The structure of distribution is changing, as some manufacturers are developing their own retail chains as well as factory outlets, while some of Europe's large fashion groups now have shown interest in footwear. Computer-based technologies have shortened production times, enabling quick response to fashion trends and the introduction of just-in-time (JIT) manufacturing. In addition, these developments have helped to make shoe manufacture environmentally safer.

INDUSTRY PROFILE

Description of the sector

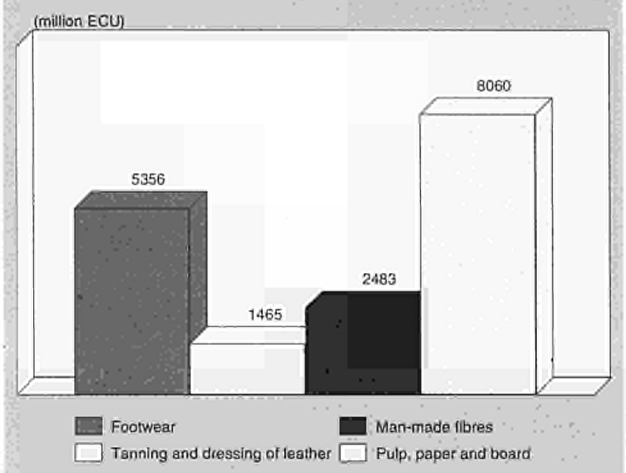
With the former NACE'70 classification the different types of footwear produced within the Community are classified under code 451 and 452 as follows: mass produced outdoor footwear (451.1) mass-produced indoor footwear (451.2), special types of footwear (451.3), and hand-made footwear (452). Now with the new NACE classification, these product groups are all included into the code 19.3. It is also common to classify footwear into broad groups by the major material used for the upper - leather, synthetic, rubber, textile and other. Some of Europe's large fashion groups have an interest in the manufacture of footwear, which is sold through their own outlets.

Recent trends

The EU footwear industry is relatively labour-intensive with labour costs equal to around 20% of production value. Employment, however, has fallen sharply with the declining importance of the EU footwear industry. The industry employed approximately 286000 workers in 1994 (including firms with less than 20 employees), according to the "Confédération Européenne de l'Industrie de la Chaussure" (CEC). Eurostat data, which excludes firms with less than 20 employees, estimated total employment in 1995 to 221600 workers, a decrease of 3% with respect to the level in 1994 and of 28% since 1985. The difference between CEC and Eurostat estimates reflects the importance of small enterprises in the footwear sector.

The value of production in 1995 was 17.9 billion ECU including labour costs of 3.4 billion ECU. Total value added for the industry in 1995 was estimated to 5.6 billion ECU. Apparent consumption in 1994 was marginally higher than production, reflecting a very small deficit on extra-EU trade. The EU recorded its first footwear trade deficit in 1991, although the 1994 deficit of 60 million ECU represents an improvement. The vulnerability of EU footwear producers to low cost extra-EU competitors increased throughout the 1980s and into the 1990s, underpinning the emergence of the trade deficit. Moreover, this deficit will expand alongside increased intra-EU trade, following the entry to the European Union of the three new Member States. Austria, Finland and Sweden

Figure 1: Footwear
Value added in comparison with related industries, 1994



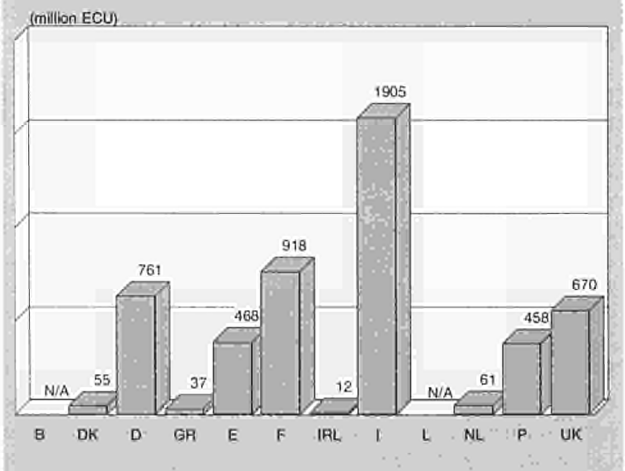
Source: DEBA GEIE

were important destinations for EU footwear exports. The footwear industry is relatively unimportant in the new entrants, which in total employed only around 7400 workers in 1995 (in firms with 20 or more employees). Eurostat estimates that the trade deficit on footwear in the EU-12 amounted to 70 million ECU in 1995, but it increases to 650 million ECU when the EU-15 is considered.

Production stagnated during the 1980s, albeit recovering somewhat in the recent years. This recovery was characterised by growth spurts in 1988, 1990 and 1994 rather than a sustained improvement. Eurostat estimates for 1995 point towards a further increase of around 4% in current prices, mainly through increased sales on the buoyant European market.

Employment trends highlight the difficulties faced by the European footwear industry, as numbers of employees fell continuously over the last ten years, with the exception of 1989. In the early 1990s job losses were relatively heavy, and the recent upturn in production simply moderated the decline rather than reversing it.

Figure 2: Footwear
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Footwear
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	12 064	14 233	15 767	17 469	16 981	16 615	17 208	17 556	18 778	19 430	20 230	21 090
Production	13 726	15 132	16 548	16 990	16 693	16 183	17 151	17 879	18 501	19 160	19 970	20 830
Extra-EU exports	4 231	3 929	4 117	3 941	4 176	4 364	5 173	5 372	4 880	5 130	5 400	5 740
Trade balance	1 662	905	781	-479	-288	-433	-58	323	-277	-270	-260	-260
Employment (thousands)	307.7	272.2	279.3	273.5	256.8	238.7	227.8	221.6	229.0	230.0	220.0	220.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Footwear
Production in volume by Member State

(million pairs)	1994
EUR12 (1)	1 108.3
Belgique/België and Luxembourg (1)	1.8
Danmark	5.3
Deutschland	49.0
Ellada (1)	12.5
España	190.4
France	155.0
Ireland (1)	1.0
Italia	471.3
Nederland (1)	5.5
Portugal (1)	109.8
United Kingdom (1)	106.8

(1) Estimates.
Source: CEC

Italy is Europe's major footwear producer, accounting for 43% of the total volume of EU production in 1994. Spain, the next largest producer, accounted for 17%. Other major producers are France (14%), Germany (4%), Portugal (10%), and the United Kingdom (10%). Together, these six countries account for 97% of the total value of EU-12 production. Within this amount the relative value of the shares of Italy and Portugal have increased over the last decade. Thus, Italy accounted for 44% of production in 1995, followed by France (14%). Production in the EU is dominated by leather footwear, 680 million pairs, accounting for more than six out of every ten pairs produced in the EU. The importance of the different types of footwear production varies across Member States - leather footwear accounted in 1994 for 90% of footwear produced in Portugal, 79% in Germany and 68% in Italy, while slippers are important components of output in Belgium and France and synthetic footwear is relatively important in the United Kingdom.

International comparison

Footwear production is dominated by low-cost developing countries and newly industrialised countries (NICs). The USA and Japan account for only 2% and 3% of world footwear production respectively. The EU, however, remains a major producer, accounting for just under 10% of the value of global footwear production and around 20% of world footwear exports.

In the USA the value of production halved in current prices in the last decade, as well as apparent consumption. Production in the highly protected Japanese market, however, has risen faster than in the EU over the last ten years, but all of this growth occurred during the second half of the 1980s, and Japanese production has contracted steadily since 1991. Apparent consumption has also risen more rapidly in Japan than in the EU.

Foreign trade

The EU footwear sector is heavily dependent on international trade, with 30% of EU production exported to extra-EU destinations in 1994. The export/production ratio fell in the second half of the 1980s but rose again in the 1990s, although the buoyancy of the internal EU market reversed this trend in 1995, as the value of extra-EU exports actually fell despite a 4% rise in EU production. Having fallen sharply between 1985 and 1988 there was counterbalancing growth in the value of extra-EU exports in recent years. Overall, the average real value of extra-EU imports has risen slightly, by 2% per annum on average, between 1985 and 1994. Conversely, imports and import penetration have grown sharply during the same period. Import penetration rose from 16% in 1985 to 30% in 1994, alongside a real average annual growth of extra-EU imports of 10% over the 1985-94 period. It should be noted that some of this increase includes growth in imports of semi-finished shoes for further production.

Increasing import penetration in the internal EU market is now reflected in an overall footwear trade deficit. Traditionally, the EU producers ran a surplus in footwear trade, but deficits have been recorded since 1991. In 1994, they had a trade surplus in footwear with the USA, Japan and what then constituted the EFTA countries, but a large deficit with developing countries. Italy is the EU's major exporter. With the accession of Sweden, Finland and Austria in 1995, the USA is now by far the most important extra-EU export destination.

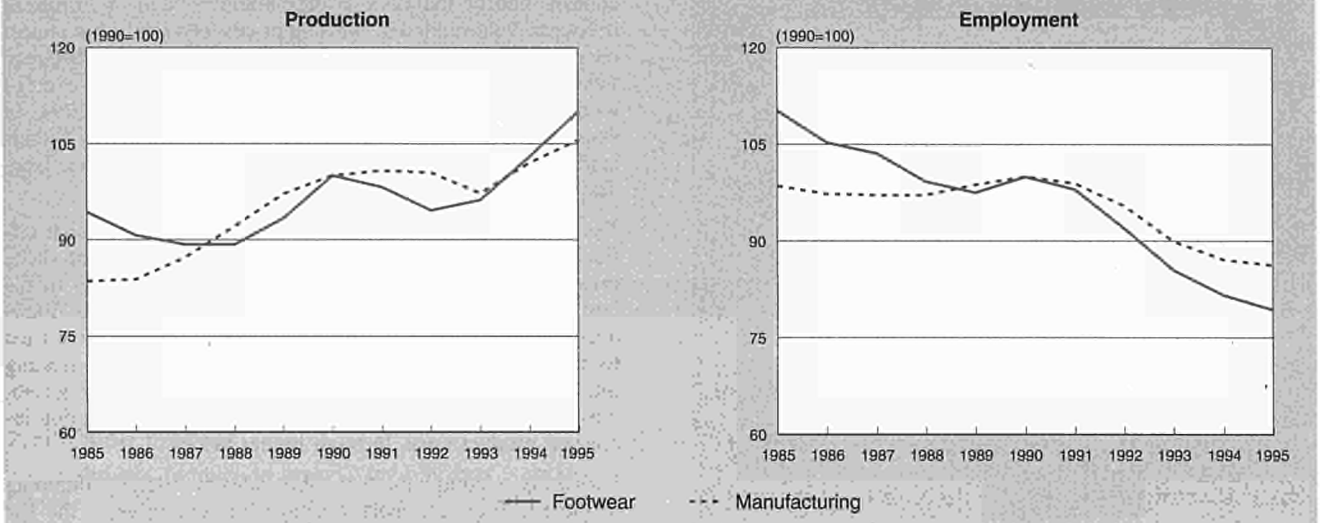
The majority of extra-EU imports come from developing countries with low labour costs, most notably China, South Korea, Indonesia, Thailand and Taiwan, although imports from other developing countries, such as Vietnam, India and Brazil, are growing. Imports from China grew the most rapidly in recent years, but has been stalled by new quotas on certain types of shoes (adopted in March 1994), which are based on the average level of trade over the last three years. Their value has been increasing steadily, although changes in the quota system has slowed growth. China, followed by Indonesia, is the largest exporter of footwear to the EU.

MARKET FORCES

Demand

Most footwear is purchased by individual consumers. Footwear is seen primarily as a necessity, and a smaller proportion of income is spent on footwear as income rises. Spending on footwear is cyclical, reduced or deferred during recession, with a compensating increase during economic recovery. Con-

Figure 3: Footwear
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

tract sales to major customers such as the military, or industries requiring specific work or safety footwear, are important niche markets.

Some niches, in particular the market for trainers and certain segments of the ladies' footwear market are strongly influenced by fashion trends. In addition, demand for sports footwear has been boosted by higher levels of sports participation. Increased fashion demand has also boosted the use of coated fabrics and textiles, rather than leather, for uppers or lining material.

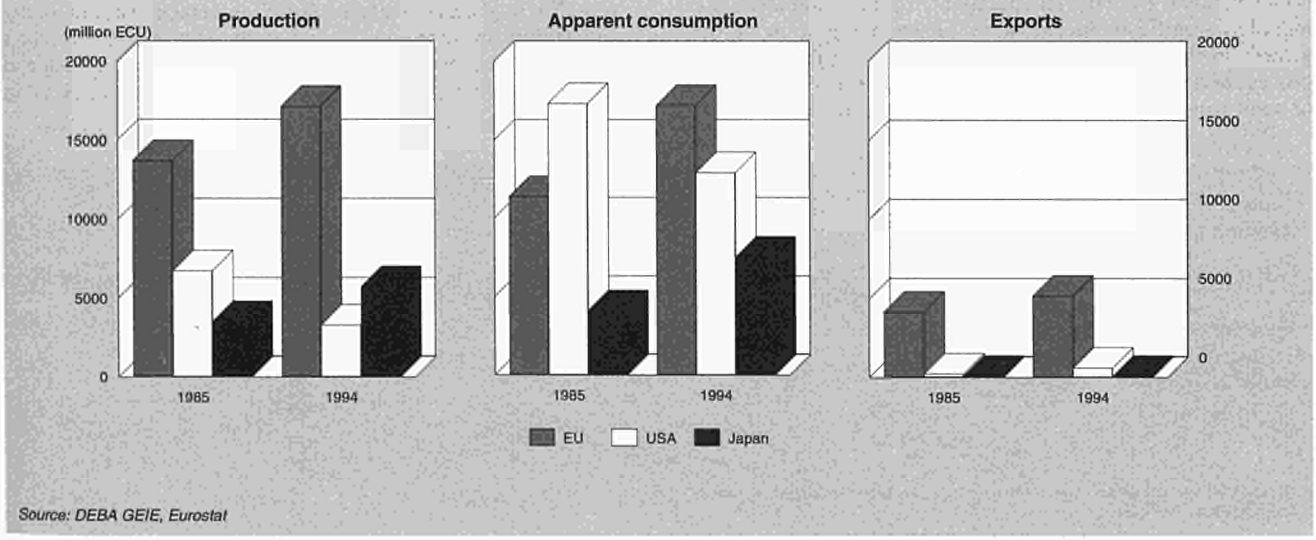
Traditionally, small independent retailers characterised footwear distribution, but the retail sector has become more concentrated and the key players in many EU Member States are multiple chains, often linked to manufacturers. Many large manufacturers such as Bata Organisation (F), Andre (F), Charles Jourdan (F), Clarks (UK), Eram (F) and Salamander AG (D) operate retail units both within their domestic markets and in other Member States. Footwear manufacturers also sell directly to customers through factory outlets. Manufacturers are also benefiting from the trend of retailers to combine their clothing lines with accessories. Thus, more and more footwear companies are attempting to link with retailers or operate in-store concessions.

Supply and competition

Most EU footwear producers are relatively small firms, employing around 20 workers on average. There are, however, major differences across Member States with relatively large firms in France and Germany (averaging about a hundred workers) compared to around 13 workers per firm in Italy and Spain. The number of producers has fallen steadily in recent years from 15897 in 1989 to 14005 in 1994.

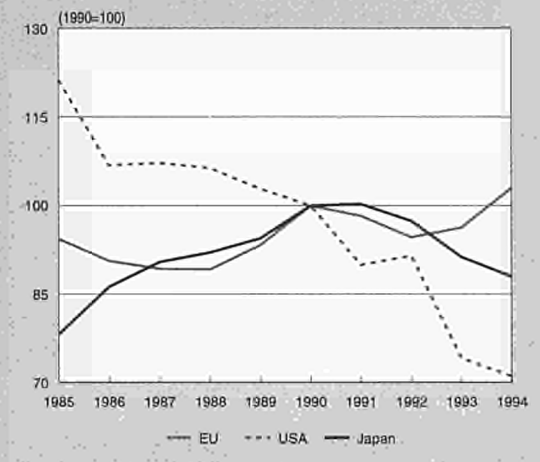
The key competitive advantages of the EU footwear manufacturers - under pressure from lower priced imports - is their timely and high-quality service, along with design, styling and other creative features. In response to the ever-changing needs of retailers, footwear manufacturers, including SMEs,

Figure 4: Footwear
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Footwear
International comparison of production in constant prices



Source: DEBA GEIE

are increasingly adopting quick response strategies, although the number of companies using them remains relatively low compared to the clothing sector. The removal of customs and other physical barriers to intra-EU trade has led to a reduction in transport cost and delivery time. This benefits firms who are dependent on markets situated in other Member States, as well as those competing on the basis of delivery performance and quick response. The approximation of VAT on footwear will not take place until at least 1997, when Member States which currently have a low VAT on footwear - Ireland, Spain, Italy and Luxembourg - will experience price increases.

The internal EU footwear market is relatively competitive, with a large number of firms and few trade restrictions. Apparent consumption in the EU, with the exception of a brief spurt in 1991, increased steadily over the last decade. Consumption growth consistently outpaced production and EU producers steadily lost market share to extra-EU companies. In the 1985-94 period the value of EU apparent consumption and production increased in current prices by 51% and 25% respectively. A turnaround in the footwear industry in the 1988-91 period, with strong real annual average growth rates of EU production and extra-EU exports, ended with the recession in 1992. The rapid fall in employment in the last three years reflects this recession and an accompanying round of rationalisation within the industry.

An analysis of trends for individual Member States indicates that the value of production in constant prices fell in most Member States over the last decade. Only Italy and Denmark recorded significant increases. A substantial portion of the growth in the value of production in Italy results from the process of adding value - often through marketing - to finished or semi-finished shoe imports and then re-exporting them at much higher prices. This practice exists in all Member States, particularly in the market segment related to shoe uppers. The added value is also generated by high levels of quality control, one of the keys to the "brand" image of European footwear. Value added in constant prices fell slowly, but almost continuously, over the last decade, falling by 19% between 1984 and 1994. Similarly, employment in firms with over 20 workers declined by 104000 over the ten years to 1994. In some Member States, particularly Belgium and the Netherlands, the importation and re-export of low-cost footwear from developing countries is prevalent.

The fragmented nature of the footwear industry makes it difficult for manufacturers to benefit from economies of scale. Pressure from cheap imports, coupled with increases in the cost of labour, has undermined profitability in the sector. European manufacturers competing with cheap imports have tried to maintain their market share by expanding their existing line of products, while companies responsive to changing fashions are producing smaller production lots and recouping increased product costs through higher prices.

Following a complaint from the industry alleging dumping in the EU footwear market from some countries in the Far East, the Commission is undertaking enquiries into imports of specific leather shoes from China, Thailand and Indonesia and certain textile upper shoes from China and Indonesia. Many developing countries exporting to the EU benefit from GSP (Generalised System of Preferences) regulations with around 40% of total EU imports falling under this regime. Since January 1995 and until the end of 1998, a revised GSP will operate. The quotas and ceilings of the previous regime have been replaced by a series of duties and the new system targets preferential margins to specific country/product group combinations based on their sensitivity and specialisation. Footwear is classified as a sensitive product which implies a basic preferential duty rate of 70% of the MFN rate for most beneficiary countries. However, those countries which are very specialist, such as South Korea, Thailand, Brazil and Indonesia, are having their preferential margin phased out during the duration of the regulation. In addition, countries such as China and South Korea which were excluded for most footwear products under the previous regime, remain outside the new GSP, while the least developed countries continue to enjoy duty-free access.

In order to improve the prospects of EU footwear firms, assistance for export promotion has been established in the EU. This will improve access to the markets of non-EU countries. This budget was increased by more than 65% for 1995 and remains at around this level in 1996, although changes in the way it has been make direct comparison difficult. This increases dovetails with the "market-opening" benefits of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). In general, while the GATT agreement was not totally satisfactory in improving access to the fast-growing markets in Asia, some progress was made, particularly in Thailand and Korea. In Japan, the most lucrative market, there is an

Table 3: Footwear
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.9	1.0	3.1	4.6
Production	1.2	0.8	1.0	7.1
Extra-EU exports	-4.0	5.7	0.2	17.7
Extra-EU imports	12.2	7.6	10.1	8.8

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Footwear
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	4 231	3 801	3 392	3 192	3 929	4 117	3 941	4 176	4 364	5 173	5 372	4 880
Extra-EU imports	2 569	1 935	2 367	2 732	3 024	3 336	4 420	4 464	4 797	5 231	5 049	5 157
Trade balance	1 662	1 866	1 026	461	905	781	-479	-288	-433	-58	323	-277
Ratio exports / imports	1.6	2.0	1.4	1.2	1.3	1.2	0.9	0.9	0.9	1.0	1.1	0.9
Terms of trade index	85.3	93.2	96.8	100.1	97.2	100.0	96.4	93.4	85.7	86.1	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

agreement to significantly lower tariffs over an eight-year period. However, non-tariff barriers remain a concern.

Production process

The traditional production process for footwear is relatively simple, yet labour-intensive. It can be divided into a number of stages. The first stage, called "clicking", involves the cutting out and preparation of components for the upper and the sole. This is followed by "closing", when the components are stitched together to produce an "upper". The upper is then shaped, and an insole and a sole are affixed. Finally, the shoe is finished by cleaning, inspecting and boxing.

Footwear production within the EU is becoming more mechanised and more specialised. Computer-aided design (CAD) allows a shoe to be designed on a computer and the detail-work to be downloaded to production machines, enabling a quick response to style changes for fashion footwear. The use of CAD systems has been accompanied by computer-aided manufacture (CAM) and computer-integrated manufacture (CIM). CAD systems are increasingly being linked with computer-aided cutting systems using water jet, laser or die cutters. Operators can view a piece of leather with the use of video and computers, and create shoe patterns, taking into account any blemish on the raw material. These innovations have helped to maintain the competitiveness of European footwear producers, enabling them to introduce quick response and JIT manufacturing. A recent trend in CAD technology is modular systems, so firms can buy only what they need, rather than investing in an entire CAD package, thereby improving the access of smaller firms to technology.

Footwear technology, by comparison with many industries, is nevertheless relatively basic. Most technological advances are embodied in capital equipment, and machinery manufacturers readily sell their products to buyers in NICs and developing countries. The key for EU manufacturers is the utilisation of technological progress to maximise their proximity to the world's most lucrative footwear market and to the footwear industry's leading fashion centres. Even these advantages are being eroded and low-cost producers close to the European market in North Africa and Eastern Europe will become more important in the medium term. In addition, European manufacturers can now use CAD systems to transmit new designs on-line to production facilities in low-cost countries, thereby increasing the advantages of out-sourcing production.

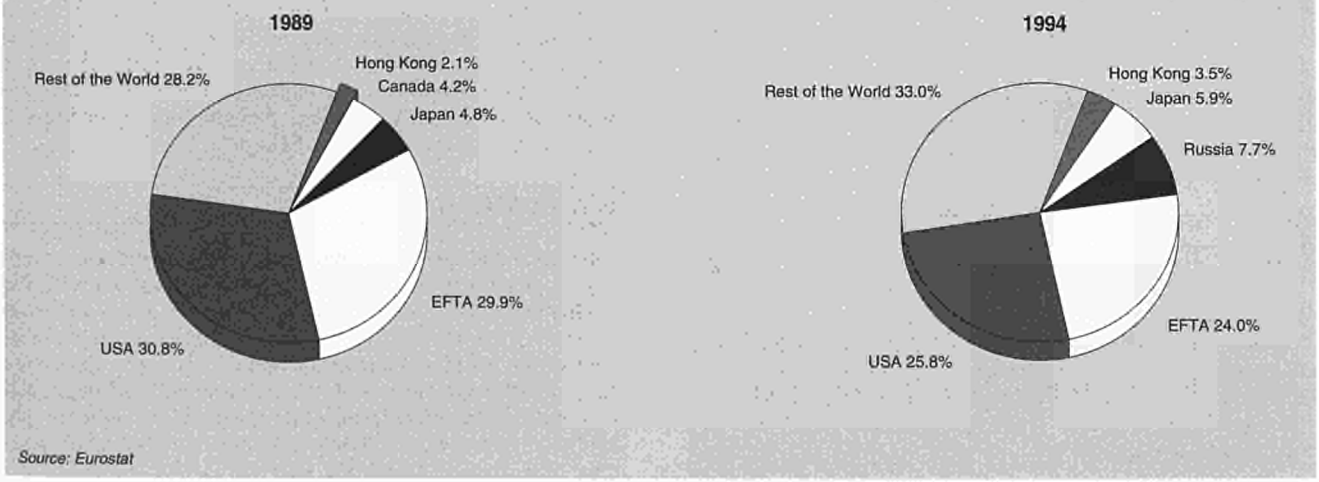
Labour productivity in the EU footwear industry increased steadily over the ten years to 1994, registering an overall increase of 47%. The increase was particularly sharp in 1993 and 1994. Unit labour costs remained relatively constant through the 1985-92 period, rising slightly overall but fell sharply in 1993 and 1994. Trends in labour costs have occurred against a background of an overall rise in total unit costs.

INDUSTRY STRUCTURE

Companies

The footwear industry within the Community is highly fragmented, characterised by a large number of small business. According to the CEC, there were about 14000 footwear firms

Figure 6: Footwear
Destination of EU exports



Source: Eurostat

Figure 7: Footwear
Origin of EU imports

Source: Eurostat

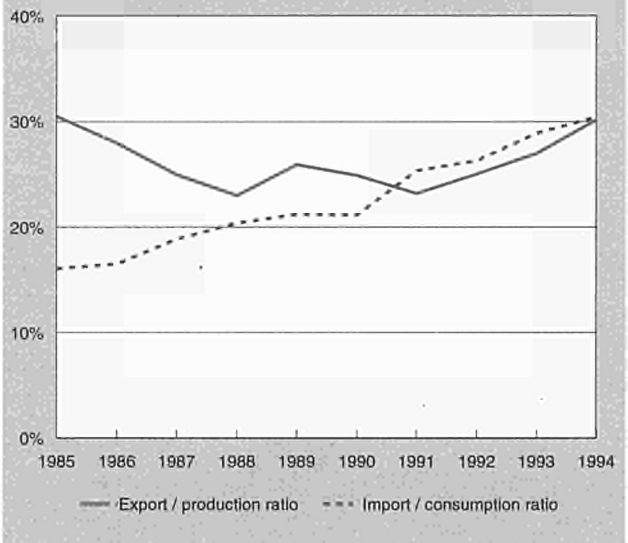
in the EU in 1994, employing 20 workers on average, compared to 14225 firms in 1993. Well over half of these firms were in Italy. Major EU footwear manufacturers include Arithmos (S), Salamander AG (D), Romika & Co KG (D), Eccolet Sko (DK), Eram (F), André (F), Clarks (UK), Church and Co (UK), Simod SpA (I) and Filanto SpA (I).

Strategies

The need to rationalise costs to maintain competitiveness with developing countries has led larger companies in some Member States to transfer production facilities to lower labour cost locations, including Spain and Portugal. Examples include Eram (F), Clarks (UK) and Eccolet (DK). Many EU producers have shifted their operations to developing countries situated outside the EU, where cheaper labour can also be found. South East Asia and China are the most popular locations, although East Europe and North Africa are also favoured. While a number of Europe's leading footwear manufacturers tried to maintain production within Europe, it has been proved that the cost advantages of cheaper production locations are difficult to resist to. Leading sports footwear manufacturers such as Adidas and Puma, for example, retained European production into the 1990s, but were obliged to transfer production to the Far East to remain competitive with rivals such as Nike and Reebok who already manufactured the majority of their footwear in the Far East. Conversely, some quality- and image-conscious footwear companies almost completely refrain from sourcing production in low-cost locations.

The integration of retailing and manufacturing has been an important feature of the footwear sector over the last decade, and many footwear companies are now placing greater emphasis on the distributional aspects of their operations.

Figure 8: Footwear
Trade intensities



Source: DEBA GEIE, Eurostat

REGIONAL DISTRIBUTION

Much of the EU footwear industry is concentrated in specific regions in a few countries. These regions often have little alternative employment to the footwear industry. The industry is the most regionally concentrated in the Iberian peninsula. In Portugal, Averio accounts for over half of all footwear production, while Porto and Braga account for most of the remainder. Meanwhile, in Spain the majority of footwear firms are located in the Valencia region. Three Italian regions - the Marches, Tuscany and Veneto - account for almost two-thirds of all footwear employment in Italy, and one-fifth of the total footwear employment in the EU. Similarly, well over half of the shoes produced in France come from the Pays de la Loire and Aquitaine regions.

The industry can also be concentrated even further in towns and areas within regions such as Herzogenaurach and Pirmasens in Germany, Cholet in France and Northamptonshire in the United Kingdom. The impact of any adverse development for the industry therefore heavily impact on specific geographical areas within the EU.

ENVIRONMENT

Environmental issues are more important in industries supplying the footwear industry than in the industry itself. The leather and tanning industry is a major source of raw materials to European producers. Suppliers in this sector are under pressure to use water and chemicals more carefully to reduce the level of effluents. They need to install water effluent treatment equipment to meet increasing costs and therefore higher supply costs for the footwear industry, although there is already sourcing of materials outside the EU.

Table 5: Footwear
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	85.7	86.1	86.2	89.9	95.8	100.0	100.3	103.0	112.6	126.4
Unit labour costs index (3)	102.3	104.4	105.6	106.3	103.6	100.0	105.5	107.0	94.5	84.9
Total unit costs index (4)	87.6	89.5	91.1	93.6	99.6	100.0	106.2	109.0	102.6	100.1
Gross operating rate (%) (5)	9.5	9.7	9.4	9.4	7.6	7.2	7.8	7.4	8.8	10.0

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 6: Footwear
Number of firms by Member State, 1994

(units)	
EUR12 (1)	14 005
Belgique/België and Luxembourg	47
Danmark	11
Deutschland	227
Ellada	N/A
España	2 145
France	265
Ireland	N/A
Italia	8 100
Nederland	68
Portugal	1 115
United Kingdom (1)	562

(1) Estimates.
Source: CEC

Table 7: Footwear
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.1	N/A
Danmark	0.6	0.7
Deutschland	0.5	0.4
Ellada	1.1	1.1
España	1.6	1.3
France	1.1	0.7
Ireland	0.4	0.1
Italia	2.5	3.0
Luxembourg	0.0	0.0
Nederland	N/A	0.2
Portugal	2.6	7.0
United Kingdom	0.7	0.6

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Further problems for the industry are caused by the divergence between existing national legislation and the EU Directive on PCP (pentachlorophenol), with the maximum permitted limit set at very low levels in some Member States. Legislative differences across Member States in relation to the use of Azo-dyes is also a cause for concern. The lack of standardised testing procedures exacerbates the situation. Suppliers of raw materials for non-leather footwear production are likely to face increasing constraints from regulations on the usage of polyurethane and polyvinyl chloride (PVC).

Environmental problems with traditional materials has accelerated the search for alternatives, both man-made and natural. Examples of the latter include fish skins - which can be tanned and cured, and available in a greater range of colours than traditional hides and can often be both tougher and easier to clean - and frog skins, which are very elastic. New man-made fibres are being developed as alternatives to traditional hides, and as insoles and other shoe components. Their advantages are the comfort, the general functionality and the environmental appropriateness. Components are also being produced using recycled materials, particularly insoles. Discussions regarding an eco-label for shoes are ongoing. A CEN Working Group is also working on specific functional requirements for shoes. These will provide a further "quality" guide to help brand and market EU-produced shoes.

REGULATIONS

With the arrival of the Single Market and the dismantling of border protection, the national quotas for footwear imports from some low-cost producers have become more or less redundant. Previously, national quotas could be protected through Article 115 of the Treaty of Rome. This Article helped to circumvent national import controls by routing goods through another Member State. With no physical internal border control since January 1993, the use of this article is being phased out.

An EU Directive concerning the labelling of the materials used in the main components of footwear for sale to the consumer has entered into force. The Directive deals primarily with indicating the composition of footwear by either "pictograms" or text.

OUTLOOK

The EU footwear industry faces a difficult future, although there are some encouraging factors. Extra-EU exports are generally leather footwear of high quality to developed countries. Thus, long-term competitiveness of EU producers depends on the ability to supply high-quality products within the EU, to high income extra-EU countries and to consumers in de-

veloping countries with high levels of disposable income. In particular, new markets for EU footwear are emerging in the increasingly prosperous Asian NICs. Expansion into some extra-EU markets is blocked by high duties and tariff barriers (particularly in Japan), but these trade restrictions may ease following the GATT agreement, although mixed outcome of the agreement complicates forecasts aimed to establish when and how deeply EU companies will penetrate these markets. Moderately bright prospects for the economies of the EU, Japan and US will help to maintain sales, but will also lead to increased extra-EU imports of footwear from low-cost competitors.

Competition from cheap extra-EU imports, including production sourced in lower-cost countries by EU companies, will continue to erode the competitiveness of EU producers. Anti-dumping measures will help to slow import growth, but the EU footwear industry faces the fundamental difficulty that it is caught in a shift of comparative advantage in labour-intensive industries. This shift is accentuated by the nature of footwear. It is a basic commodity for which there is traditionally strong local demand, and also that it represents a major part of the industrial sector in developing countries which are at early stages of industrialisation. Thus, when labour costs in countries such as Taiwan and South Korea rose with ongoing economic development, new locations such as Vietnam, China and Indonesia took their place. Improved trade relations with East Europe also makes it easier for EU manufacturers to locate production facilities in these countries. The volume of extra-EU footwear imports from Eastern Europe seems likely to increase, as does the volume of imports of uppers or semi-finished inputs.

Growth in consumption is expected to lag behind overall economic growth. With increasing import penetration both employment and production in the EU will fall in the medium term. While the increasing use of technology will help the industry to regain its competitiveness, it will not provide the complete solution. Increased cost effectiveness will also be needed, along with a greater emphasis on marketing and satisfying the changing demands of the consumer.

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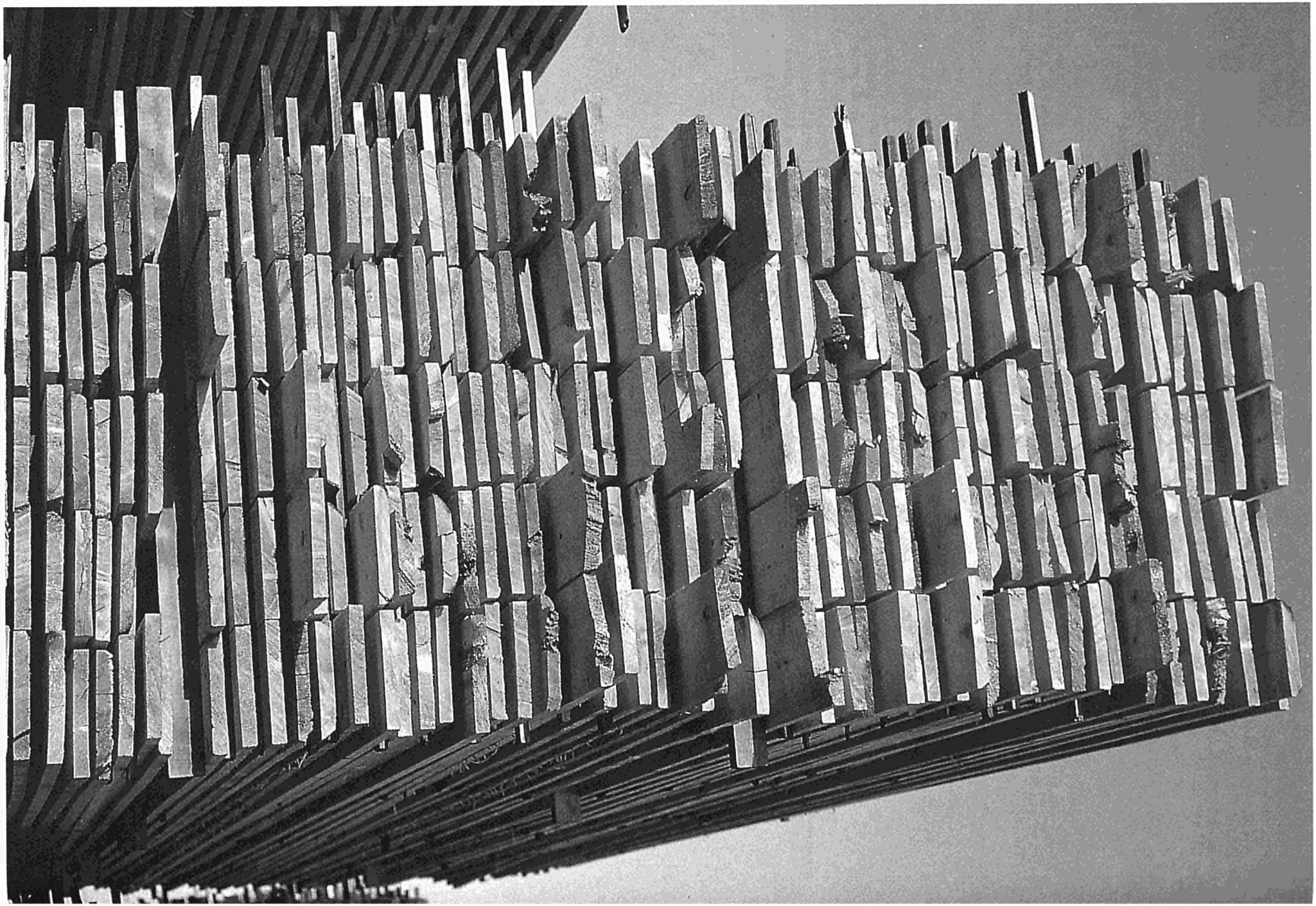


Overview

NACE (Revision 1) 20

With the entry of Austria, Finland and Sweden into the EU in January 1995, the relative importance of the wood processing industry for the EU economy has increased considerably. It indeed led to an increase of over 30% of the EU production volume in the sector. In 1995, total production in the wood processing industry (excluding furniture) is estimated to reach 41.5 billion ECU in EU-12 and 54.1 billion ECU in EU-15. The sector is highly dependent on developments in building activity and furniture production. The industry is characterised by an abundance of small and medium-sized enterprises (SMEs). Intra-EU trade is still hindered by remaining technical barriers in the EU-15. Over the period 1996-1999, demand for goods produced by the wood processing industry is expected to grow by an average nominal rate of 5.3% per year.

INDUSTRY PROFILE

Description of the sector

According to the NACE classification, the wood processing industry can be divided into a number of subsectors. For instance, sawing and processing of wood (NACE 461 or Nace Rev. 20.1), semi-finished wood products, such as particleboard, fibreboard, plywood and impregnated wood (NACE 462 or Nace Rev. 20.2), carpentry and joinery components, such as doors, window frames, parquet flooring (NACE 463 or Nace Rev. 20.3), wooden containers (NACE 464 or Nace Rev. 20.4), other wood products (excl. furniture) (NACE 465, 466.1 and 466.2 or Nace Rev. 20.5);

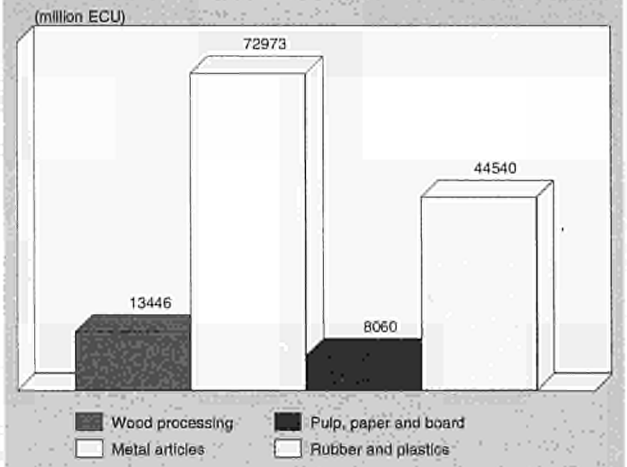
The wood processing industry is, among others, an important supplier to the building and furniture industries. In 1995, the total production value is estimated at 41.5 billion ECU in EU-12 or 54.1 billion m3 in EU-15. Employment is estimated at around 405 000 people in EU-12, whilst at 482 000 in EU-15. The largest subsector is the carpentry and joinery components industry. At an estimated production value of 15.7 billion ECU in 1995, it represents 38% of the total wood processing industry production. Sawing and processing of wood accounts for 16% of total production, semi-finished wood products for 22%, and the other wood products for 24%. Value added amounted to 13.4 billion ECU in 1994. Germany is the biggest producer, representing 40% of total EU-12 value added.

Because the sector is characterised by an abundance of SMEs, the production and employment figures are considerably underestimated by most statistical sources, since these generally do not cover smaller businesses (less than 20 employees) or part-time and seasonal work.

Recent trends

Between 1985 and 1994, apparent consumption of wood products grew at an average real annual rate of 3.8% per year. In the same period, production in constant prices increased by 30.4% (3% per year), and as a result, outperformed total EU manufacturing industry which grew by 22% (2.2% per year). In addition to the substantial increase which occurred in 1993 (+8.8%), extra-EU exports in current prices jumped by 36.4% in 1994. A further growth of 5.2% occurred in 1995 within EU-12, whilst, in 1996, the growth in EU-15 was forecast to reach 8.2%.

Figure 1: Wood processing
Value added in comparison with related industries, 1994

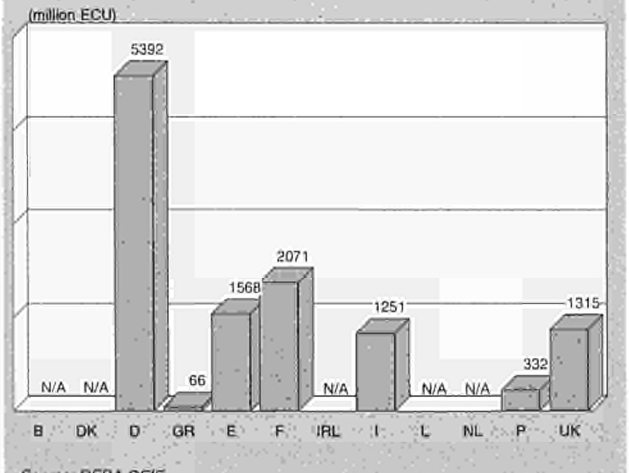


Source: DEBA GEIE

Employment grew by 7.1% between 1986 and 1990 to reach a peak of 440 600. Since then, however, employment dropped to an estimated 402 200 jobs in 1994. Nevertheless, the downward trend seems to have stabilised in 1995, since employment is assumed to have slightly increased by 0.6% to reach 404 600 units. The long term evolution of employment in the wood processing industry is remarkably parallel to that of the EU manufacturing industry. Since production has increased more rapidly than the manufacturing industry average, it can be deduced that the wood processing industry achieved higher productivity growth.

EU consumption and production expanded in 1987-91, however, stagnated in 1992 and 1993. In 1994, apparent consumption in current prices amounted to 48.7 billion ECU, an increase of 8.5% compared with 1993. A further growth of 5% in EU-12 was estimated for 1995 compared to 1994. Between 1996 and 1999, apparent consumption is projected to

Figure 2: Wood processing
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Wood processing
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	29 445	40 350	43 014	43 554	44 265	44 917	48 742	50 209	58 430	61 700	65 170	68 760
Production	23 511	32 416	34 722	35 779	36 229	36 797	39 278	41 543	54 150	57 270	60 620	64 130
Extra-EU exports	1 709	2 056	2 035	2 019	2 014	2 194	2 992	2 787	3 530	3 820	4 130	4 460
Trade balance	-5 934	-7 933	-8 292	-7 775	-8 035	-8 120	-9 464	-8 666	-4 280	-4 430	-4 550	-4 630
Employment (thousands)	429	436	441	437	419	406	402	405	482	490	490	490

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Wood processing
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	$ Production	Extra-EU exports
Articles of cork and articles of straw	2 083.3	2 090.0	549.0
Carpentry and joinery components	16 137.8	14 954.5	464.8
Other wood products	4 436.6	4 085.2	932.2
Sawing and processing of wood	12 372.7	5 871.9	346.1
Semi-finished wood products	10 318.9	8 853.4	610.0
Wooden containers	3 393.0	3 423.0	90.1

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Wood processing
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.2	2.0	3.8	4.9
Production	4.8	2.3	3.7	5.2
Extra-EU exports	2.2	3.8	2.9	19.6
Extra-EU imports	3.9	2.3	3.2	9.8

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Wood processing
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	1 709	1 611	1 652	1 776	2 056	2 035	2 019	2 014	2 194	2 992	2 787	3 530
Extra-EU imports	7 643	7 207	7 939	8 800	9 990	10 328	9 795	10 049	10 314	12 456	11 453	7 810
Trade balance	-5 934	-5 596	-6 287	-7 024	-7 933	-8 292	-7 775	-8 035	-8 120	-9 464	-8 666	-4 280
Ratio exports / imports	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5
Terms of trade index	89.5	100.9	102.4	101.4	99.9	100.0	103.1	107.2	103.9	96.3	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Wood processing
Production and employment compared to EU total manufacturing industry

(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

increase at an average annual growth rate of 5.3%. Production amounted to 39.3 billion ECU in 1994, an increase of 6.7% compared to 1993. For 1995, Eurostat estimates indicate a new upswing in production by 5.8%. For the period 1996-1999, production is estimated to reach an average annual growth rate of 5.9% in EU-15.

International comparison

In 1994, EU production of wood products equalled only 58% of USA production and became nearly equivalent (96%) to the Japanese production. With an average annual real growth rate of 3.7% over the period 1985-94, production in the EU (12) grew slightly faster than it did in the USA (where it grew by 3.1%), but outperformed remarkably the Japanese wood processing industry (-0.6%). Production in Japan and to a lesser extent in the USA are evidently subject to cyclical fluctuations to a greater extent than in the EU.

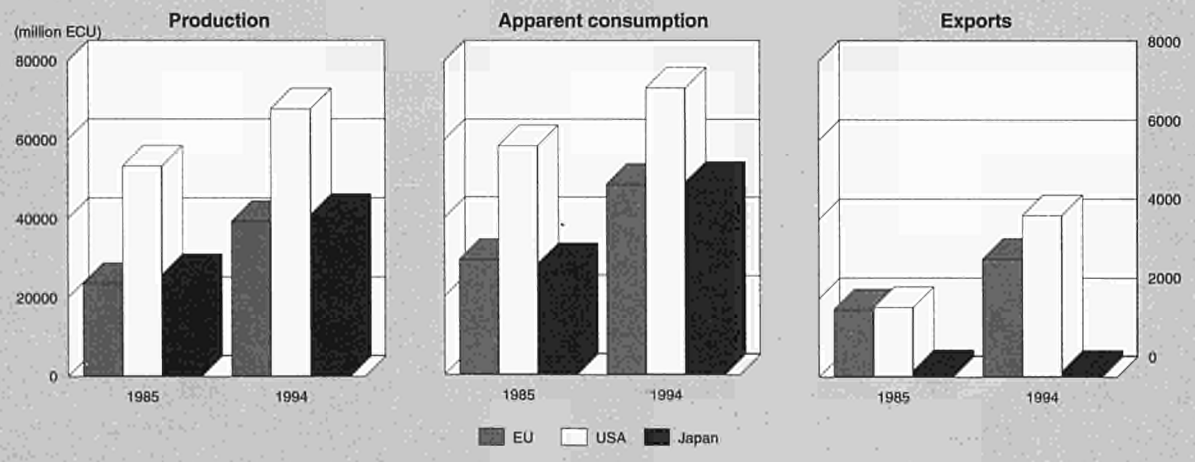
Foreign trade

In constant prices, both extra-EU exports and extra EU-imports are following a long term positive trend. Between 1985 and 1994, they rose at an average real annual rate of 3.8% and 4%, respectively. Although, exports have increased faster than imports since 1993, the EU trade balance deficit still increases. In 1994, the deficit amounted to 9.5 billion ECU.

In current prices, Extra-EU imports, rose by 5.4% per year from 1985 to 1990, declined by 5.2% in 1991, but increased again moderately by 2.6% in 1992 and 1993. In 1994, they jumped by some 20.8%. Extra-EU exports expanded rapidly in 1987-89, but then stagnated between 1990-92. In addition to the substantial growth experienced in 1993 (+9%), 1994 was marked by a new jump of 36.4% in extra-EU exports.

Between 1985 and 1993, the exports/imports ratio remained stable at about 20%. It rose to 24% in 1994 and is assumed to remain at the latter level in 1995. The import/consumption ratio progressively declined, from 28% in 1984 to 23% in

Figure 4: Wood processing
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

1993. It rose again in 1994 to reach 25.6%, but is assumed to decline to 24.9% in 1995 within EU-12 or to 12.6% within EU-15. The export/production ratio also fell between 1985 and 1993, but has increased in 1994 to reach 7.6%.

In 1994, extra-EU imports mainly originated in the EFTA countries (43.7%), the USA (9.9%), Indonesia (5.5%), Malaysia (4.5%) and Canada (4.4%). Extra-EU exports, on the other hand, were destined for the EFTA countries (38.5%), USA (13.9%), Japan (4.5%), Saudi Arabia (4.3%) and Israel (2.5%).

Moreover, the entry of Austria, Finland and Sweden into the EU in January 1995 enabled a considerable "improvement" of the EU wood products trade balance statistics, since it brought about a substantial fall in the volume of extra-EU(15) imports when compared with extra-EU(12) imports. In 1995, the trade balance deficit dropped by two-thirds within EU-15 when compared to its would-be level within EU-12.

MARKET FORCES

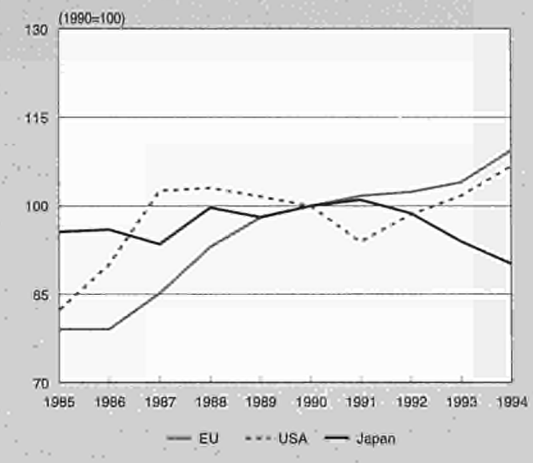
Demand

Since the wood processing industry is comprised of a wide range of products, these products have different types of buyers, i.e. industrial or final consumers. Demand for the products of the wood processing industry largely depends on two sectors, the furniture and the building industries. Since these two sectors are highly cyclical, demand for wood products is largely influenced by the evolution of general income levels and interest rates.

In 1994, the furniture industry did not completely emerge from the recession. On average, whilst production of wooden furniture in the EU increased by 1.6% in value , it decreased by 0.5% in volume to reach a current value of 39.8 billion ECU. Belgium, France and Germany experienced a decrease in furniture production, whilst Italy, the UK, Denmark and to a lesser extent Spain, recorded positive growth rates in the sector. The furniture industry still suffered in 1994 from the negative impact of certain economic factors, such as a weak demand due to a lack of consumer confidence (increasing unemployment) and a stagnation or even reduction of disposable income. In 1994, eventhough the situation of the sector did not improve considerably, it was however better than 1993, which had been a year of deep recession for most furniture manufacturers.

In the EU, the construction business cycle reached its peak in 1992, after experiencing 5 years of declining growth rates

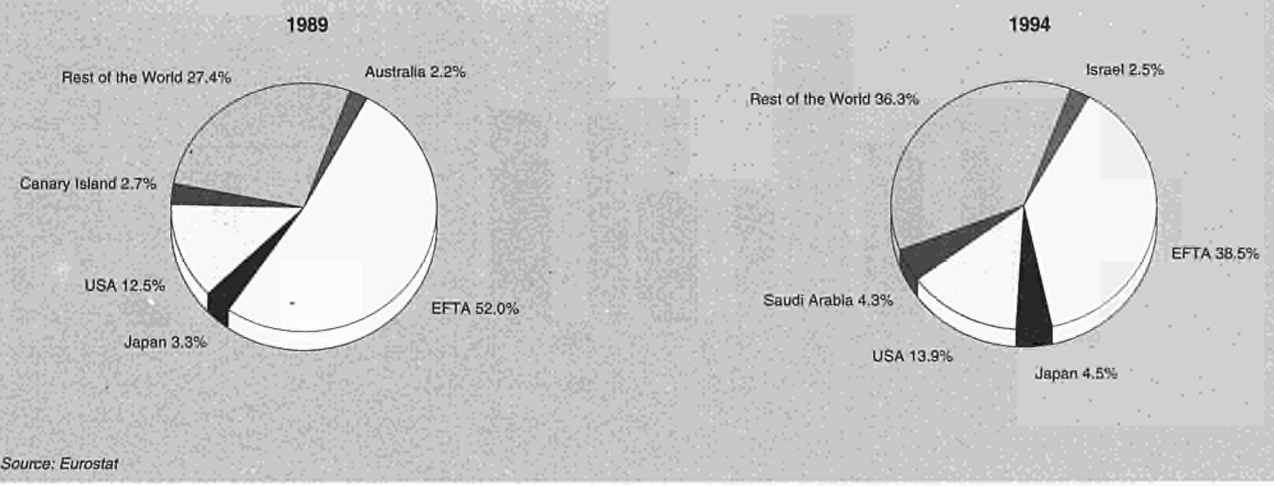
Figure 5: Wood processing
International comparison of production in constant prices



Source: DEBA GEIE

from 1988. In 1994, following the fall of 2.6% in 1993, there was a modest increase of 2% in construction activity and this result was the mean of positive trends - in Germany (+8%), Ireland (+4.2%), Denmark (+4.1%), the UK (+3.2%) and the Netherlands (+3.1%) - and of negative trends - in Italy (-5.2%) and France (-1.5%), whilst the other countries of the EU-12 registered small growth rates in the range of 1%. When taking into account the three new Member States, the growth rate in the European construction sector reached 1.8% in 1994. The construction activity in Finland and Sweden fell by 4.5% and 5.8% respectively, the latter negative trend not being compensated by the rise in activity experienced in Austria (+4.1). Of the subsectors, the most adversely affected were non-residential building and civil engineering, where as housebuilding grew slightly (2.6% in EU-12 or 2.2% in EU-15). These results can be attributed to the difficulties met in eliminating the significant stocks of unsold commercial office buildings in many EU countries, as well as to the downward trends in investment in infrastructure as a result of restrictive budgetary policies. For 1995, there was a slight increase in the EU-15 construction activity (+1.2%), with peaks in Portugal (+6.5%), Finland (+5.4%), Sweden (+5.3%), Denmark (+4.6%) and Spain (+4.5%).

Figure 6: Wood processing
Destination of EU exports



Source: Eurostat

Supply and competition

The deficit in the EU trade balance can be explained by the dependence of important subsectors on imports of hardwood and softwood timber, sawn timber, plywood from South East Asia (especially from Indonesia) and the USA, hardboard from South America (especially Brazil) and Eastern Europe and imports of miscellaneous wood products from the countries of Central and Eastern Europe at extremely low prices. The political and economic developments in Central and Eastern Europe will continue to have significant implications as these countries have very large wood reserves and much lower labour costs than the EU-countries.

Although imports of raw materials, such as hardwood and softwood timber, are likely to continue, an improvement in the trade balance of the sector could be stimulated by way of forestry policy in the EU.

Trade flows among Member States are more important than extra-EU exports. This is partly explained by transport costs that limit trade in wood and wood products. In previous years, competition has been affected by a large number of technical barriers to trade between Member States (national standards that have already been in existence for a long time, major differences in procedures for granting technical approval, etc.). Against the backdrop of European integration, the sector will be influenced by the results of the discussions on the short-term implementation of European standards and technical reference documents. This technical integration is expected to result in increased trade between Member States. Thus, it is imperative that the industry follows the activities in the regulatory and technical field. Within the European Committee for Standardisation (CEN), nine technical committees were created to work out standards for products in the wood processing fielThese include, CEN/TC 33: doors, windows, shutters and building hardware; CEN/TC 38: durability of wood and derived products; CEN/TC 112: wood based panels; CEN/TC 124: timber structures; CEN/TC 134: floor coverings; CEN/TC 173: brushware; CEN/TC 175: round and sawn timber; CEN/TC 207: furniture and CEN/TC 261: packaging.

Thanks to rationalisation and automation investments, labour productivity in the wood processing industry is rising rapidly. Between 1985 and 1994, labour productivity has increased by some 40%. The gross operating rate averaged 10% over the past decade. Profitability deteriorated in 1990-93, but improved in 1994.

INDUSTRY STRUCTURE

Companies

The wood processing industry (including wooden furniture) comprises around 335 000 companies in EU-15, of which 96% have less than 20 employees, and 3.5% have between 20 and 99 employees. Companies with less than 20 employees represent 52% of employment and 40% of turnover. This indicates that most official statistics significantly underestimate the importance of the wood processing industry, as they usually do not include units that have less than 20 employees. Companies with more than 99 employees represent only 0.5% of the total number of enterprises, but account for 24% of employment and 34% of turnover. In all, the 335 000 companies represent an employment of nearly 2 million people in the EU-15 and total turnover of 134 billion ECU.

Since wood processing started as an artisan activity, the family structure of SMEs in the sector remains an important characteristic. The EU countries which are the most specialised in the processing of wood are Portugal (with a production specialisation ratio of 1.9), Spain (1.5) and Germany (1.2) within EU-12.

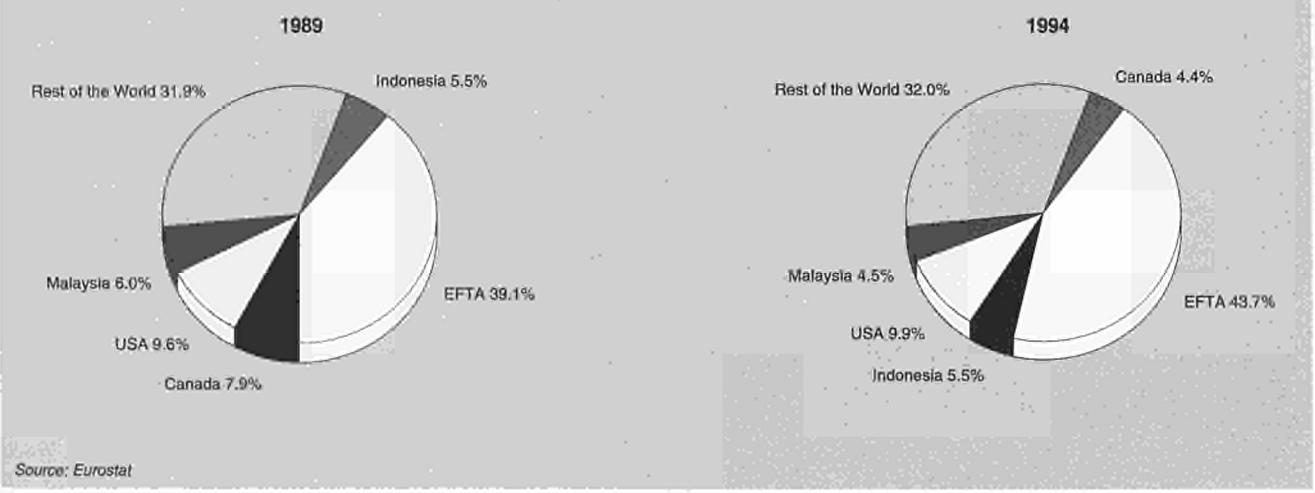
Strategies

The wood processing industry underwent a crisis in the early 1980s. During the second half of that decade there was a rapid expansion in the demand for wood products. The companies in the wood processing industry made substantial investments in order to respond to this larger demand. Since new machines normally outperform older ones, new investments resulted in a rationalisation of the production process and an improvement in efficiency and productivity. The capital intensity of the production process increased considerably over the past decade. As demand slowed down in the beginning of the 1990s, investments were focused on the introduction of new products (e.g. medium density fibreboard (MDF) , oriented strand board (OSB), and new production technologies. In order to stave off extra-EU competition, many SMEs have adopted a strategy of specialisation.

Skill shortages

Due to the fast changes in production techniques, the sector is having increasing difficulties in finding properly trained staff. This implies that considerable attention will have to be paid to raising training standards in this field, to meet the need for skilled workers and qualified executives. In the context of the Eurofortech/EU-Comett programme, a training and

Figure 7: Wood processing
Origin of EU imports



Source: Eurostat

Table 5: Wood processing
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	81.2	84.7	89.2	95.3	99.1	100.0	102.5	107.6	112.9	119.9
Unit labour costs index (3)	94.0	93.4	92.4	91.8	93.9	100.0	105.2	106.6	106.3	102.5
Total unit costs index (4)	87.9	87.9	88.6	90.8	96.1	100.0	103.2	103.5	102.9	103.0
Gross operating rate (%) (5)	8.3	9.5	10.4	10.8	10.5	10.0	9.4	9.5	9.8	10.5

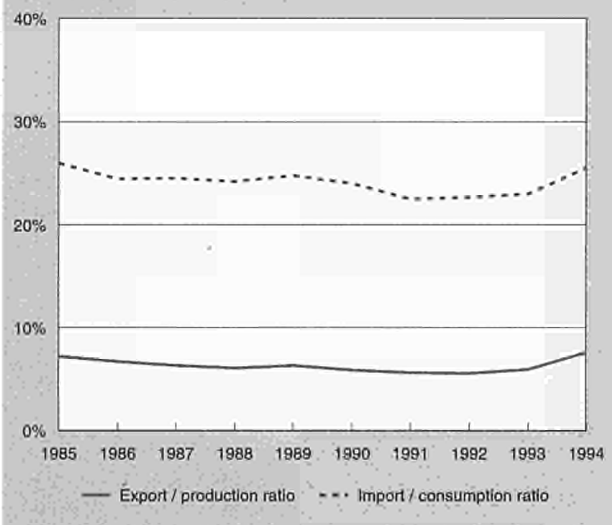
(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

education programme in the area of timber engineering and design known as STEP (Structural Timber Education Programme) has been developed. STEP aims at organising more than 100 Euro-wide courses, seminars and workshops on the structural use of timber. Its budget is nearly 1.5 million ECU.

Impact of the Single Market

The impact of the Single Market on the wood processing industry varies between the different measures of the programme, as well as across the sectors of the industry. The overall effects are difficult to distinguish as they have been obscured by the impact of the recession. With increasing harmonisation, intra-EU trade has grown, as have extra-EU imports, particularly of simple standardised products, such as pallets imported from East Europe. Increasing competition has spurred mergers and acquisitions, mainly among larger companies in the industry, and has triggered a shift to higher value added products. SMEs have responded through strategies of specialisation and customisation. Cost reductions through rationalisation and increasing automation have had the effect of raising the required skill levels of the workforce, which has resulted in the lack of qualified labour. This highlights the need for appropriate training programmes directed to the wood processing industry. Intra-EU trade is still hindered by remaining internal barriers, specifically technical ones related to the harmonisation of product standards.

Figure 8: Wood processing
Trade intensities



Source: DEBA GEIE, Eurostat

ENVIRONMENT

Wood comes from forests which are renewable. The processing of wood requires a minimum of energy, and depending on the subsector, results in minimal to no pollution of the air, water or soil. However, there have been discussions on the use of tropical wood, the recycling and disposal of packaging waste and the tax related to CO_2-emission. This is certainly not unique to this sector, and has to be seen in a much broader context.

The protection of tropical forest

The deforestation of the tropics is an alarming situation that gives rise to general concern. The most important reason for this deforestation is the circle of poverty, population pressure, over-indebtedness and economic underdevelopment that produces an increasing demand for land, for farming, industrial purposes and infrastructure.

Although the volume of tropical wood traded is small and accounts for less than 4% of EC consumption overall, it can however be a locally important factor in initiating forest degradation.

The tropical forests must be protected, but adequate account has to be taken of their ecological, economic and social functions. This requires a land planning that designates protected forests, forests for commercial use and areas for agricultural, industrial and infrastructure purposes.

Environmentally sound and sustainable forest management schemes can make important contributions to the preservation of forests. The European wood processing industry fully supports the introduction of such schemes. Generalised bans and boycotts do not contribute to the preservation of tropical forests. On the contrary, they are likely to accelerate the deforestation of tropical areas due to the increase of poverty that is likely to arise as a result. The ITTO guidelines for sustainable forestry, which have been adopted by all producer and consumer countries, constitute the first internationally recognised criteria for sustainable forest management. It is essential to achieve the implementation of these guidelines before the target date 2000 that has been agreed upon within ITTO.

Studies and EU-figures show that there has been an enormous increase in potential wood resources in the EU and in the EFTA countries. Indications show that there is a potential increase of annual yields by 170 million m3.

Recycling and disposal

In recent years, national authorities, as well as those on the European level, have begun to focus on packaging and packaging waste. This resulted in the adoption, in December 1994, of an EU Directive concerning packaging and packaging waste.

Among packaging materials, wood takes a specific place. Wood is a recyclable raw material, and requires little energy for

Table 6: Wood processing
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	321 049	96.0	51.6	39.5
20-99 employees	11 754	3.5	24.3	26.7
100 or more employees	1 721	0.5	24.1	33.8

(1) Estimates for EUR15; Nace 4600, includes wooden furniture.
Source: Eurostat Enterprises in Europe

processing compared to other raw materials. Therefore, this helps to reduce the use of valuable energy resources. Wood waste cannot be considered to be final waste, since it can be and is used to manufacture other materials such as particleboard, fibreboard and laminated wood. If this use of wood waste is not possible, it can also be used as a fuel. Many wood processing companies burn bark and wood waste from their operations for heating purposes. Modern furnaces have reached very high standards and from an environmental point of view, have to be regarded as being highly efficient.

Based on the arguments above, wood is a highly suitable packaging material. It can be recycled to produce other materials, or can be used for energy production. Treated or coated wood packaging can be burned in suitable furnace installations together with household wastes. The wood processing industry supports the re-use of wooden packaging materials for energy production as one of the solutions in recycling, and suggests positive discrimination of the use of wood in packaging.

CO_2 reduction policy

After considerable effort, the wood processing industries have managed to achieve some quite good results in the reduction of energy use. This sector of the industry is well aware of the necessity to reduce the emissions of CO_2 to protect the atmosphere. Therefore, it will aim at further CO_2 reductions if they can be realised in an economic way. One should also bear in mind that around 30% of CO_2 emissions are caused by households, mainly from heating. It is therefore necessary to reduce energy use for the heating of houses. Wooden constructions could very well contribute to this. Expending the use of wood wastes for heating would bring down the use of other non-renewable energy sources that are less "CO_2 friendly".

Outlook for the near future

The recent entry of Austria, Finland and Sweden into the Union will most likely lead to an increasing emphasis on environmental issues, taking into consideration the high environmental awareness in these countries. At the same time, however, these three countries are highly dependent on their forest resources and, therefore, have a positive attitude towards wood and wood processing products.

REGULATIONS

The Construction Products Directive which aims at harmonisation on European level. However, the wood processing industries are still confronted with a number of areas which are not yet sucessfully harmoniseThe following items are of specific concern for the wood processing industries: German "Gefahrstoffverordnung" - a "decree on dangerous substances", introducing, amongst other things, a requirement that wood based materials and furniture made thereof should not result in test chamber concentration values of more than 0.1 parts per million (ppm) of formaldehyde; and German "Prüfverfahren für Holzwerkstoffe" - test methods for wood-based panels.

Table 7: Wood processing
The 15 largest companies in Europe, 1994 (1)

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Enso-Gutzeit	FIN	2 865.5	66.8	14.2
Bertrand Faure	F	1 703.0	13.9	14.9
Rugby Group	GBR	1 304.0	64.0	9.5
Strafor Facom	F	1 149.4	9.7	11.5
Glunz	D	978.5	-8.0	6.2
Constantia Industrieholding	A	844.5	11.2	7.5
Skane-Gripen	S	559.9	27.9	4.0
Zodiac	F	449.3	20.7	4.3
Wagon Industrial Holdings	GBR	448.3	19.5	4.8
Samas-Groep	NL	438.9	9.8	5.4
Schaerf	D	296.5	6.8	2.6
Dapta Mallinjoud	F	279.0	2.8	3.2
Corticeira Amorim Soc. Gestora Parti.	P	254.9	7.9	3.3
Ahrend	NL	241.1	10.3	1.5
Silentnight Holdings	GBR	228.3	9.3	3.4

(1) Nace 4600, includes wooden furniture.
Source: DABLE

Table 8: Wood processing
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.0	N/A
Danmark	N/A	N/A
Deutschland	1.0	1.2
Ellada	1.0	1.0
España	1.4	1.5
France	0.9	0.9
Ireland	N/A	N/A
Italia	0.9	0.8
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	N/A	1.9
United Kingdom	0.9	0.7

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Regulations related to wood dust

In some countries, there are very strict regulations on the exposure to wood dust in workplaces, due to its presumed health risks. For the time being, wood dust does not appear on the EU-list of carcinogenic substances in work places, because no direct relationship between exposure to pure wood dust and certain types of cancers of the higher respiratory system has been proven. However, research is still being done on a continual basis. The industry launched a research programme to be performed at the Cancer Research Centre in Heidelberg. The programme, which is cofinanced by the EU, takes approximately 4 years. It is expected to provide vital scientific evidence in the wood dust discussion.

Packaging and packaging waste directive

This aims at harmonising national measures concerning the management of packaging and packaging waste and sets five-year targets for achieving specific recycling rates for different materials. The directive authorises energy recovery which is deemed to be the best solution for certain wood wastes.

Volatile organic compounds

The Commission of the European Union is in the process of modifying its proposal for a Directive concerning the limitation of the emissions of organic solvents from certain activities and industrial installations. The aim of this Directive is to reduce the emissions of VOCs from certain industrial installations and processes. It is part of a strategy for an overall reduction of the emission of VOCs in the EU.

The proposal covers two activities of the wood processing sector, namely coating of wooden surfaces and wood impregnation. The VOC Directive could still have important implications on many SMEs in subsectors of the wood processing industries, such as the manufacturers of furniture, parquet and joinery. Discussions on this subject will continue.

Biocidal products directive

This directive should enable the creation of a single market for biocidal products, including wood preservatives. Meanwhile, discussions have started on the possible revision of the EU directive on Pentachlorophenol (PCP), where certain Member States now press for a generalised ban.

A discussion now risks to take place with respect to creosote, for which a European regulation already exists (14th adaptation of EU directive 76/769). There are now different requests for derogations (from Denmark, Germany and the Netherlands) on basis of article 100 A §4 of the Treaty.

Generalised system of (tariff) preferences (GSP)

At the end of 1994, the European authorities adopted a revision of the GSP. Within this scheme, developing countries receive preferential tariff duties for certain industrial products. Whereas in the former system, fixed duty-free amounts or quotas were given to certain countries, all industrial products are now grouped into four categories: very sensitive, sensitive, semi-sensitive and non-sensitive. Most products from NACE 46 have been classified as non-sensitive, which means that all tariff duties are abolished. Certain products, however, continue to be classified as semi-sensitive (e.g. wood-based panels, joinery and brushware), which means that duties will only be reduced to 70% of the rate agreed upon in the context of the General Agreement on Tariffs and Trade.

Cooperation with Central- and Eastern Europe

Developments in Central and Eastern Europe are having important consequences for the wood processing industries in the EU, as these countries have large wood reserves and a qualified workforce, having low operating costs. Furthermore, companies are not yet as restricted by environmental legislation as companies in the European Union, although they are bound by the Europe Agreements to match EU standards.

The EU wood processing industries are, therefore, looking for cooperation with these countries, supporting them to develop their own market for wood products. As a first step towards this aim, CEI-Bois, the European Confederation of Woodworking Industries, organised in March 1995, under the auspices of the European Commission, a seminar which enabled woodworking industrialists of Eastern and Western European countries to actually meet and possibly start cooperating.

OUTLOOK

Average nominal annual growth in EU-15 for the period 1995-97 is estimated at 5.3% for apparent consumption and 5.9% for production. This growth should be supported by general economic recovery in the EU. It is possible, however, that recovery in the wood processing industry might initially be somewhat slower than the manufacturing industry average. The two main user industries, building and furniture, are typically sectors which lay behind the main economies.

Extra-EU exports are expected to increase by an average nominal rate of 7.9%. Exports of wooden boards to the emerging markets in the Far East will probably play a major part in this development. The wooden building components industry is likely to benefit from certain structural changes in the construction industry, such as the trend towards more subcontracting and the increasing use of prefabricated elements. Increasing consumer preference for wood as a building material is an additional advantage. Demand for containers and pallets will be stimulated by the recovery of international trade.

After five consecutive years of decline, employment levelled out in 1995 with a slight increase of 0.6% in EU-12. Between 1996 and 1999, employment is forecasted to further increase by an average annual rate of 0.8% within EU-15. The stricter requirements with respect to health and environment will increase costs in the industry. Furthermore, the industry is facing increasing competition, especially from countries in Central and Eastern Europe.

With the recent entry of Austria, Finland and Sweden into the EU in 1995, the relative importance of the wood processing industry for the EU economy has increased considerably. It indeed led to an increase of over 30% of the EU production volume in the sector.

Written by: Cei-Bois
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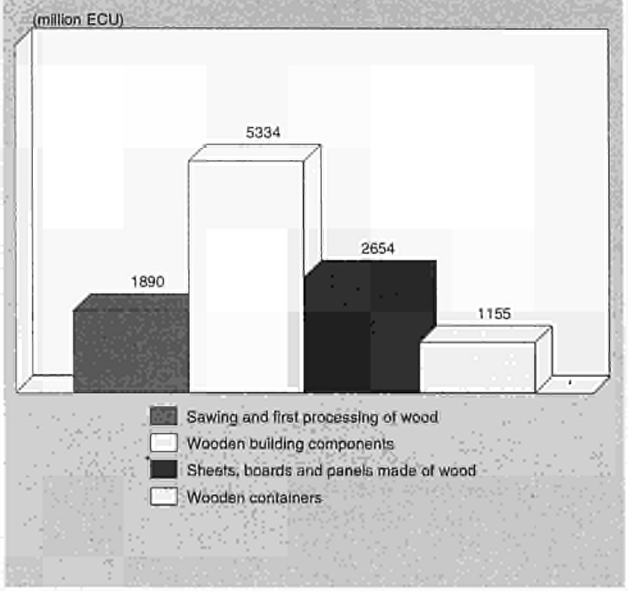
Sawing and first processing of wood
NACE (Revision 1) 20.1

Until the end of 1994, half of the EU consumption of sawn, planed and dried timber was met by imports. However, the restructuring of the industry which took place in the 1980s had a favourable impact on EU production and has already led to a decrease in extra-EU imports in the early 1990s and an improvement of the trade balance. Structural changes have taken the form of vertical integration and/or the merging of small production units. Now, since the entry of Austria, Finland and Sweden in the EU in January 1995, hardly 15% of EU-15 consumption of sawn, planed and dried timber is met by imports. Indeed, 52% of EU-12 imports originated in EFTA countries in 1994. Average annual growth rates in the period 1996-99 are estimated at 3.8% for consumption and 5.6% for production within EU-15.

Figure 1: Sawing and first processing of wood
Value added in comparison with related industries, 1994



INDUSTRY PROFILE

Description of the sector

The first stage in the processing of wood falls under NACE code 461. The companies in this subsector are engaged in the following activities, sawmilling, planing of wood, drying and seasoning of wooThe new Nace Rev. 1 code for this sector is 20.1, which will also include the companies engaged in the impregnation of wood (formerly included in Nace 462: semi-finished wood products).

The subsector is an important supplier to the other subsectors of the wood processing industry, as well as to the furniture and the construction industries. Production in 1995 is estimated at 6.7 billion ECU in EU-12 or 8.7 billion ECU in EU-15. Value added in 1994 amounted to 1.9 billion ECU within EU-12, compared to 2.7 billion ECU for semi-finished wood products (NACE 462) and 5.3 billion ECU for the carpentry and joinery components subsector (NACE 463). Sawing and the first processing of wood represents 17% of the value added generated by the European (EU-12) wood processing industry. In 1994, the most important producers in the EU-12 were Germany (representing about 37% of value added), Spain (22%), France (16%) and the UK (12%).

Recent trends

In the period 1991-1993, sawing and first processing of wood has been affected by economic recession, when apparent consumption, production and extra-EU imports sharply decreased in current prices. However, 1994 appeared to be the year of recovery for this sector also. Apparent consumption rose by 14.6%, production increased by 6.7% and extra-EU imports as well as exports jumped by 22.9% and 21.6% respectively, all beyond their last peak of 1990. In 1994, the real growth rate reached 6.4% for consumption, 5.3% for production, 8.1% for extra-EU imports and 20.5% for extra-EU exports. In 1995, apparent consumption in current prices is estimated to increase by a further 2.4%, production by 14.1%, extra-EU-12 imports by 4.9% and extra-EU12exports are forecast to jump by 252%. For the period 1996-99 in the EU15, production is estimated to reach an average annual growth rate of 5.6%, whilst apparent consumption is expected to increase at an average annual rate of 3.8%.

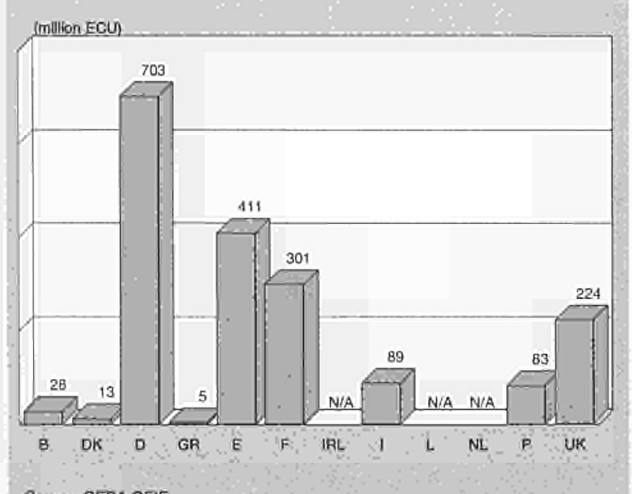
Employment decreased by 1% to 65 800 people in 1994, reaching its lowest level in ten years, but increased slightly in 1995 by 0.8% to 66 300 in EU-12. In EU-15, the sector employed 79 100 people in 1995. Employment in the sector represents 16% of total employment in the wood industry in both EU-12 and EU-15. The decrease in employment between 1990 and 1994 was stronger in the sawing and first processing of wood sector (-16.7%) than in the total manufacturing industry (-13.5%). According to the 1995 estimates, however, employment in EU-12 started to grow again (0.8%), while it declined further in the total manufacturing industry (-0.9%).

In 1995, production in constant prices is expected to be 37.5% higher in EU-12 than in 1985, outperforming the manufacturing industry average (+24.3%). The sawing and first processing of wood sector performed significantly better than total manufacturing industry in the late 1980s, but was hit harder by economic recession during the early 1990s and is estimated in 1995 to do much better (+10.8%) than the total manufacturing industry (+3.4%) in EU-12. This shows that'the subsector is more cyclical than the manufacturing industry average.

International comparison

In 1994, EU production (ECU 5.9 billion in current prices) in the sawing and first processing of wood sector amounted to 28% of US production and 44% of Japanese production.

Figure 2: Sawing and first processing of wood
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Sawing and first processing of wood
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	8 517	11 805	12 309	11 249	11 008	10 792	12 373	12 257	10 873	11 400	11 980	12 580
Production	4 025	5 604	6 027	5 744	5 541	5 505	5 872	6 702	8 736	9 220	9 750	10 310
Extra-EU exports	286	301	303	281	259	285	346	368	1 144	1 210	1 280	1 360
Trade balance	-4 491	-6 201	-6 283	-5 504	-5 466	-5 287	-6 501	-5 555	-2 137	-2 180	-2 230	-2 270
Employment (thousands)	78	78	78	75	71	66	66	66	79	80	80	80

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Sawing and first processing of wood
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.3	-0.2	2.3	6.4
Production	4.9	0.3	2.8	5.3
Extra-EU exports	-2.7	2.6	-0.4	20.5
Extra-EU imports	3.4	-0.5	1.7	8.1

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Sawing and first processing of wood
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	286.1	261.5	271.0	275.5	301.5	303.4	281.4	259.2	284.6	346.1	368.4	1 144.4
Extra-EU imports	4 777.4	4 709.4	5 227.4	5 648.5	6 502.8	6 585.9	5 785.9	5 725.6	5 571.7	6 846.8	5 923.2	3 281.3
Trade balance	-4 491.4	-4 448.0	-4 956.5	-5 372.9	-6 201.4	-6 282.5	-5 504.4	-5 466.4	-5 287.1	-6 500.8	-5 554.8	-2 136.9
Ratio exports / imports	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3
Terms of trade index	95.8	108.2	110.0	103.0	99.4	100.0	103.3	110.9	109.3	97.1	N/A	N/A

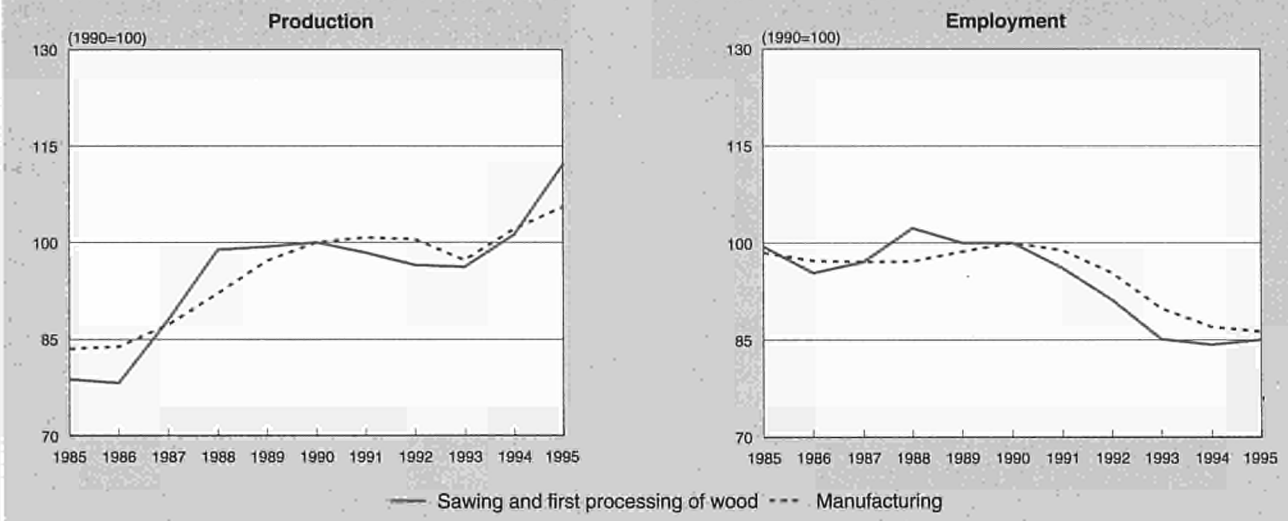
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Sawing and first processing of wood
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	77.9	81.9	87.4	95.1	98.0	100.0	104.8	110.7	117.6	127.1
Unit labour costs index (3)	99.1	95.6	90.8	91.4	95.1	100.0	106.7	106.8	102.6	98.6
Total unit costs index (4)	86.2	86.0	85.6	88.5	95.9	100.0	101.1	99.0	98.2	97.8
Gross operating rate (%) (5)	8.5	8.9	9.7	10.7	10.2	9.9	8.7	8.9	9.6	10.8

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Sawing and first processing of wood
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

Canada and the Scandinavian countries are also important players on the world market. With the entry of Sweden, Finland and Austria in 1995, the relative importance of the EU increases significantly, since it leads to an increase by more than 30% of the production in current prices .

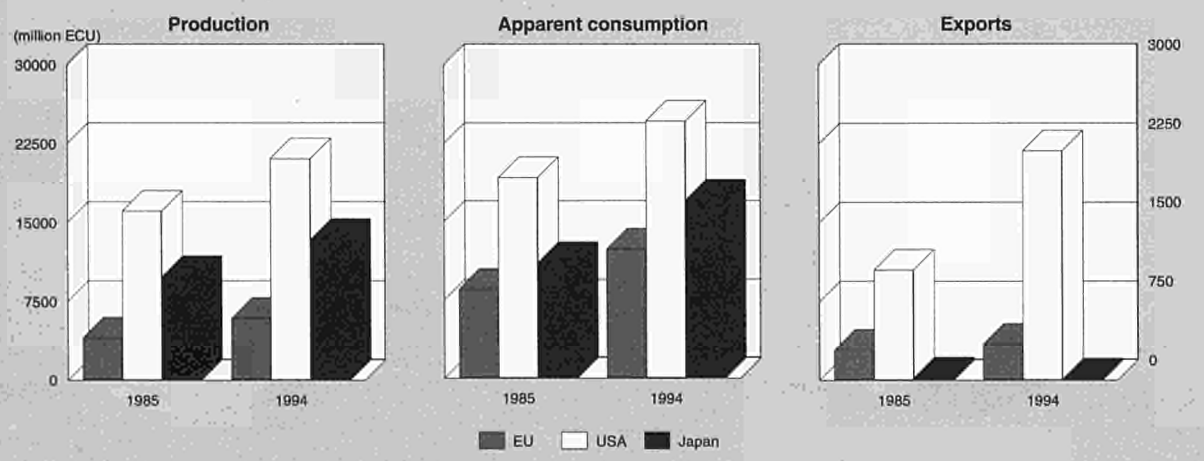
Over the last ten years, production in the three trading blocks has developed more or less in parallel. Nevertheless, the average annual real growth rate of EU production (2.4%) over the period 1985-94 was higher than that of the US and Japan (both 1.9%). On a yearly basis, growth differentials are larger. In 1994, while production increased in the EU by 5.3% in constant prices reaching a new peak, it increased in the USA by 0.6% only, whilst production in Japan, following a negative trend since 1989, decreased by 3.4%. Moreover, production in the USA and Japan is still below the 1990 level.

Foreign trade

The negative trade balance is reflected in the very low ratio of extra-EU exports over extra-EU imports, averaging 5% between 1985 and 1994. In 1994, extra-EU exports rose by 21.6% and imports by 22.9%, in 1995 extra-EU-12 exports are estimated to rise by 252% and imports by 4.9% only, due to the entry of Austria, Finland and Sweden in the EU. The ratio extra-EU-12 exports over imports is therefore forecast to reach 17% in 1995. In EU-15, the mentioned ratio should jump to 43% in 1995, since extra-EU imports are considerably brought down (-64%). In the period 1985-1994, the import penetration rate has remained very high, at 54% on average. In 1994, it reached 55%, and a further increase is estimated for 1995 at nearly 57% in EU-12. However, due to the enlargement of the EU in 1995, the import penetration is estimated to be brought down to 26% in 1995.

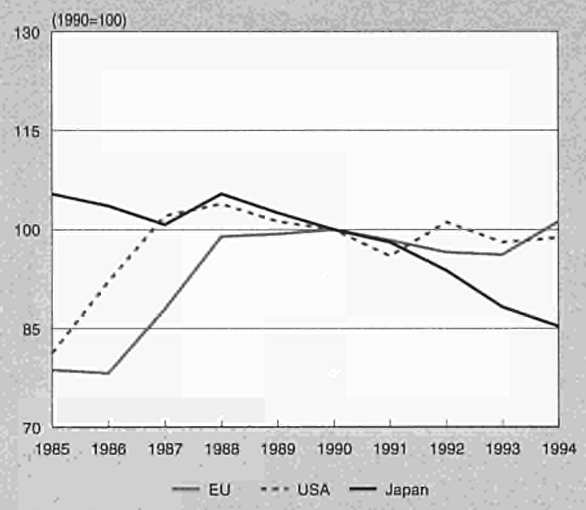
In 1994, extra-EU-12 exports registered a real growth rate of 20.5%, while extra-EU-12 imports rose by 8.1%. Even though extra-EU-12 exports grew significantly, they were not sufficient to compensate for the rise in extra-EU-12 imports. As a result, the trade balance in current prices further deteriorated by 23%. However, in 1995, with the entry of Austria,

Figure 4: Sawing and first processing of wood
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Sawing and first processing of wood
International comparison of production in constant prices



Source: DEBA GEIE

Finland and Sweden in the EU, extra-EU-15 imports are being reduced by 64% compared to extra-EU-12 imports. The trade balance in current prices is, therefore, expected to improve remarkably by some 75% (from -5.96 billion ECU to -1.48 billion ECU). In 1994, extra-EU imports mainly came from the EFTA countries (52%), the USA (9.7%), Canada (6.2%), Malaysia (5.9%), and Russia (5.2%). Extra-EU exports mainly went to the EFTA countries (57%), and Japan (7.5%).

MARKET FORCES

Demand

In 1995, the percentage of production in EU-12 being exported outside the EU is estimated to have remarkably increased to reach 18.2%, compared to 5.9% in 1994. In the EU-15, this percentage is estimated at 13%. The latter development shows that manufacturers have increased their extra-EU market shares for exports, not only in the EFTA countries, but mostly in the other parts of the world. The larger part of EU production goes to industry, more specifically to the pallets, carpentry and furniture industry. This situation is not expected to change in the near future. New products are emerging based on new techniques, such as gluing, in order to increase added value. Automation is increasing in the large sawmills, more specifically in the softwood sector.

Supply and competition

The pallets industry is facing problems as inexpensive products are entering the EU market, mainly from Poland, but also from other Central and East European countries.

Labour productivity has risen continuously over the past decade. In 1994, it increased by 8.1%. After a significant increase in the years 1989-91, unit labour costs stabilised in 1992 and declined in 1993 and 1994, when they fell below their 1990 level, due to the rapid growth in labour productivity. After having declined continuously since 1989, the gross operating rate in the sawing and first processing of wood sector showed significant improvement since 1993, surpassing in 1994 its peak level of 1988.

INDUSTRY STRUCTURE

Companies

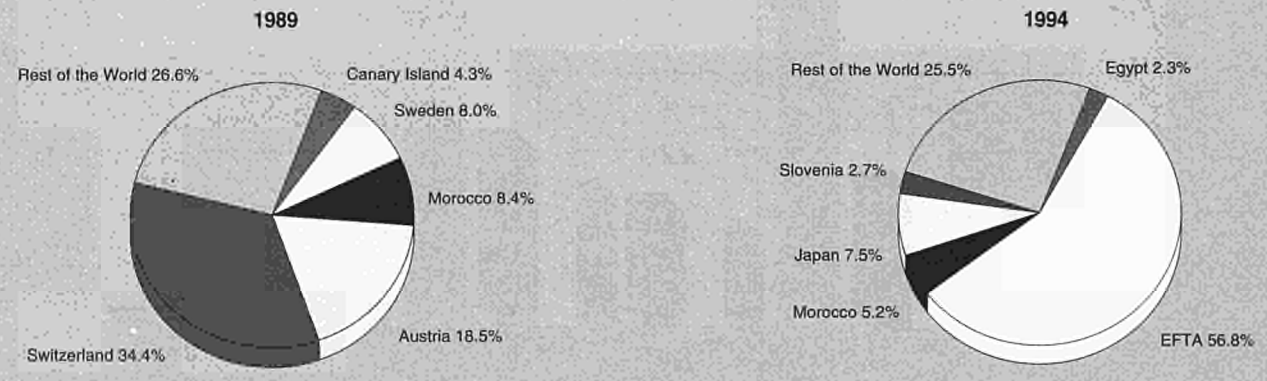
Around 1 350 enterprises employing more than 20 persons operate in the first processing of wood sector. Altogether, about 66 300 persons within EU-12, or 79 100 within EU-15, were working in these enterprises in 1995. Since small and medium sized enterprises predominate, total employment is likely to be considerably higher than official figures reveal. The EU countries with the highest degree of relative specialisation in the sawing and first processing of wood are Portugal (3.3) and Spain (2.3).

Strategies

Following stiff competition from non-EU producers, the sector had to reorganise and invest in the course of the 1980s. There were three main types of structural changes: the closure of non-profitable enterprises, the merging of small production units and an increased tendency towards vertical integration.There have been numerous mergers and acquisitions in the sector. Moreover, there is a growing need for highly qualified personnel.

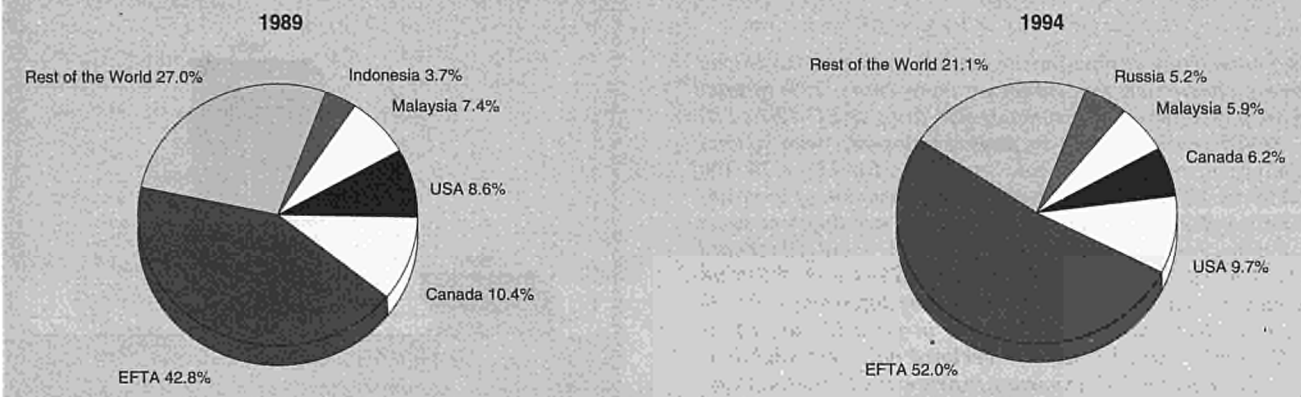
The main strategy among the companies in the sector is to produce goods with higher added value. They, therefore, tend

Figure 6: Sawing and first processing of wood
Destination of EU exports



Source: Eurostat

Figure 7: Sawing and first processing of wood
Origin of EU imports



Source: Eurostat

Table 5: Sawing and first processing of wood
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.6	0.7
Danmark	1.0	0.3
Deutschland	0.9	1.1
Ellada	0.8	0.6
España	1.4	2.3
France	0.9	0.9
Ireland	N/A	N/A
Italia	0.7	0.4
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	4.3	3.3
United Kingdom	1.5	1.1

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

to subcontract for second stage processing, instead of remaining mere suppliers of raw material. By producing goods that are customised for further processing, EU companies can improve their competitiveness vis-à-vis extra-EU competitors.

Due to their geographical proximity, companies engaged in the first processing of wood may also respond in a more flexible way to the needs of companies involved in the second processing of wood (e.g. just-in-time delivery).

REGIONAL DISTRIBUTION

For obvious reasons, sawmills specialised in indigenous wood species are usually located in or near forests. Sawmills specialised in imported wood species, on the contrary, often prefer to be established near harbors or in the proximity of their customers (e.g. furniture industry).

OUTLOOK

Consumption, which increased in real terms by 6.4% in 1994 in EU-12 and is expected to increase again in 1995 by 2.4% in current prices in EU-12, is expected to increase further in the coming years in EU-15. For the period 1996-99 an average growth rate of 3.8% is expected. Production, which grew by 14.1% in 1995 in EU-12 (in current prices), is expected to increase further in the period 1996-99 at an average rate of 5.6% per year in EU-15. This means that EU production will continue to substitute for extra-EU imports. In short, the prospects in the short and medium terms are positive. After a continuous decline since 1990, employment grew slightly by 0.8% in 1995, but is only expected to stabilise in the period 1996-99.

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Semi-finished wood products

NACE (Revision 1) 20.2

The manufacture of semi-finished wood products is the second largest wood processing subsector, representing 22% of total sector production. Approximately 750 firms in EU-12 or 850 in EU-15 (each with 20 or more employees), with a total employment of 62 400 people within the EU-12 or 74 400 within the EU-15, are involved in the production of semi-finished wood products. The main products are different kinds of wooden board material, such as particleboard, fibreboard and plywood. The real growth rates for 1994 were 5.5% for production and 3.8% for consumption. The difference in growth is caused by a substantial decrease in extra-EU imports (-5.5%), while extra-EU exports declined only very slightly (-1%). The trend towards exporting to new extra-EU destinations prevailing in 1993 weakened somewhat in 1994, since EU markets were on the upturn again. The average nominal annual growth rates for the period 1996 to 1999 are estimated at 4.4% for consumption and 5% for production in EU-15.

INDUSTRY PROFILE

Description of the sector

The subsector mainly produces wooden board material, such as particleboard, fibreboard and plywood. These, in turn, are used as intermediate products in the furniture or construction industries, or sold as end products. Apart from raw boards, there are also surface-improved panels (boards covered with veneer, laminates or resin impregnated paper). Besides wood based panels, NACE 1970 Classification group 462 also includes the companies that are engaged in the impregnation of wood with chemical preservatives. In the new Nace Rev. 1 classification, the latter will be transferred to code 20.1, i.e. sawing and first processing of wood. The wood based panels industry will fall under Nace Rev. 1 code 20.2.

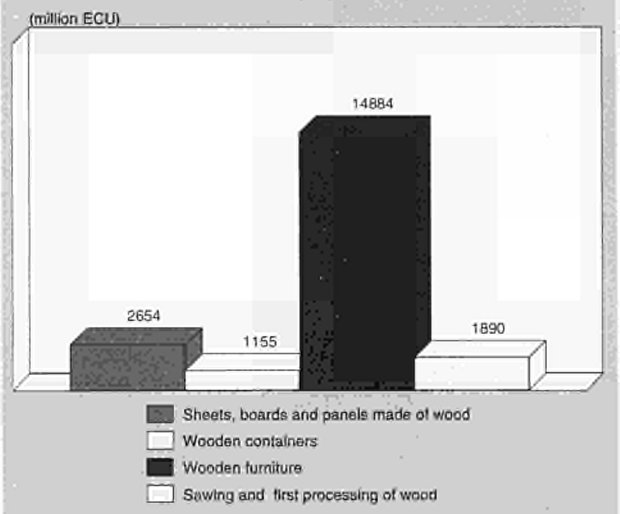
The production of semi-finished wood products represents 22% of the total production of the wood processing industry. Of the total volume of consumption of raw wooden board material, particleboard represents 73%, fibreboard 11% and plywood 16%. Particleboard accounts for approximately 77% of the total production volume of wood based panels in the EU-15.

The value added in the subsector in 1994 amounted to nearly 2.7 billion ECU, compared to 1.2 billion ECU for the production of wooden containers (NACE 464), 1.9 billion ECU for the subsector sawing and first processing of wood (NACE 461) and 14.9 billion ECU for the production of wooden furniture (NACE 467). About 37% of the value added was generated by Germany, the biggest producer in the EU, followed by France and Italy, accounting for 16% and 14% of value added, respectively.

Recent trends

In the period 1985-94, apparent consumption of semi-finished wood products grew at an average real annual rate of 3.3%. Decreasing consumption in 1986 and 1993, were the only exceptions to this positive trend. In the same period, production in constant prices increased by 41.4%, performing well above the total manufacturing industry (+22.1 % on average), especially since 1993, when the gap between both widened significantly. Average annual real growth rates in production were 3.9% for semi-finished wood products and 2.2% for the total EU manufacturing industry.

Figure 1: Sheets, boards and panels made of wood
Value added in comparison with related industries, 1994

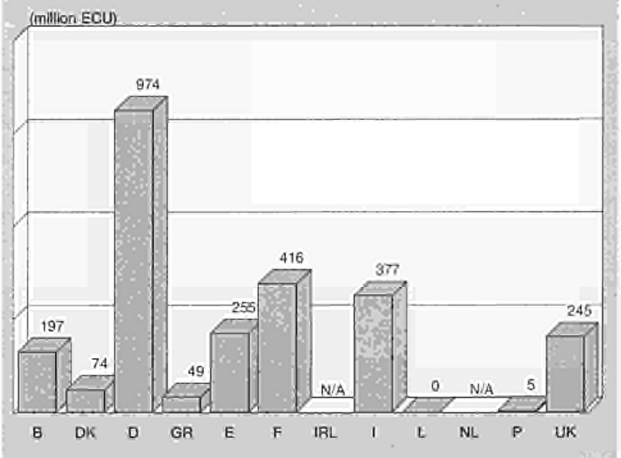


Source: DEBA GEIE

In 1994, production of semi-finished wood products increased by 5.5% in constant prices, the highest pace in five years. In the same year, production in current prices rose by 7.7%. Estimates for 1995, however, indicate only a very moderate increase of the production of semi-finished wood products within EU-12 in current prices (+1.3%), while in constant prices a decline of 2.8% is forecast. 1995 was indeed characterised by two opposite trends: the first half of the year was marked by a high level of activity, after which the activity slowed down the second half of 1995. Since the latter trend has continued so far in 1996, overall perspectives are not very bright for the current year, unless the overall economic recovery expected for the second half of 1996 actually materialises. However, for the period 1996-99, production is estimated to reach an average nominal annual growth rate of 5% within the EU-15.

The real growth rates for 1994 were 5.5% for production and 3.8% for consumption, the difference in growth was caused by a significant decrease in extra-EU imports (-5.5%), while extra-EU exports declined only very slightly (-1%). The trend towards more exports to new extra-EU destinations prevailing

Figure 2: Sheets, boards and panels made of wood
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Sheets, boards and panels made of wood
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	7 197	9 124	9 606	9 862	9 994	9 698	10 319	10 584	12 686	13 280	13 900	14 550
Production	5 901	7 618	7 972	8 299	8 405	8 217	8 853	8 969	11 691	12 280	12 900	13 560
Extra-EU exports	375	481	475	468	468	611	610	828	788	840	890	950
Trade balance	-1 296	-1 506	-1 634	-1 563	-1 589	-1 481	-1 465	-1 615	-996	-1 000	-1 000	-990
Employment (thousands)	72	68	68	68	66	64	62	62	74	70	70	70

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Sheets, boards and panels made of wood
Breakdown by sector, 1994 (1)

(thousand cubic metres)	Apparent consumption	Production	Extra-EU exports
Particle board	21 697	21 011	4 962
Fibre board - hardboard	1 132	1 056	821
Fibre board - MDF	2 200	2 500	300
Plywood	4 497	1 648	835

(1) EUR12.
Source: Cei-Bois

Table 3: Sheets, boards and panels made of wood
Breakdown by sector, 1995(1)

(thousand cubic metres)	Apparent consumption	Production	Extra-EU exports
Particle board	24 400	24 700	6 209
Fibre board - hardboard	1 194	1 235	1 021
Fibre board - MDF	3 100	3 700	600
Plywood	5 002	2 653	1 761

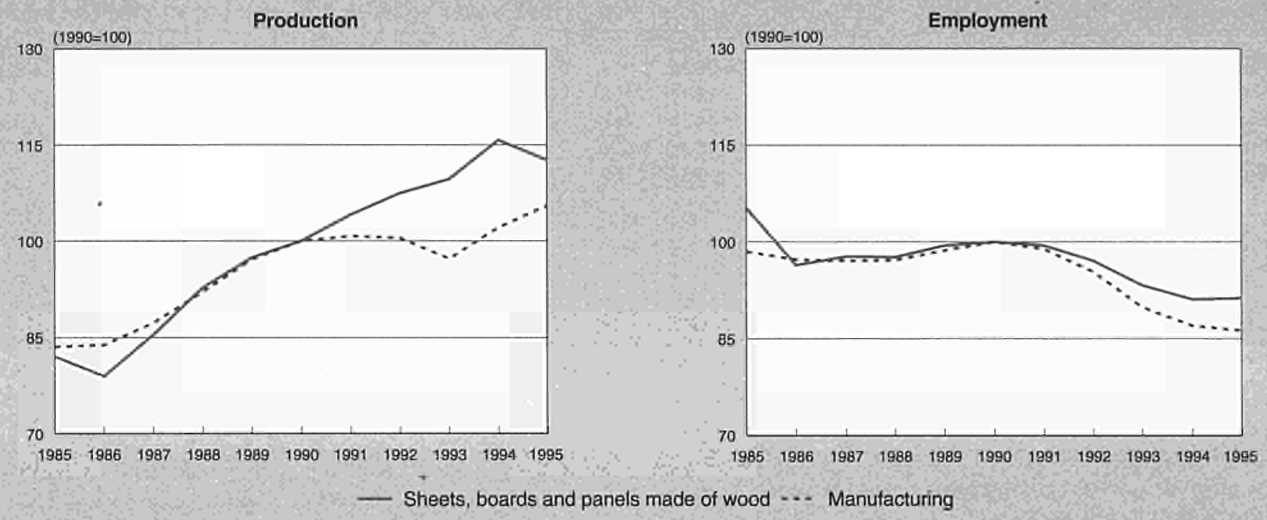
(1) EUR15; estimates.
Source: Cei-Bois

Table 4: Sheets, boards and panels made of wood
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.2	2.2	3.3	3.8
Production	4.1	3.7	3.9	5.5
Extra-EU exports	1.9	6.0	3.7	-1.0
Extra-EU imports	4.1	-3.2	0.8	-5.5

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Figure 3: Sheets, boards and panels made of wood
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

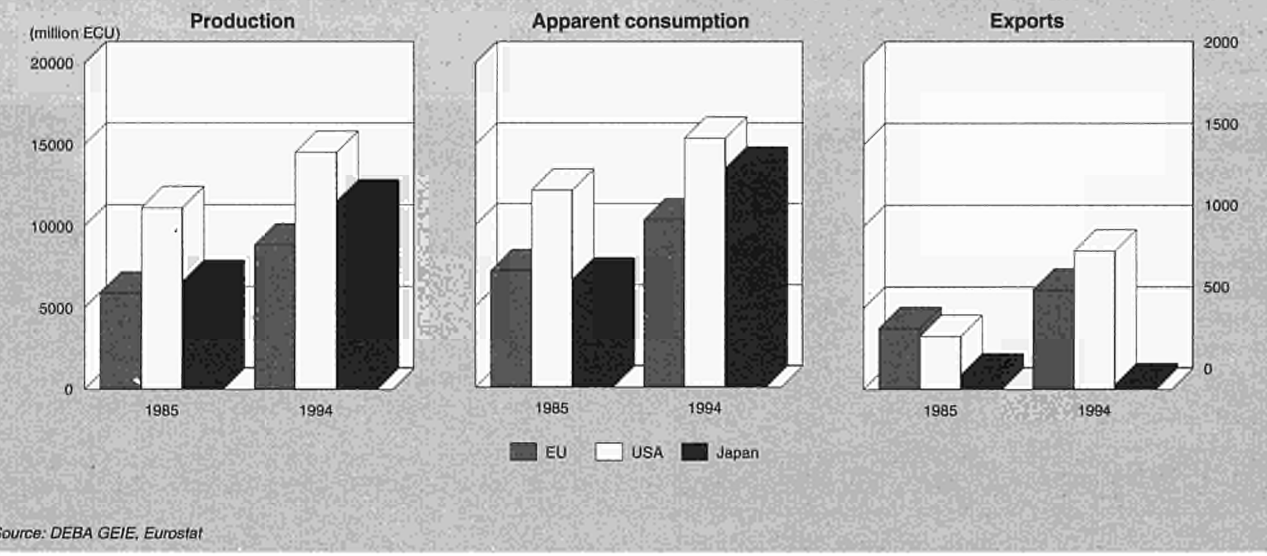
in 1993, weakened somewhat in 1994 since EU markets were on the upturn again. Consumption has indeed benefited from the overall European economic recovery in 1994. Apparent consumption of semi-finished wood products amounted to 10.3 billion ECU, which was 6.4% above the 1993 level. In 1995, consumption in current prices is forecast to stagnate in EU-12. From 1996 to 1999, apparent consumption is expected to increase at an average nominal annual rate of 4.4%.

In 1995, the semi-finished wood products subsector employed around 62 400 people in EU-12 or 74 400 in EU-15, which represents 15% of total employment in the wood processing industry. Meanwhile, its share of total sector production amounted to 22%. Hence, the subsector is relatively capital-intensive. Employment in the semi-finished wood products industry decreased by an estimated 8.9% between 1990 and 1994. However, this negative trend in the employment level is less marked than for the whole EU manufacturing industry (-12.9%). In 1995, the employment level stabilised in the semi-finished wood products industry (+0.2%), while it slightly decreased in the whole EU-12 manufacturing industry (-0.9%). Moreover, the stabilisation of the employment level is expected to uphold in the period 1996-99.

International comparison

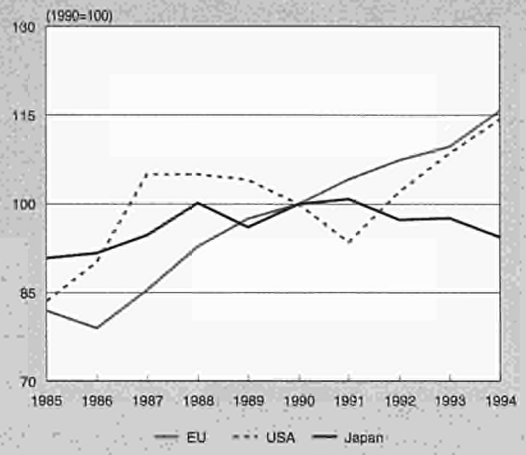
In 1994, EU-12 production of semi-finished wood products equalled 61% of USA production and 77% of Japanese production. However, in the period 1990-94, production in the EU of semi-finished wood products grew by an average real annual rate of 3.7%, against 2.9% in the USA and -1.1% in Japan. EU production has grown continuously since 1986, whereas USA production has been more cyclical. The European wooden board industry is relatively young and specialised in products such as particleboard and Medium-Density Fibreboard (MDF), the markets for which have displayed significant growth potential during the period. US industry is still largely engaged in the production of plywood. The plywood market is a more mature market, subject to cyclical fluctuations and also to substantial competition from low wage countries in

Figure 4: Sheets, boards and panels made of wood
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Sheets, boards and panels made of wood
International comparison of production in constant prices



Source: DEBA GEIE

South America (e.g. Brazil) and Asia (e.g. Indonesia), but also from the rapid expansion of Oriented Strand Board (OSB) production.

Foreign trade

Following a steep rise of 30.6% in 1993, extra-EU exports stabilised in 1994 (-0.1%). The trend towards more exports to non-EU destinations (especially Asia) started in 1993 and slackened somewhat in 1994 since domestic markets were on the upturn and European demand was increasing again in the second half of 1994 until mid-1995. Nevertheless, extra-EU-15 exports, mainly consisting of particleboard and MDF, are expected to grow further during the period 1996-1999 at an average annual rate of 6.5%. The trade balance, after improving in 1993, improved once again in 1994 due to a decline in extra-EU imports. Nevertheless, the trade balance remains negative because of massive extra-EU imports of plywood.

The extra-EU exports over extra-EU imports ratio remained stable during the period 1984-1992, averaging around 23%. In 1993 and 1994, it reached 29% due to the rise of extra-EU exports which occurred in 1993. This level was maintained in 1994 and was accompanied by a decline in extra-EU imports, as already mentioned. The import penetration rate, which had remained stable during many years at about 21%, decreased somewhat in 1994 to reach 20%. For the semi-finished wood products sector, the EFTA countries and the rest of the world are the major export markets, representing 41% and 36% respectively of EU exports in 1994. Indeed, the EU producers have increased their share of the rest of the world markets (mainly the Far East) significantly over the past years, while the relative importance of exports to the EFTA countries has been reduced.

In 1994, the most important Asian export markets were Japan (6%) and Taiwan (4%). Meanwhile, 40% of extra-EU imports originated in the EFTA countries. The USA (13%), Indonesia (12%) and Brazil (9%) are important suppliers of plywood. In fact, extra-EU imports mainly consist of plywood and hardboard, whilst particleboard and MDF make up the bulk of extra-EU exports. Since 40% of 1994 extra-EU imports originated in EFTA countries, the introduction in the 1995 figures of the data regarding the three new EU Member States that previously belonged to the EFTA, will lead to a considerable reduction of extra-EU-15 imports and hence of the EU-15 trade balance deficit.

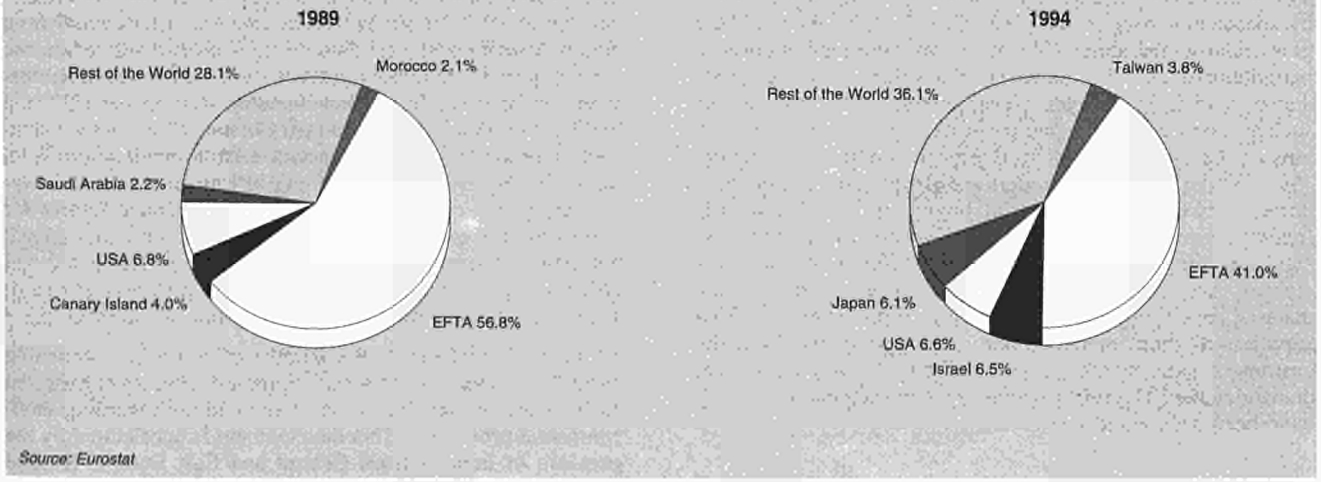
MARKET FORCES

Demand

The development of new applications for particleboard will continue to gather momentum and, hence, influence demand. The range of special boards is expanding continuously. Special products, such as moisture-resistant boards, fire-retardant panels, bendable, lacquered, printed and melamine-faced boards have joined other special products such as very thin as well as very thick boards.

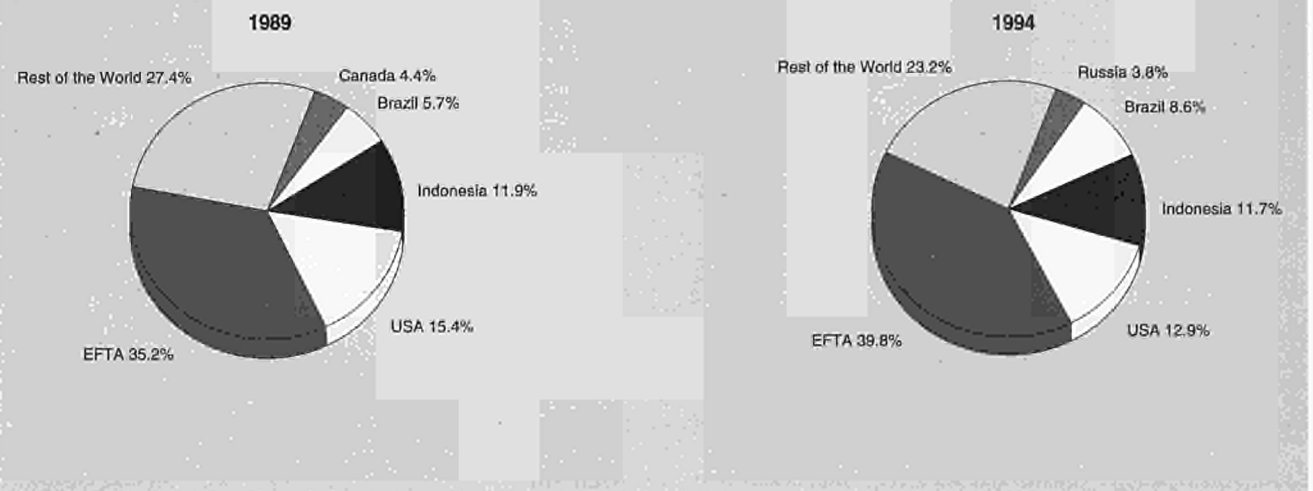
One trend in buyers' preferences is to replace solid wood, tropical wood, plastics and other wood based panels by MDF, especially for furniture manufacturing. MDF is a good substitute material for more expensive types of solid wood. Thin MDF is a strong competitor and substitution product for thin plywood and hardboard. As thin plywood and hardboard are mainly imported from outside the EU, intra-EU competition is not affected by this development. For plywood, one of the major developments in the world market is the reinforcement of export limitations of wood due to national and international environmental pressures (such as the reduction of trade in logs in Malaysia, the limiting of logging in the USA, etc.). Oriented Strand Board (OSB) is a relatively new type of wooden board material, at least in Europe. It is mainly used in the construction industry because of its mechanical prop-

Figure 6: Sheets, boards and panels made of wood
Destination of EU exports



Source: Eurostat

Figure 7: Sheets, boards and panels made of wood
Origin of EU imports



Source: Eurostat

erties and mainly serves as a substitution product for plywood. It raises a lot of interest among European potential users and manufacturers. This product is certainly one that will experience a major growth in the years to come.

Supply and competition

Wooden board production is practically fully automated and the investment threshold is very high, especially for continuous production lines. Important modernisation and concentration has taken place in recent years and the industry has reached an advanced level of technology and very high efficiency. This enables the industry to meet high quality standards also in the near future.

The risk of overcapacity in the European particleboard sector was reduced between 1993 and 1995, years in which few new production lines were installed. During the recession of the early 1990's, rationalisation, rather than investments in new production capacity, has taken place. In some cases, this has led to the closure of older or less efficient production units. In view of the rationalisation and the increase in demand that can be expected from economic recovery, prospects for the EU particleboard sector again look more favourable than they did in the first years of the 1990s, at least in terms of production volume.

Whereas the risk of overcapacity weakened in 1993-95, the EU particleboard industry has simultaneously been confronted with some raw materials cost pressures. 1994 was characterised by spectacular rises in the glue prices by 30% or morThese glues represented about 20% of the total production costs of particleboard. In 1995, however, glue prices were almost reduced to their 1993 level. Nevertheless, other costs factors such as wood, melamine and paper have been tightening margins of the industry in many European countries throughout 1995. Whilst commodity traders are already anticipating economic recovery, the industrial buyers of wooden boards (mainly furniture and construction industries) are typically "lagging" sectors. This makes it very difficult for the particleboard sector to adjust its profitability to the higher raw material cost. Caught between an upward price pressure from suppliers of input materials and a downward one from the customers' side, which are still suffering from a weak final demand in the EU, profit margins in the particleboard industry have been reduced to nearly zero.

The popularity of MDF, especially in the furniture industry, is still increasing. Total European MDF output amounted to 3.8 million m3 in 1995, a growth of nearly 10% in comparison with the 1994 production level. MDF production almost doubled during the 5 last years. In 1994, MDF accounted for 67% of total fibreboard production. Capacities are rising substantially. There are currently 44 production plants in 18 European countries, which are operating 53 production lines. The rapid expansion of MDF production in Europe is likely to continue until late 1997 when the installed capacity may rise to 8 million m3. However, these investments will have to be cut back to a normal level after 1996 and should be rather focused on demand, in order to contain an already existing threat of overcapacity.

The impact of foreign competition may be distorted due to less environmentally friendly log harvesting or production methods, lower labour costs, greater availability of raw materials, trade practices and trade policies (such as dumping by countries in Central and East Europe and the GSP countries). Technological advantages are not considered factors that will affect competition on the EU and extra-EU markets. It is, therefore, necessary for extra-EU competitors to respect the prevailing rules of international trade and competition.

The deficit in the EU trade balance for semi-finished wood products is the consequence of large, inexpensive wood reserves outside the EU (North America, Scandinavia and East Europe) and the massive imports of plywood from North America and Southeast Asia as well as imports of hardboard from South America and East Europe. In the plywood sector, the most important competitive advantage of the EU manufacturers over the large single-product manufacturers in the USA and Indonesia is that European industry is specialised in the manufacture of a small series of special, custom-made goods from very different types of wood. As already mentioned, a significant positive impact on the EU trade balance figures for semi-finished wood products is attached to the entry of Finland, Sweden and Austria into the EU. As for particleboard and MDF, competition is mainly intra-EU. In plywood and hardboard, there is a strong competition from outside the EU.

In the hardboard sector, the number of companies switching from the so-called wet process to the dry process is expected to increase further due to strict regulations regarding environmental protection. This development is accelerated by the pressure of imports from Central and East Europe. Despite

Table 5: Sheets, boards and panels made of wood
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	375.1	376.4	399.7	414.4	481.2	475.1	468.2	467.5	610.5	610.0	827.8	788.2
Extra-EU imports	1 670.6	1 583.5	1 670.8	1 896.6	1 987.2	2 109.2	2 031.0	2 056.6	2 091.5	2 075.4	2 443.2	1 783.7
Trade balance	-1 295.5	-1 207.1	-1 271.1	-1 482.2	-1 506.0	-1 634.1	-1 562.7	-1 589.0	-1 480.9	-1 465.5	-1 615.4	-995.5
Ratio exports / imports	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4
Terms of trade index	89.6	98.3	97.9	97.8	94.2	100.0	96.4	97.1	94.4	90.7	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 6: Sheets, boards and panels made of wood
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	77.9	81.9	87.4	95.1	98.0	100.0	104.8	110.7	117.6	127.1
Unit labour costs index (3)	96.7	95.4	93.8	91.7	93.4	100.0	102.2	103.0	99.8	94.6
Total unit costs index (4)	94.3	93.1	93.3	94.5	98.3	100.0	99.9	99.3	94.6	95.7
Gross operating rate (%) (5)	6.8	9.5	10.2	10.4	10.6	10.5	10.2	9.4	9.4	10.1

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

these problems, a new hardboard production plant has come on stream in the course of 1995 in the United Kingdom. It is the first new hardboard production unit in the EU in many years.

OSB is mainly produced in the UK and France and the product has been well received in these and several other European countries. By the end of the 1990s, it should become a major product for the European panel industry. By the end of 1996 or the beginning of 1997, OSB production will already have increased substantially. By then, several new production units will be operational, e.g. in Ireland and Luxembourg.

OSB is a structural panel which uses a boilproof and waterproof adhesive to bind the particles together, and is less costly to produce than plywood. OSB tends to gradually replace plywood and keeps increasing its market share in the US structural panel market. OSB held 23% of the US panel market in 1994 and its production is estimated to increase by 9% in 199This trend is expected to continue as new mills come on stream. However, the end of plywood is certainly not at hand. In fact, on the one hand, plywood manufacturers have improved their products and, on the other hand, plywood is still traditionally preferred by many end-users. In Europe also, OSB production is developing. Although its production remains limited, the possible effects on the European plywood market will have to be taken in consideration as production of OSB becomes significantly more important.

Labour productivity in the semi-finished wood products has increased significantly since 1990. In 1994 alone, it increased by 8.1%. Higher productivity led to a decrease in unit labour costs by 5.2% in 1994, almost reducing them to their 1989 level. Following a continuous decrease since 1990, the sector achieved an improvement of its gross operating rate in 1994, from 9.4% to 10.1%.

INDUSTRY STRUCTURE

Companies

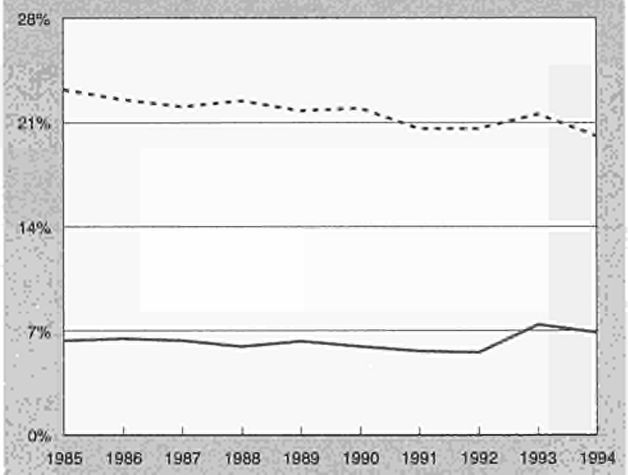
According to estimates, about 750 firms in EU-12 or 850 in EU-15 (with 20 or more employees) are involved in the manufacture of semi-finished wood products. The particleboard industry accounts for about 145 companies, employing 19 000 people within the EU-15. Total employment in the industry is about 62 400 in EU-12 or 74 400 in EU-15, which equals an average number of 83 or 87 employees per firm, respectively. These figures are relatively high compared to other subsectors of the wood processing industry.

The EU countries that were the most specialised in the production of semi-finished wood products in 1994, are Greece (with a production specialisation ratio of 3.0) and Belgium (2.1). Belgium is the world's most prominent exporter of particleboard, with an export volume of about 1.6 million m^3, representing 20% of world trade. Germany, although the biggest EU producer, only barely exceeds the European average (1.00) with a specialisation ratio of 1.10.

Strategies

The chipboard industry is a capital-intensive sector. Production is practically fully automated, requiring massive research and development efforts, and the investment threshold is high, especially for the continuous production lines. These circumstances imply that an average chipboard firm exceeds the typical SME dimension of the wood processing sector, and that the value added of this activity is lower than in other parts of the wood processing industry, where a high percentage of labour costs raises the value added. In recent years, the sector has undergone major restructuring and an apparent concentration has taken place. Large competitors have begun to expand their market share by investing in larger plants and by investing across Europe.

Figure 8: Sheets, boards and panels made of wood
Trade intensities



Source: DEBA GEIE, Eurostat

Table 7: Sheets, boards and panels made of wood
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	2.2	2.1
Danmark	1.0	1.2
Deutschland	1.1	1.1
Ellada	2.7	3.0
España	1.7	1.4
France	0.9	0.9
Ireland	N/A	N/A
Italia	1.3	1.1
Luxembourg	0.0	0.0
Nederland	N/A	N/A
Portugal	1.8	0.2
United Kingdom	0.4	0.5

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

In the fibreboard sector, investments are focused on the development of new products, the modernisation of existing products, the increase of capacity and the shift to environmentally friendly production methods (such as the installation of perfect water cleaning systems in the wet process within the hardboard industry and the dry process in the MDF industry). In order to avoid overcapacity, diversification of products is taking place, e.g. the development of structural boards. With regard to company structures, there are several new joint investments by board manufacturers in MDF, but there are no major changes in the hardboard sector yet.

Until recently, the plywood sector was quite labour-intensive. However, technological development and computer applications in production control and the operation of machinery have lowered production costs to a great extent. They have at the same time enabled a substantial reduction in wood waste. The sector is still highly suited for product diversification (with greater utilisation of European wood species), especially when production methods allow for the manufacture of small series of special, custom-made products. Investments by European companies are characterised by modernisation and new product developments.

REGULATIONS

The common external tariff on imports from outside the EU is the same for particleboard, fibreboard and plywood. After being maintained for some time at 10%, it is now being gradually reduced, as a result of the Uruguay Round of the GATT. On 1 January 1995, a progressive reduction of the tariff started in order to lower the bound level of duty to 7% by 1 January 1999. The first step of reduction brought the common external tariff to 9.4% on 1 January 1995, whilst the second step brought it to 8.2% on 1 January 1996.

The Europe agreements signed between the EU and Hungary, Poland, the former CSFR and Romania changed the regulations formerly applicable to these countries. Customs duties on imports to the EU of particleboard, plywood and fibreboard coming from Bulgaria, Estonia, Latvia, Lithuania, Poland, Hungary, Romania, the Czech Republic and Slovakia were abolished on the 1 January 1995. In addition, a Council Regulation of 19 December 1994 applies a four-year scheme of generalised tariff preferences in respect of certain industrial products originating in developing countries, including general arrangements and special incentive arrangements established for the period 1 January 1995 to 31 December 1998. Under this regulation, particleboard, fibreboard and plywood have been classified as sensitive products. This classification implies that the Common Customs Tariff duties for these products will only be reduced, for the developing countries beneficiary of the generalised tariff preferences, to 70% of the duty applicable on the 1 January 1995, taking account of the reductions agreed in the context of the GATT (see previous paragraph). The republics of the former Soviet Union have been included in the 1995 GSP. In this context, 70% of the Common Customs Tariff applies to imports into the EU of fibreboard and plywood originating in Russia, Ukraine and Belarus. As far as the countries of former Yugoslavia are concerned, annual quotas on imports of particleboard and plywood originating in the Republics of Croatia, Slovenia, Bosnia-Herzegovina and Macedonia have been fixed for 1996. The annual ceiling for particleboard is 48 068 tonnes, whilst for plywood the annual ceiling is set at 180 565 m^3. As soon as these levels have been reached, a customs tariff of 8.2% may be reintroduced by a Commission regulation.

OUTLOOK

Consumption, as well as production, of semi-finished wood products is expected to grow in the coming years. The average growth rate for the period 1996 to 1999 is estimated at 4.4% for consumption and 5.0% for production. Extra-EU exports are expected to grow further from 1996 to 1999 at an average annual rate of 6.48%, thanks notably to the positive impact of the entry of Austria, Finland and Sweden into the EU.

In the particleboard industry, 1995 has been characterised by two opposite trends: the first half of the year was marked by a high level of demand and production activity, whilst the second half faced a slump in demand. However, the production within EU-15, is estimated to have increased by 3.2% in 1995. The trend towards lower demand observable in the second half of 1995 has continued during the first quarter of 1996. As a result, the overall perspectives of the industry are not that bright for 1996. However, the structural reforms initiated in the East European countries and in the Baltic States are showing some results and therefore lead to forthcoming growth expectations. On the contrary, the political situation in the countries of the former Soviet Union is highly unstable and the economic prospects are quite uncertain.

In the fibreboard sector, the MDF industry represents a European production capacity of more than 6 million m^3. Compared to particleboard (30.7 million m^3) and sawn timber (68 million m^3), the share of MDF in the market of wood and wood products is still quite moderate. European MDF industry will, furthermore, increasingly open up export markets for its products outside the EU and EFTA, more specifically for special MDF boards. Nevertheless, the setting up of new production capacity in the Far East will expose the European exporters to increased competition from local producers.

The sector of semi-finished wood products is facing a number of risks, including the additional costs associated with the increasingly stringent requirements with respect to health and environment and competition with extra-EU imports. However, political reforms in Central and East Europe offer a potential for exports and possibly joint-ventures.

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Wooden building components

NACE (Revision 1) 20.3

The manufacture of wooden building components accounts for 38% of the production value of the EU wood processing industry and thus constitutes its main subsector. The subsector is largely dependent on developments in the construction industry. It is highly involved in renovation work, which makes the sector less dependent on cyclical new building construction.

INDUSTRY PROFILE

Description of the sector

This subsector produces a wide variety of wooden building components, such as doors, window frames, shutters, partitioning and other walls, staircases, constructions of glued laminated wood, prefabricated buildings of wood, etc. The industrial scale of its operations and the methods of production make it different from the carpentry subsector of the construction industry. The old Nace code 463 and the new Nace Rev. 1 code 20.3 are perfectly compatible.

In 1995, production in current prices reached a value of 15.7 billion ECU in EU-12 or 20.4 billion ECU in EU-15, which represents 38% of the total production of the wood processing industry (excluding wooden furniture). Hence, the manufacture of wooden building components is the most important subsector of the industry. Apparent consumption amounted to 16.8 billion ECU in EU-12 or 21.1 billion ECU in EU-15, thereby producing a slight trade balance deficit.

Employment in 1995 was approximately 156 000 people in EU-12 and 186 000 in EU-15, both representing 38.6% of the total employment in the wood processing industries. In 1994, the wooden building components industry created a value added of 5.3 million ECU in EU-12. Representing 44% of value added, Germany is the biggest producer.

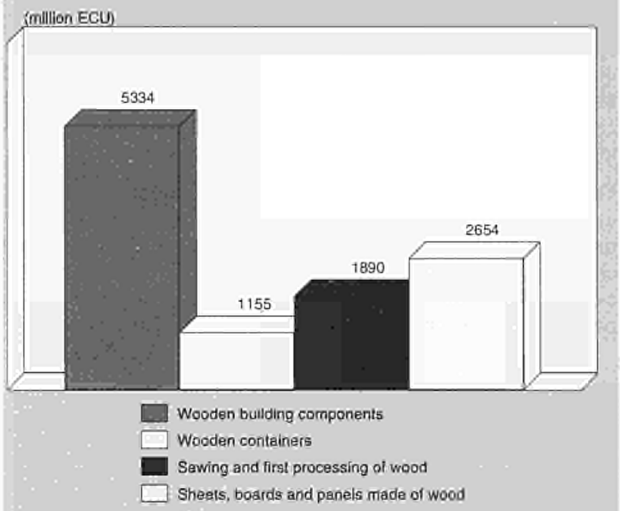
Recent trends

In the period 1985-94, apparent consumption of wooden building components increased steadily, at an average real growth rate of 5.3% in EU-12. Unfortunately, EU production was not able to keep pace with the rapidly growing demand, despite a decrease in extra-EU exports. This resulted in a steep rise in extra-EU imports, especially between 1990 and 1994 (+22.7% average real annual growth), and a trade deficit that increased from 1987 to reach 1.2 billion ECU in 1994. Nevertheless, the trade balance improved slightly in 1995, the deficit being reduced by 2.9% in EU-12. Even though the entry of Austria, Finland and Sweden has lead to a reduction of the trade deficit level to 653 million ECU in 1995, the period 1996-1998 will be characterised by a rising trade deficit, is expected to reach 1 billion ECU in 1998.

Nevertheless, production in constant prices grew by 37% between 1985 and 1995, which is 15% more than the EU-12 manufacturing industry average. This rapid growth mainly took place between 1992 and 1994, years in which the house-building activity was high. In the period 1990-94, the wooden building components industry clearly outperformed total manufacturing industry (average real annual growth rates of 2.9% and 0.6%, respectively).

Employment declined in the first half of the eighties. Thanks to increasing demand, employment started to grow again in 1987 to reach a peak of 161 100 of employed people in 1990. However, employment fell to approximately 154 800 in 1994,

Figure 1: Wooden building components
Value added in comparison with related industries, 1994



Source: DEBA GEIE

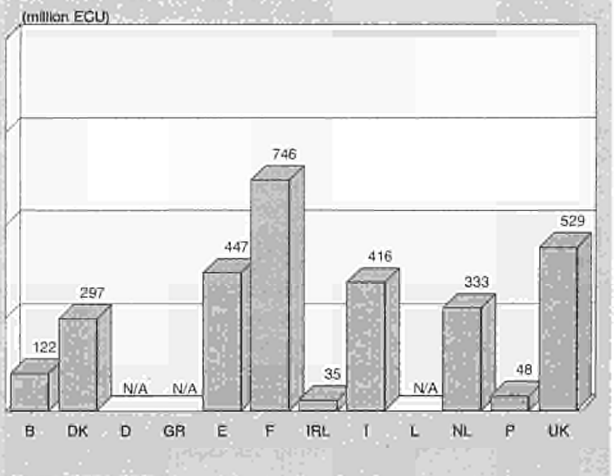
following the general trend of the entire wood processing sector. In 1995, employment is estimated to have grown again slightly (+0.8%) to 156 000 people in EU-12. Within EU-15, 186 000 people are employed in the wooden building components industry. In the period 1996-99, employment is expected to increase further by an annual average rate of 1%.

In 1995, the production of wooden building components is estimated to reach 15.7 billion ECU in EU-12, registering a growth rate of 4.8%. Within EU-15, production is expected to reach 20.4 billion ECU. In the period 1996-99, production is projected to increase annually by 5.8% on average. In 1995, consumption of wooden building components is estimated to reach 16.8 billion ECU in EU-12, recording a growth of 4.2%, whilst, in EU-15, it is estimated to reach 21.1 billion ECU. In the period 1996-99, consumption is expected to grow annually by 6.52% on average.

International comparison

Previously, the wooden building components industry was significantly larger in the USA than in the EU. In 1985, the production value of the EU represented only 56% of its US

Figure 2: Wooden building components
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Wooden building components
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	7 650	11 146	12 041	12 559	13 523	14 954	16 138	16 535	20 863	22 140	23 500	24 950
Production	7 722	11 055	11 859	12 214	12 953	14 065	14 955	15 665	20 420	21 620	22 900	24 250
Extra-EU exports	385	436	442	422	403	379	465	473	551	580	610	640
Trade balance	72	-91	-182	-345	-571	-889	-1 183	-870	-444	-520	-600	-700
Employment (thousands)	153	160	161	158	153	155	155	156	186	190	190	190

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Wooden building components
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	6.1	4.4	5.3	4.6
Production	5.5	2.9	4.3	3.5
Extra-EU exports	-2.8	-0.2	-1.7	23.9
Extra-EU imports	10.8	22.7	16.0	21.6

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Wooden building components
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	385.4	344.8	351.5	375.3	435.9	442.3	422.4	403.2	379.3	464.8	473.4	550.9
Extra-EU imports	313.5	308.6	360.1	436.9	526.9	624.3	767.4	973.8	1 268.6	1 648.1	1 343.1	994.7
Trade balance	71.9	36.2	-8.6	-61.7	-91.0	-182.0	-345.0	-570.5	-889.3	-1 183.3	-869.7	-443.8
Ratio exports / imports	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.4	0.3	0.3	0.4	0.6
Terms of trade index	89.9	101.3	102.4	99.2	97.9	100.0	99.3	102.7	98.3	91.1	N/A	N/A

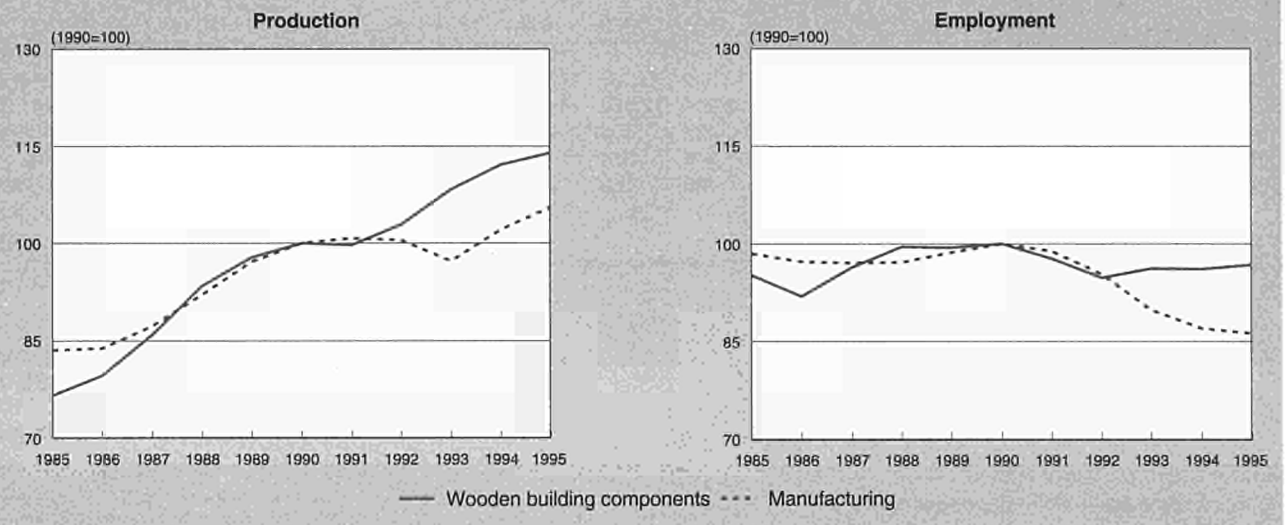
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Wooden building components
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	80.5	86.6	89.0	93.8	98.4	100.0	102.1	108.5	112.6	116.7
Unit labour costs index (3)	93.6	91.2	91.6	92.4	95.1	100.0	106.6	107.5	109.8	108.8
Total unit costs index (4)	86.4	86.4	87.7	90.6	95.2	100.0	104.2	106.0	108.3	109.8
Gross operating rate (%) (5)	8.6	9.7	11.1	10.9	10.8	9.8	9.0	9.7	10.6	10.7

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Wooden building components
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

counterpart. This is explained by the popularity of wood as a building material in the USA. However, the difference in production value was reduced to 12.4% by 1994 in EU-12. This was due, not only to cyclical factors, but also to the fact that wood is becoming increasingly popular as a building material in the EU as well.

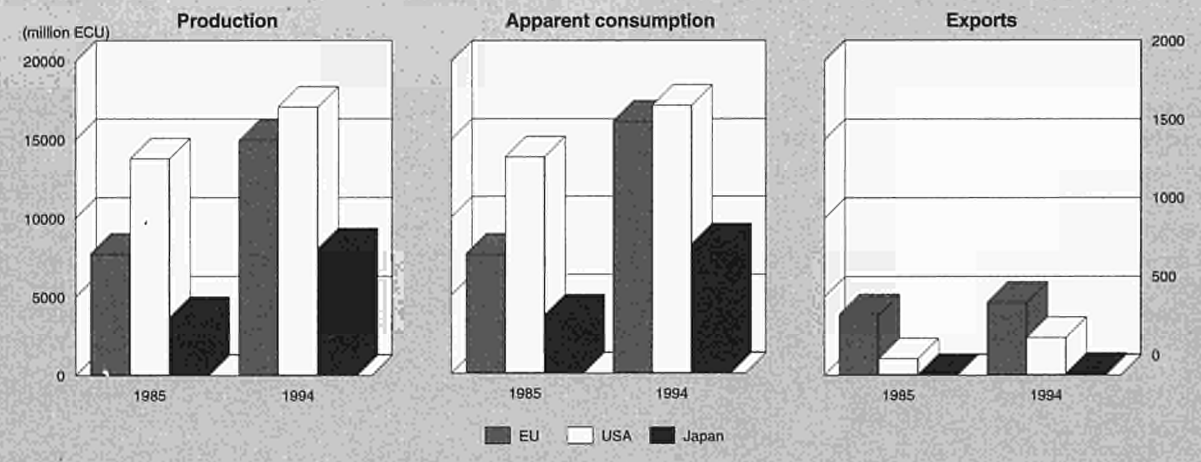
US production is more subject to cyclical fluctuations than that of the EU and Japan, where production is growing more steadily. The production of wooden building components in Japan amounted to 54% of EU-12 production in 1994. With 4.3%, the EU registered the highest average annual growth rate between 1985 and 1994 at 4.3%, compared to 3.2% in the USA and 3.0% in Japan.

Foreign trade

Between 1985 and 1994, extra-EU exports declined at an average real annual rate of 1.7%. This trend would have been significantly more negative without the exceptional real growth rate of 23.9% in extra-EU exports recorded in 1994. This means that, until 1993, EU producers have mainly been focusing on their home markets. On the other hand, extra-EU imports have grown by an average real annual rate of 16% over the same period. In 1990-94, extra-EU imports grew at an average real rate of nearly 23%. The trade balance has deteriorated continuously over the past decade and became negative in 1987.

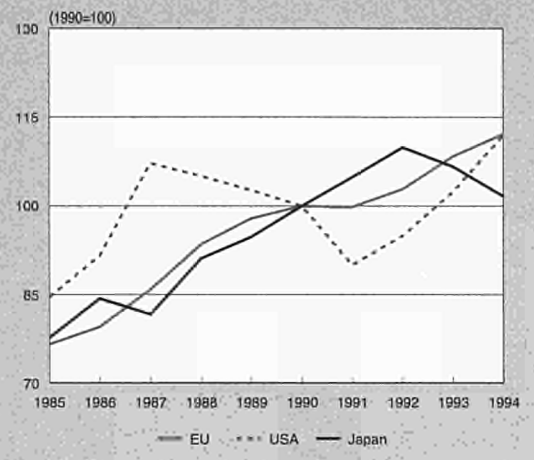
However, extra-EU trade in wooden building components remains limited. Extra-EU-12 exports amounted to only 3% of production in 1995, whilst extra-EU imports equalled 9.6% of consumption. In EU-15, the percentages are even lower, 2.7% and 5.7%, respectively. In the long run, the continuously increasing trade deficit is a cause for concern. Between 1985 and 1995, the export/production ratio dropped from 5% to 3% in EU-12. Over the same period, the import/consumption ratio went up from 4.1% to 9.6%. And although the entry of three new Member States meant a reduction of the import/consumption ratio to 5.7% in 1995, the trade balance remains negative. Forecasts show that it will deteriorate further in the

Figure 4: Wooden building components
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Wooden building components
International comparison of production in constant prices



Source: DEBA GEIE

period 1996-98 and exceed 1 billion ECU in 1998. Nevertheless, the import/consumption ratio will only record a limited growth to reach 6.6% in 1998.

Most companies of the wooden building components sector work closely together with the local building industry. Extra-EU trade remains limited to a few highly standardised products that can be transported at relatively low costs (e.g. plane doors). Nevertheless, intra-EU trade is increasing rapidly. This is undoubtedly due to European integration, that has started a process of harmonisation of technical standards and a broadening of the "local" market horizon. Until 1994, extra-EU exports were still mainly oriented towards the EFTA countries (53.5% in 1994), because of the geographical proximity and the partial similarity in building practices. However, the EFTA countries' share of extra EU-imports has decreased (48.9% in 1994). Inexpensive standardised products are increasingly being imported from low labour cost countries in Eastern Europe and South East AsiDue to the entry of Austria, Finland and Sweden, 1995 extra-EU-15 imports were 26% lower than 1994 extra-EU-12 imports.

MARKET FORCES

Demand

Demand in the sector is heavily dependent on developments in the building industry. Renovation work is expanding significantly faster than total building activity. This particularly enhances the demand for wooden building components, which are well suited, and sometimes even specifically designed for renovation work. It has also made this subsector less dependent on cyclical new building construction. Renovation already represents nearly half of the activity in the housing sector in Western Europe. Wooden flooring for private housing has also largely benefited from increasing consumer preference in recent years.

In private housing construction, the Single Market will not have a significant impact on the demand for building components since well defined regional markets will continue to exist within Europe. This is largely due to the specific climatic conditions and local building practices and styles. The demand for wooden building components is more and more influenced by the ability of wood to provide thermal and acoustic insulation, rather than the more traditional properties associated with wood, particularly in the non-residential building sector.

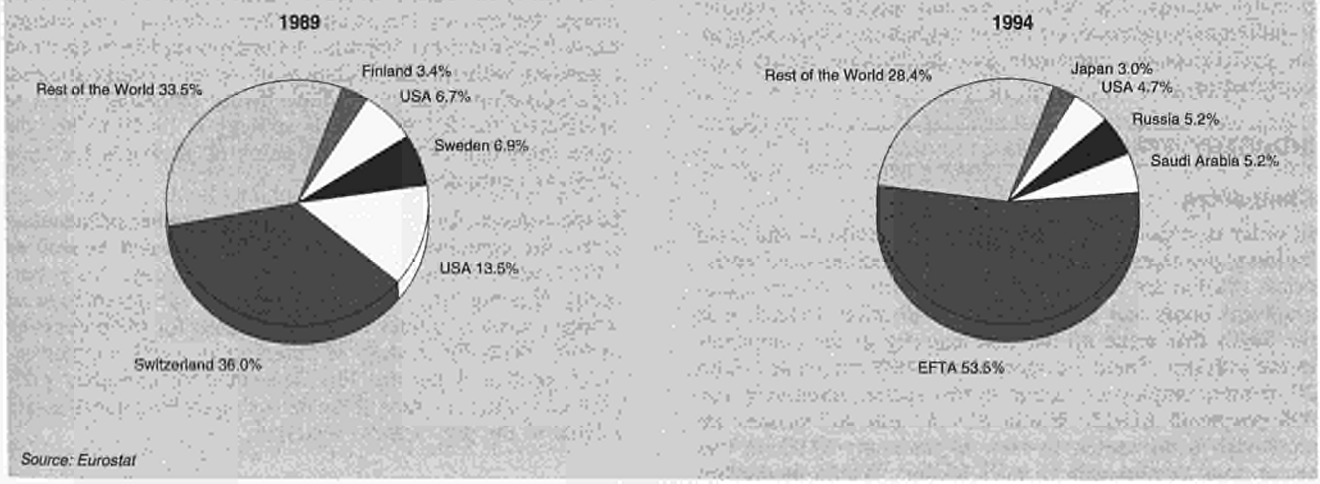
Supply and competition

International competition remains rather limited due to differences in climatic conditions and building practices. Transport cost is also a limiting factor for international trade, since most products are heavy and voluminous. Nevertheless, foreign competition still makes its presence felt, mainly due to lower labour costs in non-EU countries. Factors such as exchange rate developments, improved availability of raw materials or technological advantages also play an important part.

Wood treatment enables the use of wood in applications, whereas, previously its use had been excluded. This makes it possible for wood to take market shares from alternative building materials in non-traditional markets. Treated wood is now used in relatively new applications, e.g. in agriculture and horticulture, for enclosures, playgrounds, and hydraulic engineering.

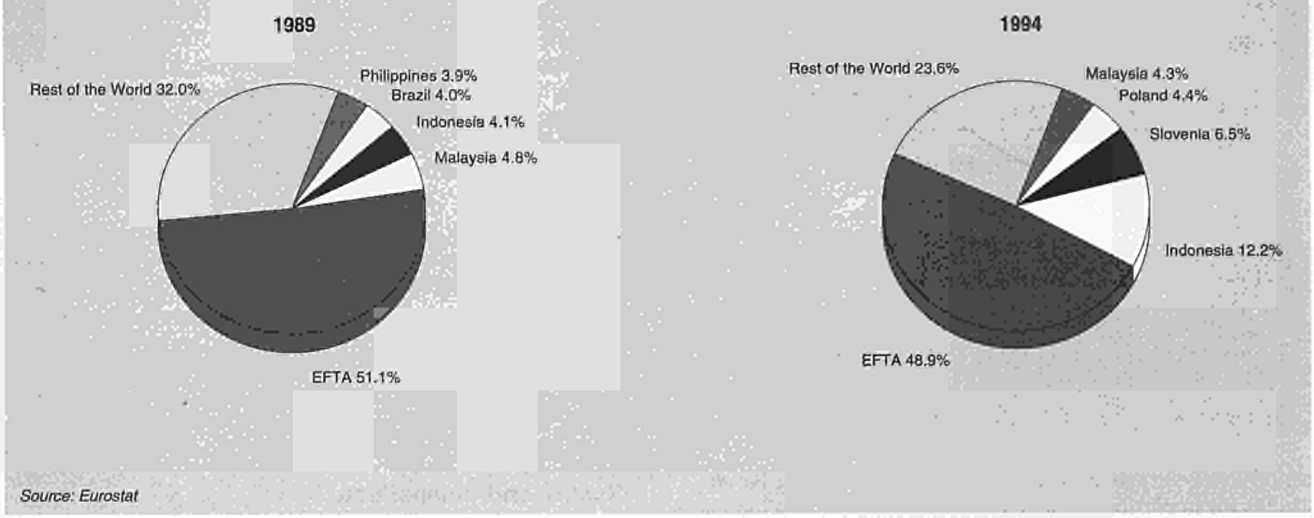
Products such as fire-resistant wooden doors may appear inconceivable. However, the high degree of dimensional stability of wood provides it with a competitive advantage over metal or synthetic materials, since the latter deform more rapidly at high temperatures.

Figure 6: Wooden building components
Destination of EU exports



Source: Eurostat

Figure 7: Wooden building components
Origin of EU imports



Source: Eurostat

Producers of wooden window frames experience competition from substitution products made from other raw materials, such as aluminium and PVC (polyvinyl chloride). However, wooden frames still have the largest market share in the EU with 40 %, well ahead of aluminium and PVC. Debates on the environmental impact of the use of the latter materials may seriously affect their market share.

Recently, traditional producers of wooden building components also experienced competition from other subsectors of the wood processing industry, such as sawmills, wooden board producers and even furniture manufacturers. The latter often produce building components, such as wooden flooring or doors, in order to increase the value added of their products (true for sawmills and wooden board manufacturers) or to be less dependent on cyclical furniture demand (furniture manufacturers).

Production process

The production process distinguishes the industrial manufacturer of wooden building components from the local carpenter. The machinery and production techniques used in a factory producing, e.g. doors or window frames resemble those in the furniture industry rather than those of the individual carpenter. Computer aided design and computer aided manufacturing (CAD-CAM), state-of-the-art computerised numeric control (CNC) machinery and automated coating installations have already found their way into the wooden building components industry. The industry has thus become the supplier to individual construction firms or carpenters which integrate the prefabricated components into the building at the local construction site.

INDUSTRY STRUCTURE

Companies

In order to cope with specific climatic conditions and local building practices and styles, small to medium-sized enterprises (SMEs) are ideal, with a size that fits established geographical limits and a technical specialisation. Indeed, it is the SMEs that make up the vast majority of the companies in the industry. There are more than 2 000 companies (with 20 or more employees) active in this sector, employing 156 000 people in EU-12. Within EU-15, 186 000 people are employed in the sector. In view of the many SMEs in this sector, total employment is much higher. With a production specialisation ratio of 3.0, Denmark is the only EU country with a specific specialisation in the production of wooden building components.

Strategies

Recent investments have focused on plant modernisation and capacity increases. Investment is mainly undertaken by European producers themselves, and foreign investment is insignificant. Producers tend to specialise considerably and the sector is characterised by numerous acquisitions, particularly in Germany.

Most manufacturers of wooden building components are active on local or regional markets, because of the differences in climatic conditions and building practices. However, by conforming to the European construction products directive, many enterprises will be able to expand their potential market to the EU level.

In brief, there are three generic strategies for companies in this sector. The first one is to specialise and to focus on the local market by taking the specific preferences and requirements of local consumers and building companies into account. Aspects such as service and flexibility are very important parts of this strategy, which is common among SMEs in the sector. The second strategy involves concentration and mass production of highly standardised building components. The market for these products is the entire EU. Economies of scale and price leadership are the keys to success. Large companies that employ this strategy have to reckon with competition from extra-EU imports. A third strategy is to focus on a product with specific technical properties. Unlike the first (specialisation) strategy, it allows firms, including SMEs, to operate on the EU level. This strategy is likely to become more important as the harmonisation of standards for these products continues.

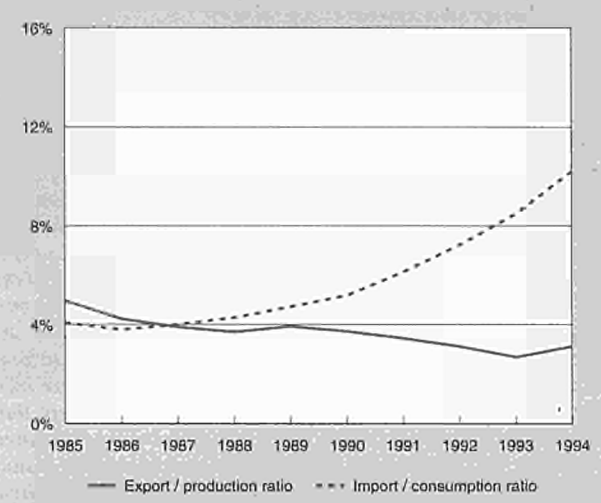
In the window frames sector, a growing number of manufacturers are combining the production of wooden as well as PVC frames. From the viewpoint of technology, this is perfectly feasible since the machinery for the production of wooden window frames may also be used for the processing of PVC. With this strategy of differentiation and complementarity, producers become less dependent on consumer preferences and the outcome of the debate on environmental issues related to the use of these materials.

Table 5: Wooden building components
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.6	0.7
Danmark	2.8	3.0
Deutschland	1.0	1.4
Ellada	0.2	0.4
España	1.2	1.1
France	1.0	0.8
Ireland	0.5	0.5
Italia	0.8	0.6
Luxembourg	N/A	N/A
Nederland	1.3	1.4
Portugal	1.2	0.6
United Kingdom	1.0	0.6

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Wooden building components
Trade intensities



Source: DEBA GEIE, Eurostat

Impact of the Single Market

Several measures in the Internal Market programme have had effects on the sector. Measures with regard to the free movement of persons, public procurement and consumer protection in the building industry indirectly affect the wooden building components sector as a supplier to the former industry. There hasn't been any general trends towards mergers among the many SMEs in the sector as these are active on local markets, working closely with the local building industry. Nevertheless, increasing harmonisation has expanded the market and intra-EU trade is growing. In distribution, concentration has taken place as large DIY chains have set up units in other EU countries in response to harmonisation as well as a larger market.

REGULATIONS

In March 1994, after five years of discussions within the Standing Committee on Construction, the interpretative documents relating to Council Directive 89/106 on the approximation of laws, regulations and administrative provisions of the Member States with regard to construction products, (known as the "Construction Products Directive", which defines the six essential requirements for a construction product) were finally published. In theory, this means that the Member States can now implement the Directive, and that construction products bearing the CE-mark of conformity can enter the market. In practice, however, this has not been the case yet. The industry has prepared itself for the implementation of the Directive, which it believes is necessary for the creation of a single internal market, by lending massive financial and technical support to the European standardisation process.

Recent events involving the Construction Products Directive, however, may weaken its impact on harmonisation. The European Commission has expressed the opinion that the harmonised standards should not impose limitations or prescriptions on products (such as minimum or maximum values), but should only contain definitions and test methods.

Meanwhile, the preparation of European standards concerning product specifications is progressing steadily. Five Technical Committees of CEN, the European Committee for Standardisation, are preparing standards for wooden construction products. Presently, no European technical approvals for wood processing products have been applied for in the context of EOTA, the European Organisation for Technical Approvals.

OUTLOOK

Apparent consumption of wooden building components is expected to grow by an average nominal annual rate of 6.5% in 1996-99, thanks to the expected increase in construction activity. The average annual growth rate for production for the period 1996-99 is estimated at 5.8%. Extra-EU imports are, therefore, projected to increase further. Extra-EU exports, on the other hand, are forecast to grow by 5.3% per year.

Apart from fluctuations that are purely cyclical, there are also three important structural changes taking place that may have a determining influence on the future of the wooden building components industry. First of all, there is the trend towards increasing renovation and maintenance, which highly benefits from the use of wooden building components. Renovation and maintenance already represent nearly half of the activity in the housing sector in Western Europe. This share will undoubtedly grow. Secondly, it is uncertain what effect the European integration of the construction market, through increasing standardisation of building products, will have on EU production of wooden building components (at least for some products). European standardisation, not only stimulates intra-EU trade, but also facilitates extra-EU imports. Thirdly, there is a general trend in the building industry towards increasing subcontracting and growing use of prefabricated building components. This is visible as the share of value added in building industry turnover decreases. Such developments are also assisted by European integration and the standardisation of building products. They lower the labour intensity of the construction process and increase productivity (higher turnover per capita). They also increase the geographical mobility of (large) construction firms. This causes a shift in the value added chain from the building industry to the supplying sectors, such as the wooden building components industry, thereby, creating considerable opportunities for the producers of wooden building components.

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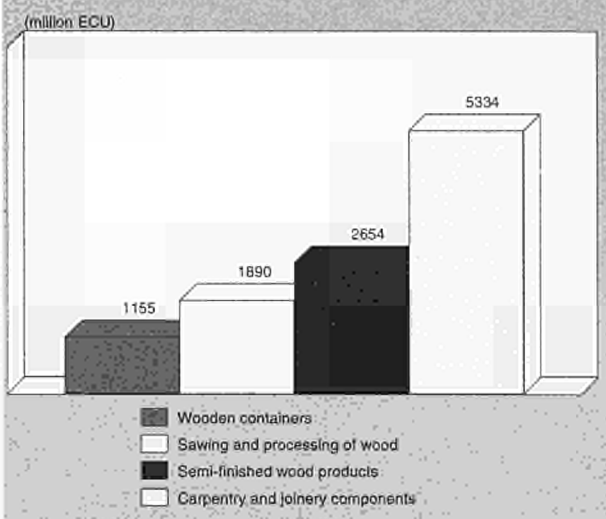
Wooden containers
NACE (Revision 1) 20.4

EU production and consumption of wooden containers increased continuously during the period 1985-91, with double digit growth rates in 1989 and 1990. After a slowdown in 1992-93, production and consumption of wooden containers grew again at a steady pace in 1994-95. Since the beginning of the 1990's, EU industry has been exposed to increasing competition from low labour cost countries in Eastern Europe. It is clear that European standardisation of pallet dimensions has facilitated extra-EU imports. Nevertheless, the trade balance remains positive. EU producers have responded to the increased extra-EU competition by specialising in custom-made packaging. As international trade is growing more rapidly than economic activity in general, it is very likely that the wooden containers industry, because of its transport related character, will continue to perform better than total EU manufacturing industry in terms of production growth. A positive aspect of the European packaging and packaging waste directive is that it authorises energy recovery, which is deemed to be the best solution for certain wood wastes.

Figure 1: Wooden containers
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

The main products of the wooden containers industry are boxes, crates, pallets, barrels and cable drums. The old Nace code 464 and the new Nace Rev. 1 code 20.4 are perfectly compatiblIn 1995, the production value of this subsector totalled an estimated 3 620 million ECU, which represents 8.7% of the total production of the woodworking industries (except wooden furniture) in EU-12. The production figure for EU-15 is estimated at 4 718 million ECU. EU-15 production is 30% higher than EU-12 production, which indicates the relative importance of the new Member States as producers of wooden containers. In addition, the employment figures amounted to 40 200 people in EU-12 and 47 900 in EU-15.

Extra-EU exports of wooden containers remain relatively limiteDespite fierce competition from low labour cost countries in Eastern Europe, the trade balance remains positive and is even expected to improve in the coming years. The wooden containers industry is one of he smaller subsectors of the woodworking industry. Its value added amounts to 1 155 million ECU, which represents 61% of the value added of the sawing and first processing of wood industry or 22% of the wooden building components industry.

In absolute value, France is the most important producer of wooden containers within EU-12, representing 31.8% of total value added. The rate of relative production specialisation of France (1.6), however, is largely exceeded by Spain (2.6).

Recent trends

Apparent consumption grew continuously during the period 1985-91, with double digit growth rates in 1989 and 1990. In 1992-93, however, demand for wooden containers decreased, due to the general slowdown of economic growth and international trade. Because of the rapid expansion of EU demand, the trade balance deteriorated between 1988 and 1991, without becoming negative. In the period 1985-94, average real annual growth of production (4.6%) was only marginally slower than that of apparent consumption (4.7%). Production, too, grew sharply in 1988-91.

In terms of production growth, the wooden containers industry clearly outperforms total manufacturing industry. In the period 1985-94, production of wooden containers grew by 50% in constant prices, which represents an average annual growth rate of 4.6%. In the same period, total EU manufacturing industry production grew by 22% or 2.2% per year.

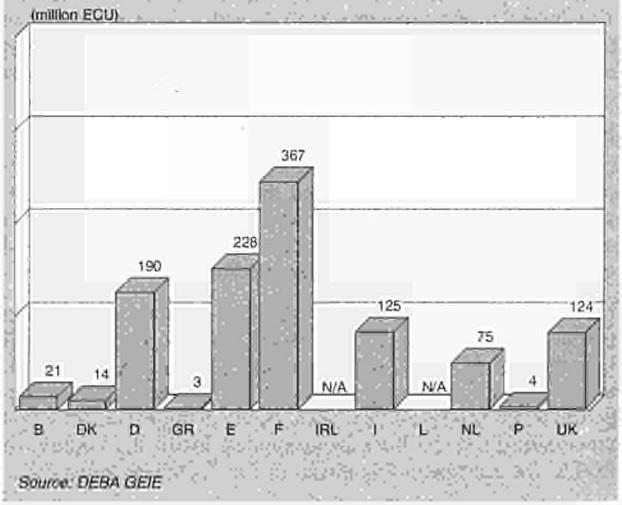
Employment in the wooden containers industry grew steadily from 1988 onwards and reached a peak of 45 900 jobs in 1991.Due to weak demand in 1992-93, employment fell back to the 1988 level of 40 000 jobs. In 1995, employment stabilised at this level. Nevertheless, in terms of employment, the wooden containers industry continues to perform above total EU manufacturing industry average, mainly thanks to the expansion of 1989-91.

In 1994, production of wooden containers grew by 9.6% in current prices. According to Eurostat estimates, this positive trend continued in 1995, with a growth rate of 5.7%. For the period 1996-99, DRI forecasts indicate an average annual growth of 5% in current prices.

International comparison

In 1994, EU-12 production of wooden containers was more than twice as important than USA production and almost 50% larger than Japanese production. Over the period 1985-94,

Figure 2: Wooden containers
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Wooden containers
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	2 020	2 860	3 293	3 522	3 331	3 102	3 393	3 575	4 668	4 900	5 150	5 410
Production	2 033	2 879	3 306	3 525	3 337	3 123	3 423	3 620	4 718	4 960	5 210	5 480
Extra-EU exports	45	54	64	65	63	72	90	100	107	120	130	150
Trade balance	13	19	13	3	6	21	30	45	50	60	60	70
Employment (thousands)	42	43	45	46	43	41	40	40	48	50	50	50

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Wooden containers
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	6.7	2.2	4.7	11.5
Production	6.4	2.3	4.6	11.6
Extra-EU exports	-0.4	7.9	3.2	24.5
Extra-EU imports	5.7	4.1	5.0	23.3

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Wooden containers
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	44.8	37.6	41.1	52.9	54.2	63.7	64.9	63.3	72.0	90.1	100.3	106.9
Extra-EU imports	31.6	19.5	17.7	21.5	35.0	50.9	62.3	57.0	50.9	60.0	55.4	56.5
Trade balance	13.2	18.1	23.4	31.4	19.2	12.8	2.6	6.3	21.1	30.1	44.9	50.4
Ratio exports / imports	1.4	1.9	2.3	2.5	1.5	1.3	1.0	1.1	1.4	1.5	1.8	1.9
Terms of trade index	84.5	97.3	103.5	107.3	95.9	100.0	92.7	102.0	99.1	104.1	N/A	N/A

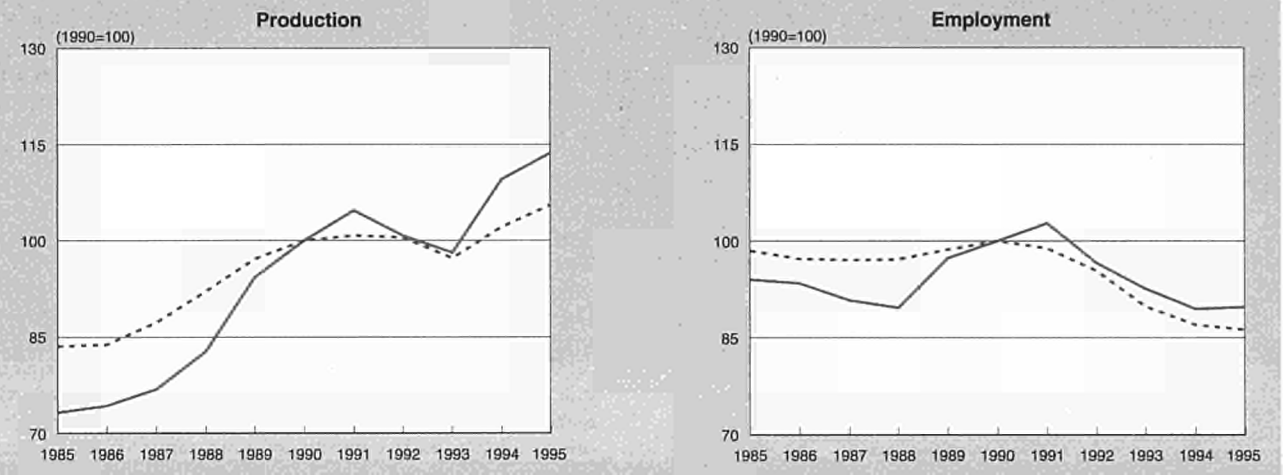
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Wooden containers
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	77.8	79.5	84.6	92.3	96.9	100.0	101.9	104.3	106.0	122.5
Unit labour costs index (3)	99.3	100.6	98.9	96.7	95.7	100.0	103.3	107.4	107.0	93.8
Total unit costs index (4)	84.4	84.9	85.8	87.9	93.2	100.0	101.8	99.6	96.8	92.9
Gross operating rate (%) (5)	8.0	8.4	8.7	8.5	8.3	9.0	8.7	8.1	7.3	9.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Wooden containers
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

EU production of wooden containers also grew significantly faster (with an average real annual growth rate of 4.6%) than USA production (3.2%) and Japanese production (-0.7%).

Foreign trade

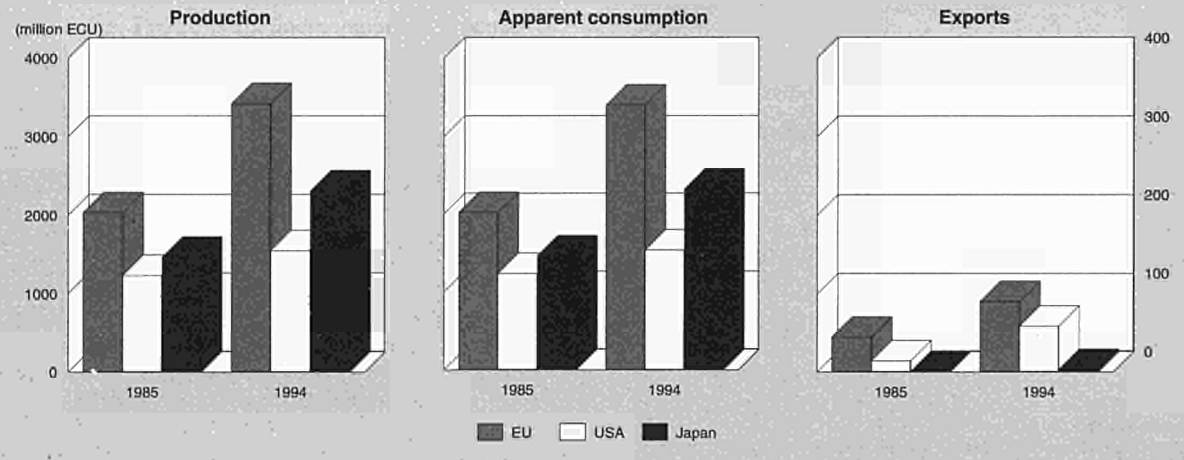
With extra-EU exports and extra-EU imports respectively amounting to 90 and 60 million ECU, there was a trade surplus of 30 million ECU in 1994. Extra-EU imports increased rapidly in the period 1988-91. The export/import ratio deteriorated from 2.5 in 1988 to 1.0 in 1991, when the trade balance surplus was reduced to 2.6 million ECU. Since then, stagnating imports and growing exports have led to a new improvement of the exports/imports ratio, reaching 1.5 in 1994.This trend is expected to persist in the coming years, leading to an increasing trade surplus. Although, the wooden containers industry is exposed to strong competition from extra-EU low wage countries, the import penetration ratio remains relatively low.

External trade in wooden containers and pallets is of limited importance, but has nevertheless increased noticeably since 1989. Extra-EU imports now cover 1.8% of the consumption of wooden containers and pallets. These imports mainly consist of cheep pallets made in East European countries like Poland, Hungary and former Czechoslovakia. Extra-EU exports, on the other hand, only represent 2.6% of production. Nevertheless, the exports/production has risen significantly since 1991, when it stood at 1.8%.

Most of the trade takes place within the EU. The trade figures might be underestimated, however, as some international movements of wooden containers and pallets are not "visible", due to the fact that consignments of empty containers and pallets are included in the external trade statistics, whereas loaded containers and pallets are not.

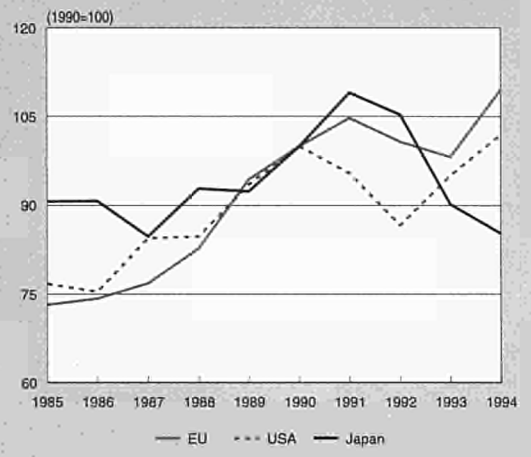
The most important extra-EU export markets for wooden containers are the USA (50.4%), Australia (9.7%) and Switzerland (7.3%). Extra-EU imports mainly originate in the USA, Swe-

Figure 4: Wooden containers
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Wooden containers
International comparison of production in constant prices



Source: DEBA GEIE

den and, more recently, several East European countries, such as Poland, the Czech Republic and Romania.

MARKET FORCES

Demand

Wooden containers are sold to various industries. Demand for these products has an indirect character: since a large part of industrially produced goods are transported either in wooden containers or on pallets, demand for these packaging materials largely follows the general macroeconomics situation.

As intra-EU as well as extra-EU trade is structurally increasing, there is a potential stimulus for sustained growth in the sector of transport-related packagings, such as wooden containers and pallets. In 1992-93, however, demand for wooden containers was rather weak due to the slowdown in economic growth and international trade. Economic recovery, mainly based on increased external trade, had a significant positive impact on production in 1994 and 1995.

Wooden containers serve to facilitate the transportation or storage of various goods. This requires lightweight structures that are able to withstand rough handling. Standardised dimensions make pallets highly suitable for repeated and different uses.

Supply and competition

Within the EU, producers of wooden containers and pallets are experiencing competition from products based on other raw materials, such as metal or plastics.

Foreign competition from extra-EU countries is fierce, mainly in standardised products. In recent years, major extra-EU competition is coming from Eastern Europe. It is clear that lower labour costs are the main competitive advantage of these extra-EU competitors. They are also less burdened by costs for social benefits and environmental protection.

Because of the relatively low degree of complexity of the production process, it is difficult for EU producers to realise technological advantages. Even with the highest possible level of automation, the lower labour costs of the extra-EU competitors is often of overriding importance, especially when combined with dumping practices. In 1995, an investigation into possible dumping practices concerning Polish pallets was launched at the initiative of several EU producers.

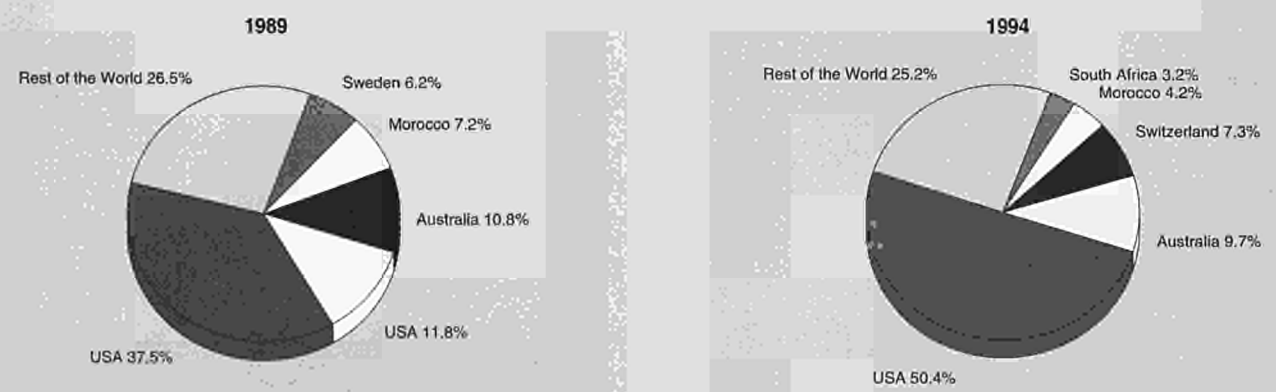
Since 1990, there has been a steep rise in the imports of pallets from Eastern Europe (especially Poland, Hungary and former Czechoslovakia) at extremely low prices, that barely cover transportation costs. These imports are a serious threat for the survival of the EU pallets producers. In this case it is clear that European standardisation of pallet dimensions has stimulated extra-EU imports. The EU industry hopes that trade agreements with these countries as well as certain structural changes in their home markets will rectify the situation. Availability of raw materials often plays an important part as well. Eastern Europe, for instance, has large reserves of wood, suitable for the production of pallets.

Production process

Common raw materials used for the production of wooden containers and pallets are poplar and pine. Pallet dimensions have, to a large extent, been standardised.

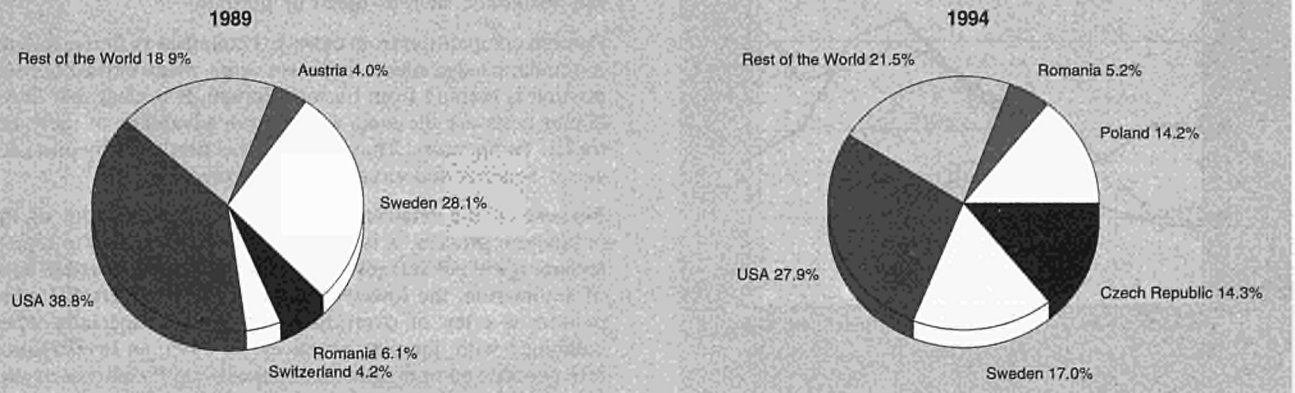
Although, the degree of complexity of the production process is relatively low, automation is possible. Since the second half of the 1980's, the wooden containers sector has realised important automation and rationalisation investments, leading to an increase in productivity. Manual work, however, is still important for certain operations. In addition, automation has generated an increasing need for people with technical knowledge of machines and tools.

Figure 6: Wooden containers
Destination of EU exports



Source: Eurostat

Figure 7: Wooden containers
Origin of EU imports



Source: Eurostat

INDUSTRY STRUCTURE

Companies

Most of the enterprises in this subsector are SME's. The number of enterprises employing more than 20 people is estimated at about 800. In absolute value, France is the most important producer of wooden containers within EU-12, representing 31.8% of total value added. The rate of relative production specialisation of France (1.6), however, is largely exceeded by Spain (2.6).

Strategies

The predominant strategy among the enterprises of this industry is to rationalise and automate the production process as much as possible in order to be able to meet the competition from extra-EU countries with lower labour costs.

Specialisation in custom-made packagings helps to minimise competition from low wage countries which mainly produce standardised products. Thanks to geographical proximity, EU producers can respond in a more flexible manner to the needs of their costumers (e.g. special dimensions, just-in-time delivery).

Producers of wooden containers, and pallets especially, are working out systems for recycling. This should provide them with a competitive advantage over the producers of plastic and metal pallets.

Impact of the Single Market

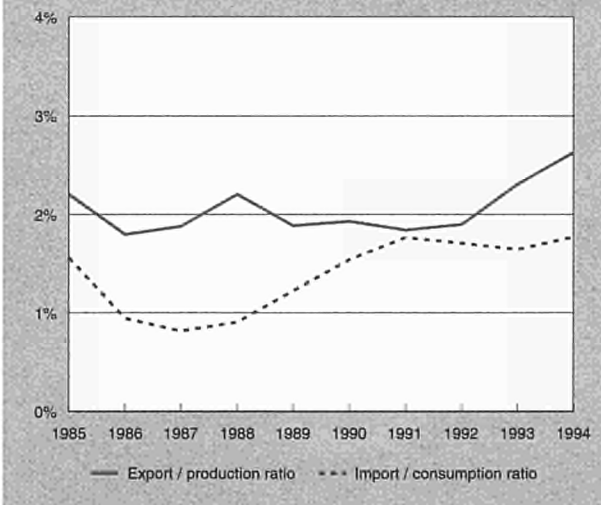
Among the measures to guarantee the free movements of goods, the elimination of internal border controls has been especially important in that it has stimulated intra-EU transport. The liberalisation of transport services has been important for much the same reason and measures with regard to environmental protection are very important. The Directive on packaging and packaging waste could have positive effects for the industry as it allows incineration with energy recovery as an alternative to material recovery. Competition from outside the EU has increased significantly, as non-EU companies have found the increasingly uniformed market of simple, stand-

Table 5: Wooden containers
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.6	0.8
Danmark	0.5	0.6
Deutschland	0.6	0.5
Ellada	0.6	0.4
España	1.6	2.6
France	1.5	1.6
Ireland	N/A	N/A
Italia	1.0	0.9
Luxembourg	N/A	N/A
Nederland	1.5	1.5
Portugal	0.2	0.2
United Kingdom	0.9	0.8

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Wooden containers
Trade intensities



Source: DEBA GEIE, Eurostat

ardised products, such as pallets, easier and more interesting to compete in. Since 1989-90, there has been a massive increase in imports of pallets from Eastern Europe, which has triggered EU producers to shift to higher value added products in response, such as customised packaging materials. Meanwhile, growing intra-EU trade and extra-EU exports have increased the demand for packaging materials which has helped to compensate for rising imports.

REGULATIONS

In December 1994, the Council of the European Union finally reached an agreement on a Directive concerning packaging and packaging waste. Indeed, work on the directive only began after the German authorities had introduced a national regulation and France intended to do so as well. It aims at harmonising national measures concerning the management of packaging and packaging waste and sets five-year targets for achieving specified recycling rates for different materials. The directive authorises energy recovery which is deemed to be the best solution for certain wood wastes.

OUTLOOK

After a slowdown in 1992-93, production and consumption of wooden containers grew again at a steady pace in 1994-95. This positive trend is expected to continue in the coming years. It is even expected that production will grow slightly faster (at an average annual nominal growth rate of 5.06% in 1996-99) than consumption (4.96%). This surmises that the rise of extra-EU import penetration will be stopped.

Nevertheless, imports from low labour cost countries in Eastern Europe will probably still constitute the main risk for this industry in the coming years. European standardisation has certain advantages, but also poses the risk of facilitating extra-EU imports (e.g. pallets). Opportunities for EU producers will come from specialisation in custom-made packaging and from developing systems for recovery (energy recovery, production of particleboard, repeated use, etc.).

As international trade is growing more rapidly than economic activity in general, it is very likely that the wooden containers industry, because of its transport related character, will continue to perform better than total EU manufacturing industry in terms of production growth.

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Other wooden products
NACE (Revision 1) 20.5

With the exception of 1992 and 1993, production of "other" wood products has grown continuously since 1985, despite increasing extra-EU competition from low labour cost countries. The industry is characterised by a large number of SMEs with relatively stable employment. Significant investments have taken place in recent years to increase automation in production as much as possible, in order to compete more successfully with imports. Nevertheless, the trade balance has continued to deteriorate.

INDUSTRY PROFILE

Description of the sector

Other wood products are comprised of several smaller and highly heterogeneous subsectors of the wood processing industry. Nace rev. 1 code 20.5 includes the manufacture of articles of cork and articles of straw (basketware, wickerwork and other articles of plaiting materials, except furniture) and other miscellaneous wood products, such as wooden frames for paintings, photographs, mirrors and similar objects. Nace Rev. 1 code 20.5 regroups the old Nace codes 465, 466.1 and 466.2.

The manufacture of wooden containers (NACE 464 or Nace Rev. 1 code 20.4), which includes e.g. boxes, crates, pallets, barrels, and cable drums, is no longer included in this chapter, but is treated in a seperate chapter (1604). The same applies for brushes and brooms, which were previously included in NACE 466.3 and are now Nace Rev. 1 code 36.62. As a result, the figures for other wood products are much lower compared to the previous editions of Panorama.

In 1995, the production value of other wood products totalled an estimated 6 587 million ECU in EU-12 and 8 886 in EU-15, which represents, in both cases, 16% of the total production of the wood processing industries (except wooden furniture). Employment amounted to 79 700 in EU-12 and 95 000 in EU-15, representing 19.7% of the total employment in the EU wood processing industries. Hence, the sector is very labour intensive. In 1994, articles of cork and articles of straw accounted for 2.1 billion ECU or 33.8% of the production of other wood products.

In 1994, the value added of the sector was 2.4 billion ECU, which is roughly half the value added of carpentry and joinery components. It represents 90% of the value added of the semi-finished wood products and is 27.7% higher than the value added of sawing and first processing of wood.

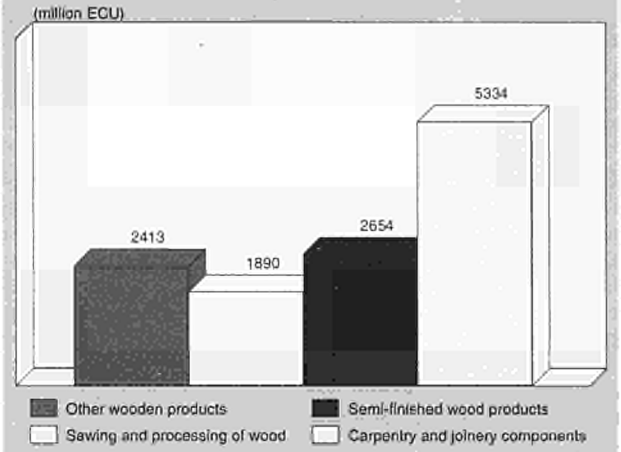
Germany is, by far, the most important producer of other wood products within the EU, not just in absolute terms. The per capita production is also much higher in Germany than in other EU countries of similar size, like France, Italy and the UK. The production specialisation rate of Germany is 1.5.

Recent trends

In the period 1985-94, apparent consumption grew at an average real annual growth rate of 3% in EU-12 while in 1994, consumption increased by an average real rate of only 1%. In the same period, production increased by 2.4% on average. As a result, extra-EU imports increased gradually by an annual real growth rate of 7%. In 1994, however, production grew by 4.7%. In 1995, production is expected to grow by 6.7%.

Employment declined between 1985 and 1988 from 84 000 to 82 700, but rose again from 1989 onwards, reaching a new peak of 90 400 people employed in 1991. In 1992 and 1993, however, employment fell back sharply. It stabilised in 1994 at 79 300 people employed and grew again slightly by 0.4% in 1995. In 1995, the sector employed 79 700 people in EU-12 and 95 000 people in EU-15. Employment is forecasted to continue to grow modestly between 1996 and 1998. Nevertheless, in terms of employment, the other wood products sector continues to perform above the total EU manufacturing industry. This is mainly because of the expansion in 1989-91 and the slight increases in employment which occurred in 1994 and 1995. Over the period 1985-94, production of other wood products grew by an annual rate of 2.4%, compared to 2.2% for total manufacturing industry.

Figure 1: Other wooden products
Value added in comparison with related industries, 1994

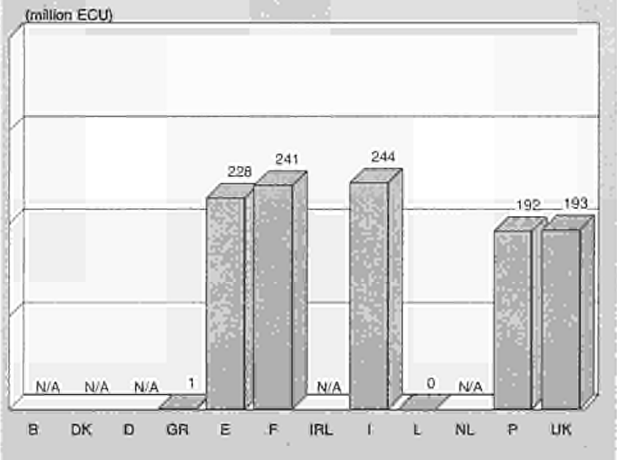


Source: DEBA GEIE

International comparison

In 1994, EU-12 production of other wood products equalled 45% of US production and 107% of Japanese production. Over the period 1985-94, EU production of other wood products grew slower (with an average real annual growth rate of 2.4%) than USA production (3.0%). In the same period, Japanese production declined by an average annual rate of 2.4% in constant prices.

Figure 2: Other wooden products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Other wooden products
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	4 061	5 414	5 765	6 363	6 409	6 371	6 520	7 258	9 340	9 900	10 480	11 070
Production	3 829	5 260	5 559	5 997	5 994	5 887	6 175	6 587	8 585	9 190	9 850	10 550
Extra-EU exports	617	783	751	783	820	848	1 481	1 017	939	1 050	1 170	1 300
Trade balance	-233	-154	-207	-366	-416	-484	-345	-671	-755	-710	-630	-520
Employment (thousands)	84	86	88	90	85	79	79	80	95	100	100	100

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Other wooden products
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Articles of cork and articles of straw	2083.3	2090.0	549.0
Miscellaneous wooden products	4436.6	4085.2	932.2

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Other wooden products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.0	0.6	3.0	1.0
Production	3.6	0.8	2.4	4.7
Extra-EU exports	-2.0	15.0	5.2	34.4
Extra-EU imports	2.8	12.5	7.0	31.8

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Other wooden products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	617	591	588	658	783	751	783	820	848	1 481	1 017	939
Extra-EU imports	850	586	663	796	938	957	1 148	1 236	1 332	1 826	1 688	1 694
Trade balance	-233	5	-75	-139	-154	-207	-366	-416	-484	-345	-671	-755
Ratio exports / imports	0.7	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.6	0.8	0.6	0.6
Terms of trade index	77.4	89.5	92.9	92.7	96.5	100.0	99.3	99.7	93.6	91.4	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Other wooden products
Production and employment compared to EU total manufacturing industry

(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

Foreign trade

In 1994, extra-EU-12 exports and imports amounted to 1 481 million and 1 826 million ECU, respectively, causing a trade deficit of around 345 million ECU. In EU-15, the trade deficit is estimated at 404 million ECU in 1995. Extra-EU imports have been increasing rapidly since 1987, taking a continuously higher share of EU consumption (from 15.2% in 1986 to 28% in 1994). The export/import ratio deteriorated from 1.0 in 1986 to 0.8 in 1994.

Extra-EU exports grew by an average real annual rate of 5.02% between 1985 and 1994. In 1994, extra-EU trade increased significantly. Exports and imports jumped by 74.4% and 37.1% respectively. The exports/production ratio remained fairly stable around 15% between 1985 and 1993, but reached 24% in 1994. In 1995, extra-EU-12 exports are estimated to grow more modestly by 4.2%. Nevertheless, the trade balance remains largely negative.

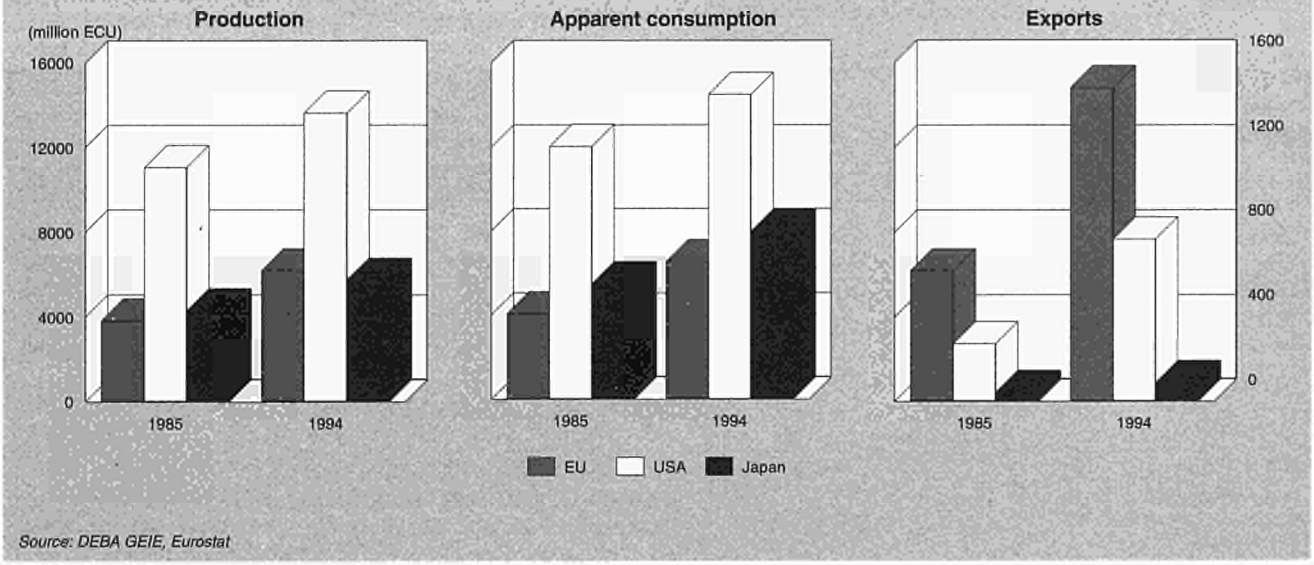
Articles of plaiting materials are mainly imported from countries in the Far East, such as South Korea, Taiwan and the Philippines. In 1994, the most important extra-EU-12 export markets for other wood products were the EFTA countries (30%) and the USA (20.5%). Extra-EU imports originated mainly in China (17.2%), the USA (14.9%), the EFTA countries (12.9%), Poland (11.8%) and Indonesia (7%, mainly articles of plaiting materials).

MARKET FORCES

Demand

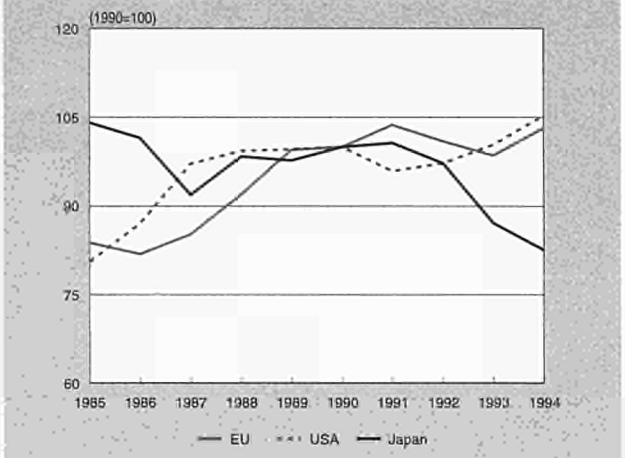
Since the sector is highly heterogeneous, its products typically have different types of buyers, i.e. industry or final consumers. Wooden frames for photographs, paintings, mirrors, etc. are mainly sold to consumers. These products are distributed by large outlets, such as department stores as well as by small specialised businesses, e.g. photographers, art galleries and gift shops. Demand for bottle corks comes from producers

Figure 4: Other wooden products
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Other wooden products
International comparison of production in constant prices



Source: DEBA GEIE

of the wine, champagne and beer industries. Cork is also used for insulation and, increasingly, for flooring.

Supply and competition

For most products under review, internal EU competition remains limited. Foreign competition from extra-EU countries, however, is fierce in all product lines. The major extra-EU competitors are the low labour cost countries in the Far East and Eastern Europe. It is clear that lower labour costs are the main competitive advantage of these extra-EU competitors. They are also less burdened by the costs of social benefits or environmental protection. Within the EU, Italy is an important producer of wooden frames for paintings, photographs, etc.

Because of the relatively low degree of complexity of the production process, it is difficult for EU producers to realise technological advantages. Even at the highest possible level of automation, it is often difficult to compete with lower labour costs and distorted trade practices, such as dumpinAlso, availability of raw materials often plays an important role. Articles of straw, cork and other plaiting materials are mainly imported from South East Asia, whilst Eastern Europe has large reserves of raw wood.

Because of the relatively labour-intensive production process, productivity growth has been rather slow. In 1990 and 1991, unit labour costs increased faster than labour productivity. Understandably, this had a negative effect on profitability, reflected by the decline in gross operating rates from 12.2% in 1988 to 10% in 1993. However, in 1994, the gross operating rate increased slightly again to reach 11%.

Production process

Although the production process is relatively non-complex, automation is possible. During the second half of the 1980s, the sector has realised important automation and rationalisation investments. Because of external competition, EU producers need to automate the production process to the greatest extent possible. Automation of production means acquiring high-performance machines, so that large quantities can be produceThe workforce still has an important role to play in the case of certain operations. In addition, automation has generated an increasing need for people with technical knowledge of machines and tools.

INDUSTRY STRUCTURE

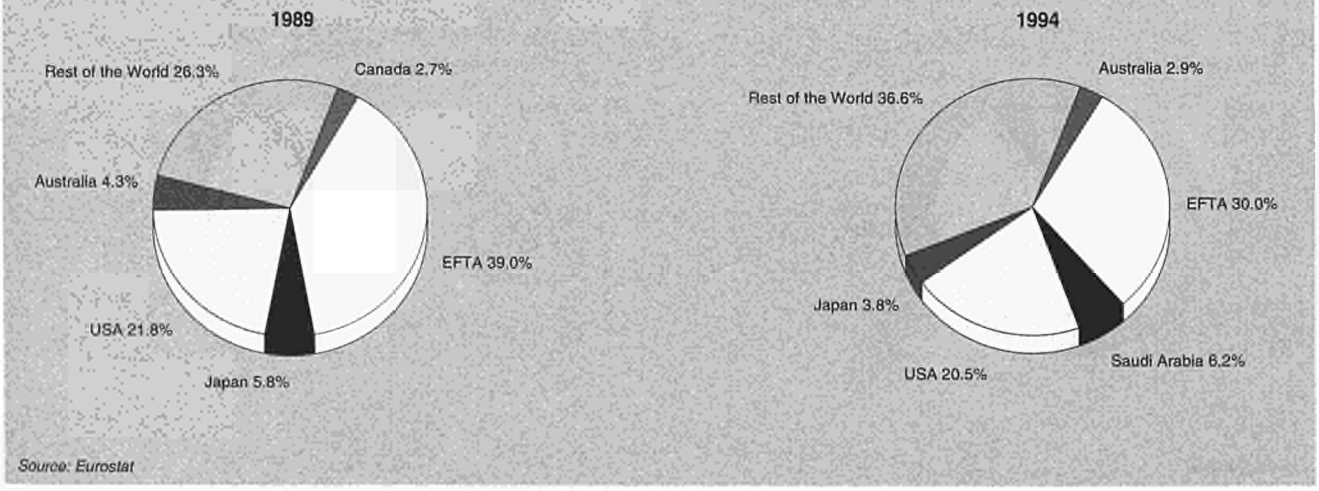
Companies

Most of the enterprises in these subsectors are SMEs. The number of enterprises employing more than 20 people is estimated at about 1 100. For most EU countries, production specialisation ratios are insignificant. The exception is Portugal, which has a production specialisation ratio of 7.0. Portugal is an important producer of cork and articles of cork.

Strategies

The predominant strategy among companies in this sector is to rationalise and automate the production process to the greatest extent possible in order to be able to meet the competition from non-EU countries with lower labour costs. Because of geographical proximity, EU producers are able to respond in a more flexible way to the needs of their customers (e.g. special dimensions, just-in-time delivery).

Figure 6: Other wooden products
Destination of EU exports



Source: Eurostat

Table 5: Articles of cork and articles of straw
Extra-EU exports

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Belgique/België, Luxembourg	2.4	2.7	2.0	3.3	3.0	3.6	3.5	3.3	3.8	6.1
Danmark	6.0	5.8	6.3	6.5	6.8	7.0	8.0	8.4	9.2	10.9
Deutschland	79.5	87.5	82.9	85.7	98.5	102.7	117.2	134.5	143.1	150.8
Ellada	1.7	1.4	1.6	0.9	1.7	0.9	0.7	0.7	1.0	1.1
España	27.1	25.3	27.5	29.0	34.4	32.8	30.9	34.4	33.7	31.9
France	28.6	25.5	22.5	24.6	28.1	29.8	28.5	30.9	31.5	29.6
Ireland	5.1	3.4	4.7	2.5	1.9	2.0	1.7	1.5	1.4	2.6
Italia	47.0	41.7	35.3	37.2	45.6	43.1	44.1	44.3	51.2	57.9
Nederland	10.8	10.3	10.2	11.7	13.0	13.2	14.3	15.9	15.7	23.2
Portugal	119.8	104.3	115.0	139.2	189.0	166.1	171.7	174.2	178.2	198.9
United Kingdom	38.9	30.2	25.1	28.8	29.8	28.7	31.4	34.5	33.5	36.1

Source: Eurostat

Table 6: Articles of cork and articles of straw
Extra-EU imports

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Belgique/België, Luxembourg	11.5	7.5	8.8	10.4	10.7	11.7	13.4	16.1	17.0	20.3
Danmark	18.1	13.2	13.9	13.3	13.3	11.2	11.9	12.2	13.1	14.8
Deutschland	125.5	78.9	85.9	94.1	95.8	97.8	131.0	123.4	141.6	138.2
Ellada	7.0	3.6	4.4	6.9	9.6	9.0	11.7	10.6	11.1	9.7
España	14.2	11.2	14.3	22.2	26.8	24.8	30.6	36.8	31.1	31.9
France	139.9	56.2	61.7	71.9	78.3	74.6	78.4	80.2	89.0	92.0
Ireland	2.8	2.7	2.0	2.0	1.8	1.8	3.1	2.3	2.4	4.9
Italia	71.8	41.7	54.1	59.8	65.6	63.7	68.1	70.2	65.5	68.3
Nederland	38.0	31.8	34.0	40.5	41.3	43.7	47.6	52.7	49.3	56.9
Portugal	10.3	2.0	2.9	4.3	4.7	4.8	6.3	8.5	12.9	11.6
United Kingdom	90.0	61.5	67.1	78.1	86.3	72.7	74.3	79.3	83.4	93.6

Source: Eurostat

Figure 7: Other wooden products
Origin of EU imports

Source: Eurostat

Table 7: Other wooden products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	88.1	89.2	91.4	98.2	102.2	100.0	101.4	104.4	110.0	115.0
Unit labour costs index (3)	86.3	90.1	91.5	89.8	90.4	100.0	105.5	108.5	108.7	106.1
Total unit costs index (4)	85.3	87.5	89.0	90.6	97.2	100.0	108.9	111.6	111.6	110.8
Gross operating rate (%) (5)	10.2	10.5	11.0	12.2	11.2	10.5	10.2	10.4	10.0	11.0

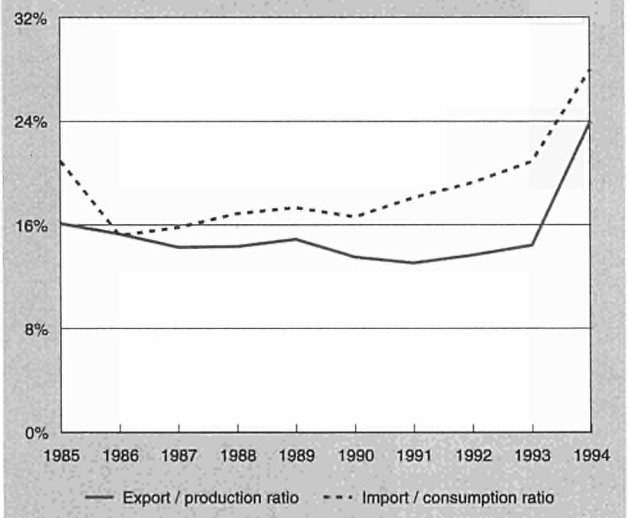
(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 8: Other wooden products
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.4	N/A
Danmark	N/A	N/A
Deutschland	1.4	1.5
Ellada	0.2	0.1
España	1.5	1.3
France	0.6	0.5
Ireland	N/A	N/A
Italia	0.9	0.9
Luxembourg	0.0	0.0
Nederland	N/A	N/A
Portugal	N/A	7.0
United Kingdom	0.6	0.5

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Other wooden products
Trade intensities



Source: DEBA GEIE, Eurostat

OUTLOOK

After a slowdown in 1992-93, production and consumption grew again at a steady pace in 1994. It is expected that consumption in EU-15 will grow at an average annual growth rate of 6.5% in 1996-99, while production will grow at a rate of 7.1%. This means that the market share of extra-EU imports will decrease.

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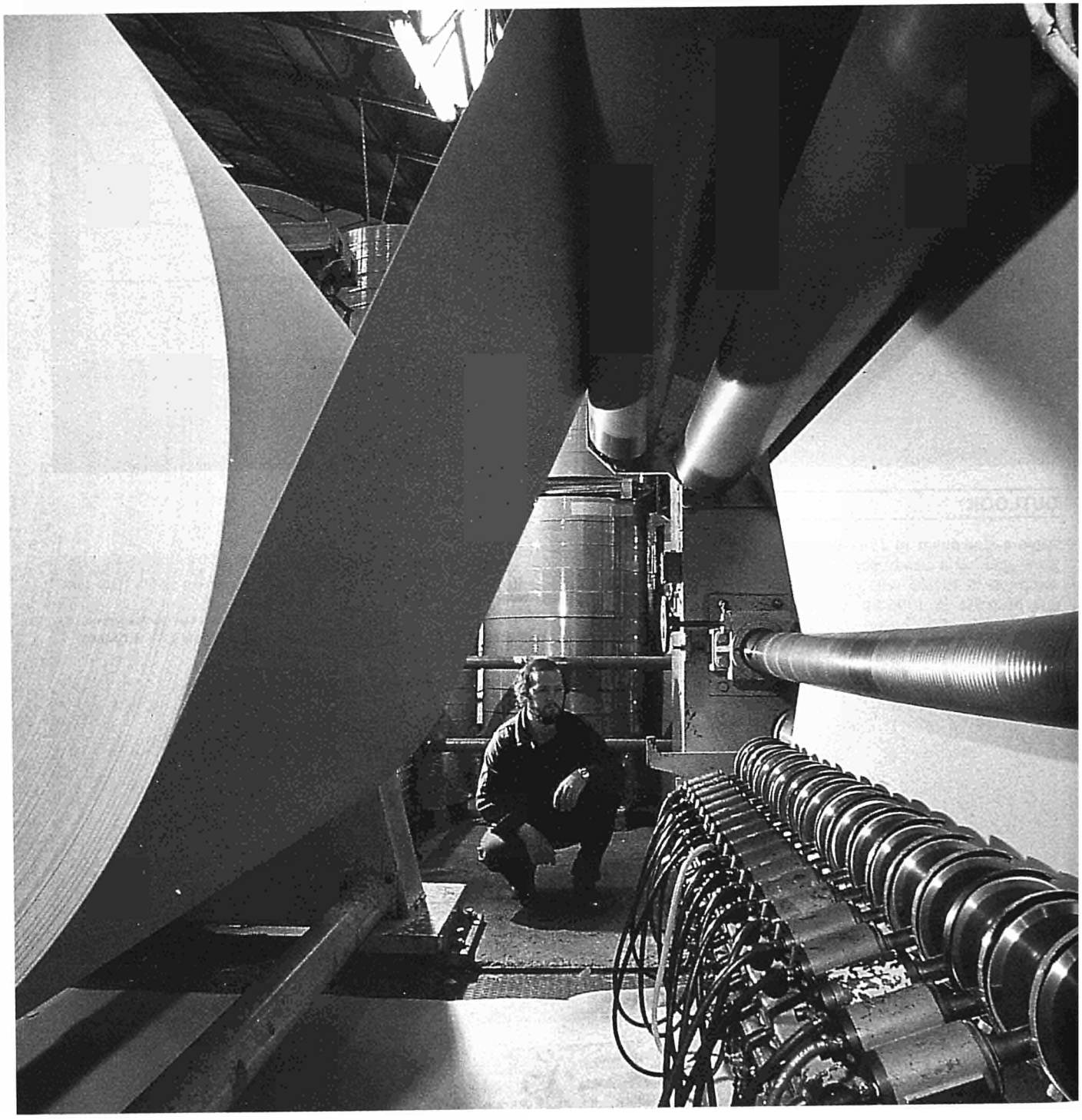


NACE (Revision 1) 21.1

Demand recovery and restocking in most of the supply chain resulted in a sharp rise in prices and a 10% increase in the current value of production of pulp, paper and board in 1994. Total EU-12 production was 54.5 million tonnes and increased again in 1995 alongside continued growth in prices and profits. Labour productivity improved sharply for the fourth successive year amid ongoing restructuring. Restructuring has also resulted in an improved environmental record, particularly through increased recycling. Recycled fibre's increasing share of the paper and board furnish is reflected in differential growth of paper, up 9% in 1994, and pulp output, up 5%. The EU's trade deficit increased in 1994, however, the addition of the three new Member States in 1995 more than trebles the EU's pulp output, increases paper and board output by over 50% and substantially reduces the trade deficit from 17 billion ECU to 2.3 billion ECU. The EU15 now produces around 7% (net) more paper than it consumes but remains a net importer of about 15% of its pulp. Slower demand and lower price growth are expected in the EU and extra-EU markets in 1996. There is now considerable uncertainty about the course of the current business cycle and the scale of its effects on the stocks and prices cycle of a sector which is restructuring so radically. Other threats to growth include currency instability, uncertainties about developments in East Europe and the former Soviet Union, and the ongoing costs of environmental measures.

INDUSTRY PROFILE

Description of the sector

The sector has three main product categories: pulp, paper and board. Formerly classified under NACE 471 they are now classified under 21.11 and 21.12. The subsectors classified as NACE 472 are also in 21.12. These are: manufacture of bituminised paper and paperboard for the building industry; manufacture of impregnated, waxed, composite, adhesive and similar paper; and manufacture of coated (other than machine-coated) and fancy paper.

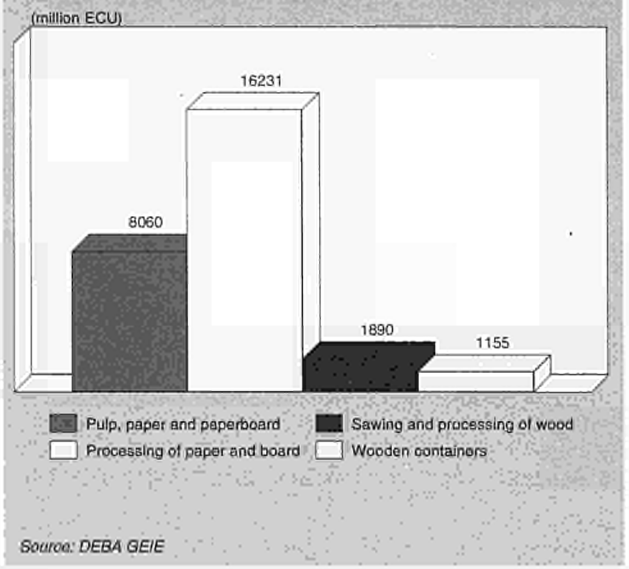
In Europe, paper and board is made mainly from waste paper and wood pulp, together with a small proportion of various fillers depending on the grade. "Market" pulp is wood pulp for papermaking sold in competition by producers on the open market. It excludes pulp for use by the producing mill or by other mills owned or controlled by the same group in the same country. Market pulp does, however, include pulp shipped to affiliated firms in other countries.

Paper and board includes products such as printing and writing paper, sanitary and household paper, wrapping and packaging paper and board, and various specialist grades.

Overall, Germany is the main EU-12 producer, followed by France, the United Kingdom and Italy. Based on the 1994 data, the inclusion of the new Member States, Sweden, Finland and Austria, would have increased the output tonnage of this EU sector by around 83%.

There are three main final uses for the sector's products: communications for printing, writing and drawing; packaging for transport, storage and presentation of goods; and various specialist applications, including hygienic and disposable paper (toilet, towels, nappies etc.), fiduciary paper (money, cheques) and technical uses (filter, photographic, insulation, wallpaper).

Figure 1: Pulp, paper and paperboard
Value added in comparison with related industries, 1994

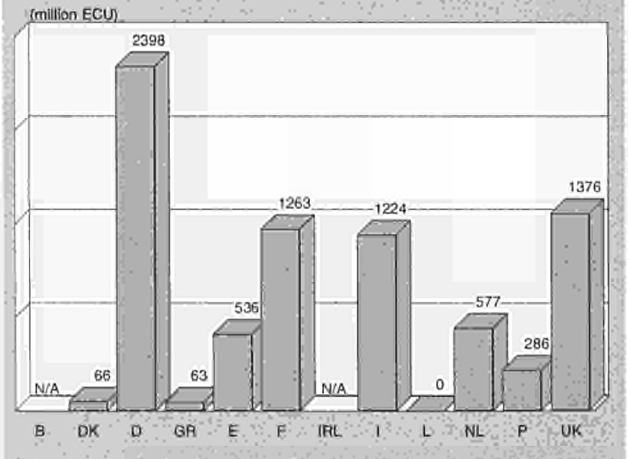


Source: DEBA GEIE

In the EU12, market pulp production is concentrated in Portugal, Spain, France and Germany in that order. The extension of the EU in 1995 adds Sweden and Finland, both of which have larger outputs than any other Member State.

Newsprint production in the EU12 is concentrated in Germany, France, the United Kingdom and the Netherlands. With EU accession, Sweden now heads the list with Finland following Germany and Austria entering lower down. Printing and writing grades are produced mainly in Finland, Sweden, Germany, France, Italy, UK and Austria. Germany and France dominate the packaging grades market with Italy, the United Kingdom and Spain being strong contenders, and Sweden and Finland joining high in the list in 1995. Germany, the United Kingdom, Italy and France lead in household and sanitary papers output. Sweden, Finland and Italy are also net exporters of these grades.

Figure 2: Pulp, paper and paperboard
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Pulp, paper and paperboard
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	32 509	44 835	44 127	42 374	39 707	35 614	40 448	51 293	49 728	52 740	55 980	59 410
Production	23 468	30 856	30 596	29 564	27 832	25 640	28 309	37 080	49 360	52 350	55 570	58 970
Extra-EU exports	2 321	2 530	2 417	2 518	2 655	2 877	3 348	4 550	8 172	8 820	9 560	10 420
Trade balance	-9 041	-13 978	-13 531	-12 810	-11 875	-9 974	-12 140	-14 213	-368	-390	-410	-440
Employment (thousands)	188	188	187	182	174	160	155	154	183	180	180	170

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Pulp, paper and paperboard
Main indicators in volume

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993 (1)	1993 (2)	1994 (1)	1994 (2)
Apparent consumption	54 283	57 461	60 478	64 625	67 104	68 976	70 351	73 502	73 014	94 196	78 445	100 643
Production	37 665	39 227	41 287	44 384	46 093	47 252	47 652	50 001	50 231	92 876	54 456	99 720
Extra-EU exports	10 193	10 983	12 219	13 854	14 646	15 670	16 352	17 523	17 070	40 426	20 186	45 515
Extra-EU imports	26 811	29 217	31 410	34 095	35 657	37 394	39 051	41 024	39 853	41 746	44 175	46 438

(1) EUR12
(2) EUR15
Source: CEPI

Table 3: Pulp, paper and paperboard
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.5	2.2	3.5	8.4
Production	3.8	1.2	2.7	6.2
Extra-EU exports	1.2	11.3	5.5	13.3
Extra-EU imports	5.4	5.5	5.4	13.1

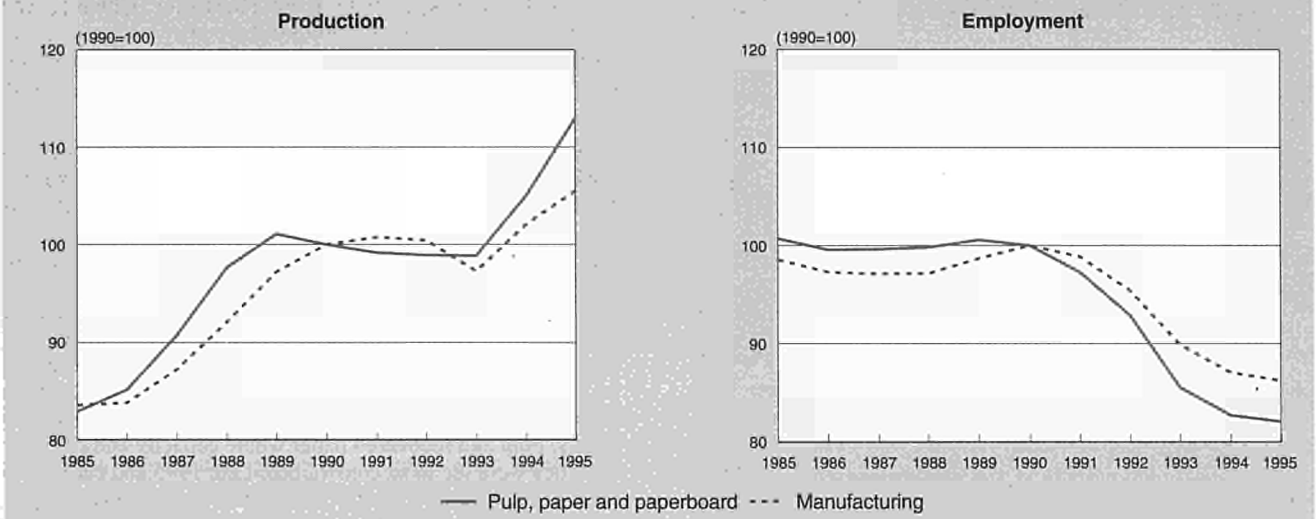
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Pulp, paper and paperboard
International comparison of production in volume

(thousand tonnes)	1993	1994
Production: Paper and board		
EUR12	41 296	45 086
EUR15	63 343	68 850
USA	77 981	80 961
Japan	27 762	28 527
Canada	17 534	18 320
Suomi/Finland	9 966	10 877
Sverige	8 781	9 284
Production: Wood pulp for papermaking (excluding market pulp)		
EUR12	8 935	9 371
EUR15	29 533	30 870
USA	57 069	58 509
Canada	22 897	24 547
Japan	10 593	10 579
Suomi/Finland	9 338	9 962
Sverige	9 953	10 097

Source: CEPI, PPI for USA, Canada and Japan

Figure 3: Pulp, paper and paperboard
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

Recent trends

There was little growth in the real value of production in recent years, averaging 1.2% in 199094 compared with 3.8% in 19851990 - output grew by 6.2% in 1994 having fallen in each of the previous four years. Preliminary estimates indicate continued strong growth in 1995. Output growth over the 198595 period was significantly faster than for EU manufacturing industry as a whole, but reflecting ongoing restructuring the shakeout of jobs in the sector employment losses were relatively heavy, falling by 18.5% over 19851995 and mostly in the second half of this period.

Rising demand and restocking underpinned production volume growth of 8.4%, to 34.5 million tonnes (paper and board plus market and integrated pulp), in 1994 and also resulted in a sharp price rises, particularly towards the end of the year. Pulp output increased by 4.9% and paper and board output by 9.2%. Total deliveries of graphic papers increased by 11.2%, packaging papers by 10.8% and household and sanitary papers by 2.5%.

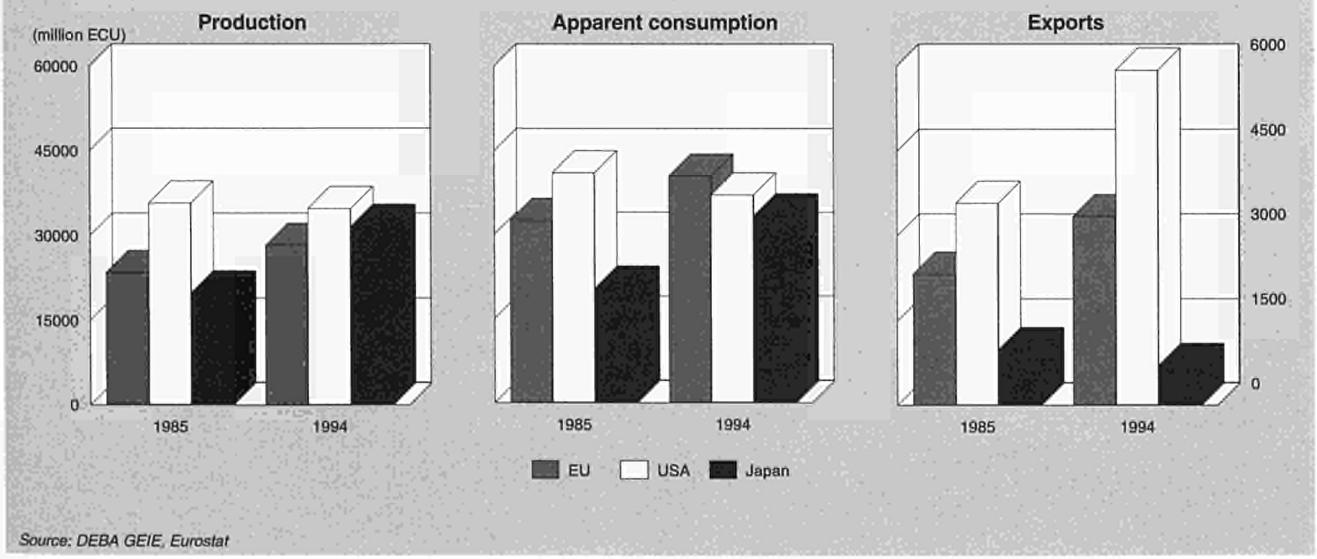
Recycling is important and rapidly increasing; waste paper utilisation represented over 57% of the total fibre furnish in 1994. Waste paper consumption increased by 2.5 million tonnes while apparent pulp consumption increased by 1.2 million tonnes. Waste paper recovery represented 42% of total apparent domestic paper consumption in 1994 compared with 41% in 1993. However, Finalnd and Sweden, having a large and necessary fresh fibre input have lower utilisation rates of recycled film, although collection rates (from a small population) are higher.

International comparison

Adding the output of the three new EU Member States increases the total EU production figure in 1994 to 99.7 million tonnes, of which 30.9 million tonnes was pulp and 68.8 million tonnes paper, moving it in both cases to second ranking in the world after the USA.

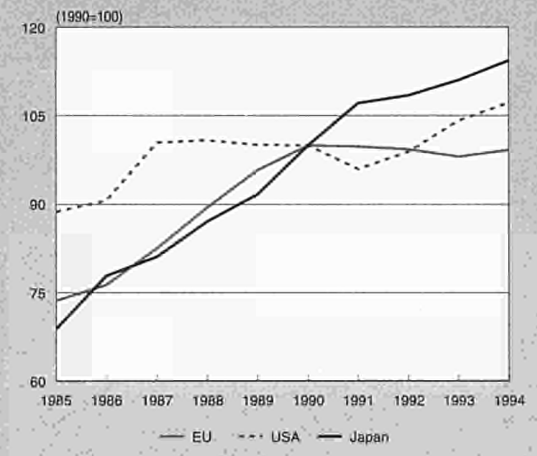
Over the 1985-94 period, Europe's output growth, in constant prices, was midway between that of Japan and the US. Japanese

Figure 4: Pulp, paper and paperboard
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Pulp, paper and paperboard
International comparison of production in constant prices



Source: DEBA GEIE

output increased steadily to 1991 but was relatively static over the three years to 1994, a cyclical setback from which it is now recovering. USA growth has followed a similar cyclical pattern as the EU.

Foreign trade

The situation has changed radically with the accession of the three new Member States, the 1995 deficit falling to an estimated 2.27 billion ECU for the EU15. In terms of 1995 volume, the EU15 region produced a net 7% more paper than it consumed but remained a net importer of some 15% of its wood pulp requirements. The difference between the latter two figures is attributable mainly to trade with North America, and in particular there were significant exports of graphic paper grades to the USA, and imports into the EU of pulp from both Canada and the USA.

MARKET FORCES

Demand

The market for pulp, paper and board products varies from intermediate industries to the final consumer. Pulp is largely an intermediate product, often sold within integrated companies but also to other firms. Customers for paper and board products vary from manufacturing industries (e.g. packaging) to retailers (e.g. toilet tissue). Market diversity affects susceptibility of the sector to the business cycle and other demand factors. For example, demand for packaging (which is also increasingly affected by environmental considerations) is relatively sensitive to economic developments, while demand for hygiene and sanitary products such as baby nappies is relatively immune.

Oversupply in 1993 and early 1994 highlighted the bargaining power of the main groups of customers - the paper and board converters, the printing and publishing industry and final consumers. The sector was under pressure from two directions: falling revenues due to lower prices and flat or falling consumption; and additional costs due to increasingly stringent voluntary and official environmental standards. From mid 1994 through 1995 the first of these pressures was removed with a resurgence in demand and prices and restocking at varying stages in the pipeline, often in anticipation of continued price increases. Prices rose particularly sharply for the furnish materials, pulp and recovered paper where capacity and recovery facilities were the most constrained. Late 1995 and early 1996 have seen these price and demand pressures slackening, particularly for pulp and recovered paper where prices are falling again.

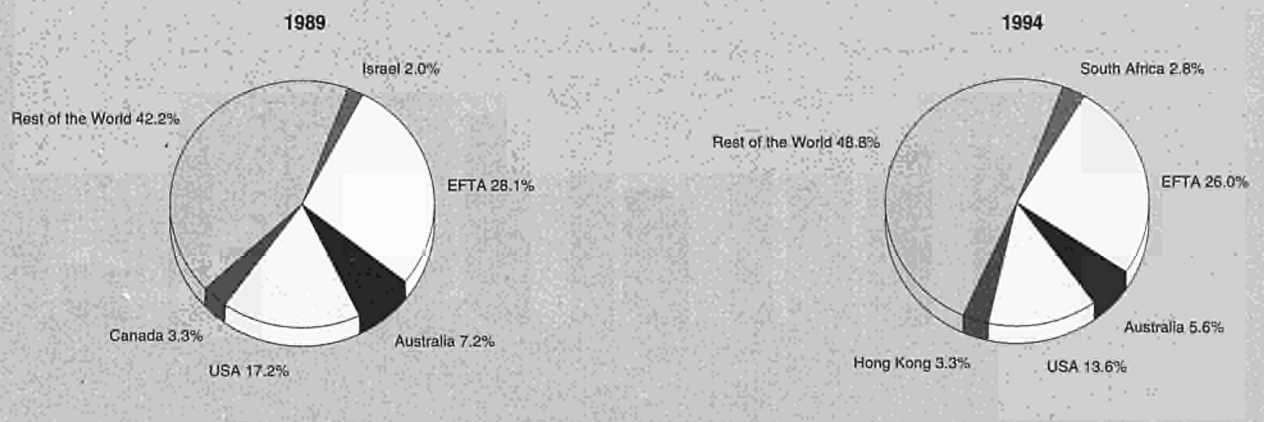
Newsprint

Newsprint is an uncoated graphic paper which can be lightly calendered and is largely made from waste paper and mechanical pulp. It is used in letterpress, flexographic, and offset printing. Consumption is directly related to revenue generated by printed advertising and, reflecting the economic upturn, the tonnage of apparent consumption in the EU-15 grew by 10% in 1994. With production growing more slowly, the trade deficit increased. Demand also grew in 1993 as Europe emerged from the recession of the early 1990s, but with new capacity coming on stream prices remained static. Prices rose in 1995 with demand continuing to grow alongside increased operating rates and tightening supplies.

Uncoated graphic paper

These grades include directory, heavily filled and supercalendered papers used in rotogravure and offset printing and in books and stationery of all kinds. Production of these grades in the EU15 in 1994 increased by 8.1%, with the wood-free grades (i.e. made from at least 90% chemical pulp) growing more rapidly than the mechanical grades (i.e. in part containing mechanical pulp which has been produced by grinding, milling or related processes). Apparent EU domestic consumption for

Figure 6: Pulp, paper and paperboard
Destination of EU exports



Source: Eurostat

Table 5: Pulp, paper and paperboard
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 321	1 871	2 032	2 238	2 530	2 417	2 518	2 655	2 877	3 348	4 550	8 172
Extra-EU imports	11 363	10 605	11 658	14 165	16 508	15 948	15 329	14 530	12 851	15 488	18 763	8 540
Trade balance	-9 041	-8 734	-9 626	-11 927	-13 978	-13 531	-12 810	-11 875	-9 974	-12 140	-14 213	-368
Ratio exports / imports	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.0
Terms of trade index	109.7	109.8	104.1	102.5	99.1	100.0	106.4	108.2	119.4	115.2	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

these grades increased by 2.5%, accompanied by an 88% increase in the trade surplus.

Coated graphic paper

The coated mechanical grades are used to print catalogues, magazines and advertising material, and the chemical grades for high quality "glossy" printed products. Production and consumption of these grades in 1994 in the EU15 increased by 14.2% and 10.2% respectively, accompanied by a large increase in the trade surplus. By the second half of 1995, the growth in production of both coated and uncoated graphic grades was slowing down as operating capacity was progressively taken up. At the same time, prices were rising rapidly.

Hygienic and sanitary products

The main final products of these grades are hygienic paper and napkins and industrial wipes. The EU15 is virtually self-sufficient in these grades. Consumption and production increased by 3% in 1994 following a small fall in 1993, but 1995 is likely to show very little growth at all. Prices were static until the second half of 1995 when there were moderate increases.

Nongraphic grades

These include kraftliner and corrugated case materials, packaging paper, folding boxboard and greyboard. Kraftliner used for the outer and inner lining of corrugated board is produced mainly in Sweden, Finland, France, Spain and Portugal with large imports from the USA. Apparent consumption of these grades in the EU15 grew by 6.8% in 1994 while production increased by 8.7% with an appreciable increase in the small net export surplus. The overall growth in production masks differences for various grades: folding boxboard increased by 12.3%; case materials by 8.9%; and, wrappings by 3.2%. During 1995 production growth slowed, particularly for boxboard.

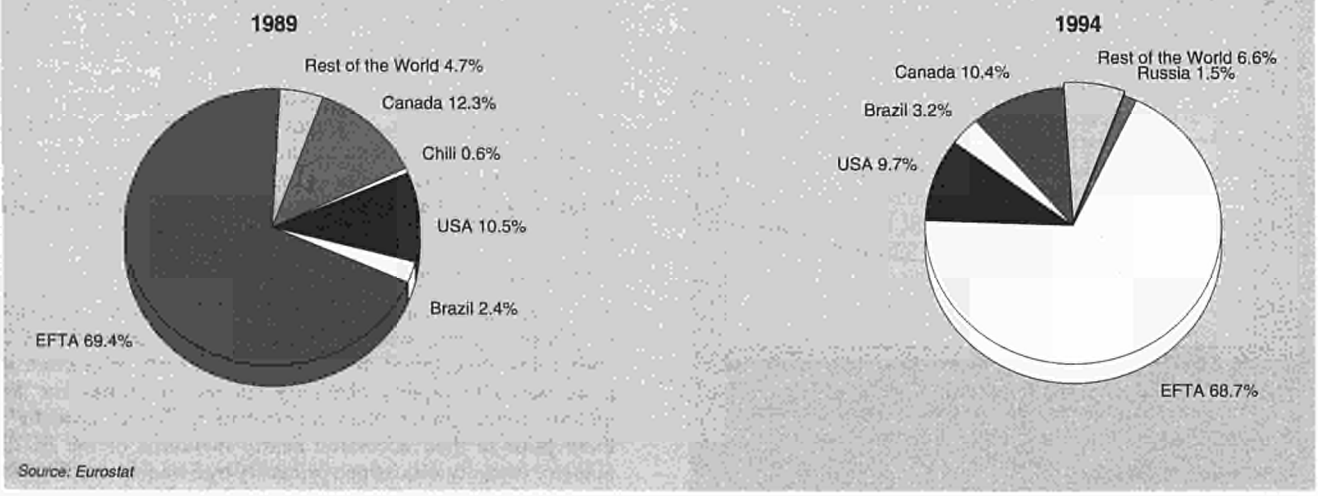
Supply and competition

Paper and board

Strong demand in 1994 and 1995 with relatively little new capacity coming on stream marked a sharp turnaround from overcapacity and depressed prices of the early 1990s. Overcapacity occurred as the downturn in the North American and European business cycles coincided with the coming on stream of considerable capacity, both from large new machines and from upgraded machines. By mid 1995 most mills were operating at optimum rates. Following a sharp increase in pulp prices, paper prices in all grades rose very sharply in the year to mid 1995 as companies restocked, but demand slackened considerably, destocking began and output levelled off in the third quarter of 1995. Prices in most grades also levelled off with pulp prices weakening - the scheduled pulp price increase for October failed to hold and by January 1996 prices were falling dramatically.

European graphic grades operating rates for 1995 were about: newsprint 95%, SC magazine grades 95%, and coated mechanical reels 94%. Germany, the key market, now plans a 19% growth in SC capacity to 1998 and the new Member States, Finland, Sweden and Austria 11%, 16% and 8% respectively. In the case of newsprint, the UK and Sweden are planning significant expansions of wastebased newsprint capacity but this will be offset by capacity reductions in Finland and Germany.

Figure 7: Pulp, paper and paperboard
Origin of EU imports



Source: Eurostat

Table 6: Paper and paperboard
Production, apparent consumption and exports by subsector

	Production		Apparent consumption		Exports	
(thousand tonnes)	1993	1994	1993	1994	1993	1994
Newsprint	7 613	8 065	7 711	8 481	4 912	5 139
Uncoated mechanical	4 431	4 673	3 849	3 596	3 184	3 654
Uncoated woodfree	8 002	8 766	7 770	8 316	4 030	4 603
Coated paper	11 594	13 243	9 757	10 757	7 842	9 689
Graphic papers total	31 640	34 747	29 087	31 149	19 967	23 084
Household and sanitary	3 550	3 657	3 571	3 680	947	995
Case materials	13 923	15 166	14 515	15 881	4 746	5 412
Folding boxboard	5 675	6 372	4 325	4 806	3 793	4 270
Wrappings	3 090	3 188	2 979	2 856	2 122	2 422
All other paper packaging	1 764	1 859	2 238	2 143	869	1 125
Packaging total	24 453	26 584	24 056	25 685	11 530	13 229
Others	3 701	3 862	3 297	3 745	1 110	996
Total EUR15	63 343	68 850	60 012	64 259	33 554	38 303

Source: CEPI

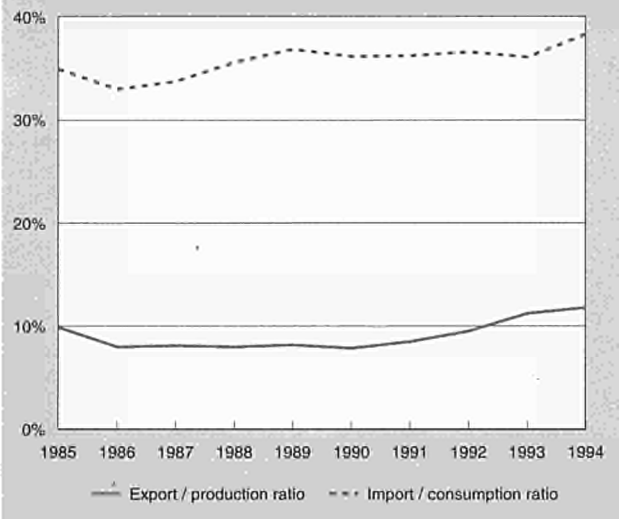
Packaging grades demand and prices were weaker than graphic grades prices in early 1996. Scandinavian companies began to feel the benefits of profit recovery via improved exports in 1993 following their national currency devaluations. EU companies, however, only began to feel benefits from restructuring during the first half of 1994, with more significant gains coming through in the second half when prices and revenues were also improving. In the first half of 1995, profits from the business upturn were strong, but weakening later in the year.

Pulp

Europe is a net importer of pulp. In 1994, the EU15's net imports of pulp were 5.5 million tonnes, contributing 15.1% of apparent consumption. Around twothirds of gross imports come from North America and most of the rest from South America and East Europe. The weakness of the USD has recently assisted North American exports.

As an internationally traded, standardised commodity produced in large scale production units (the latest investments sometimes reaching 500 000 tonnes annual capacity), the inventory, investment and price cycle for market pulp is more pronounced than that for paper since only about 20% of world output is nonintegrated supplies for the market and stock movements in anticipation of price changes themselves exaggerate the subsequent price changes. Between mid1989 and end1993 the price of Canadian NBSK pulp, the industry's prime grade, halved, with similar movements for its Nordic equivalents. Mills, particularly in Europe, were losing money. By the third quarter of 1995 NBSK prices had doubled again, but by March 1996, prices had fallen by about 25%. This unstable situation is particularly damaging for nonintegrated pulp buyers, of which there are many in Europe's relatively fragmented industry.

Figure 8: Pulp, paper and paperboard
Trade intensities



Source: DEBA GEIE, Eurostat

On a long term basis world pulp availability, particularly for softwood pulp, remains relatively tight, driven in particular by the Asian markets with their limited domestic supplies. The FAO's world capacity survey published in January 1996 suggests the Nordic countries and the EU12 may reduce their long term pulp import deficit, but the shortage for the Asian markets will persist. Europe and Asia are also expected to receive a small but increasing proportion of their supplies from the former Soviet Union. The survey suggests little change in average growth in world pulp (for papermaking) capacity over 1994-99, annual growth of 1.3% compared to 1.4% in the 198994 period. In the latter period the regional annual growth rates projected are: 0.3% for North America; 1.0% for the EU12; 2.6% for the Nordic countries; 2.4% for the former Soviet Union; 2.1% for Latin America; and 10.6% for Asia, where Indonesia is a major contributor. However, Asia's rapid growth in domestic supplies will only slightly dent its huge pulp deficit: Asian pulp consumption is six to seven times the level of its domestic supplies.

The situation in early 1996 with world market pulp prices plummeting, however, indicates how much more powerful the effect of short term stock movements is upon price than the long run supply picture. The industry's ongoing restructuring should assist in the development of a more orderly pulp market.

International competition

The international competitiveness of the EU paper industry is generally good, scoring well on labour productivity. EU companies' investment in strategically flexible production is more suited to rapidly changing market conditions for the various paper grades, than investment in "super capacity". Even prior to their accession nearly twothirds of the EU12 industry capacity was owned primarily by Swedish and Finnish

Table 7: Paper and board
Production, apparent consumption and exports by country

	Production		Apparent consumption		Exports	
(thousand tonnes)	1993	1994	1993	1994	1993	1994
Belgique/België	1 063	1 247	2 037	2 474	686	868
Danmark	285	311	1 099	1 210	154	170
Deutschland	13 034	14 457	15 800	16 059	4 556	6 238
Ellada	320	347	657	639	37	45
España	3 348	3 501	4 691	5 055	732	823
France	7 970	8 678	8 919	9 730	3 186	3 726
Ireland	37	37	335	368	27	27
Italia	6 103	6 719	7 599	8 547	1 632	1 740
Nederland	2 855	3 010	3 251	3 491	2 002	2 069
Österreich	3 301	3 603	1 327	1 490	2 641	2 862
Portugal	877	949	660	739	537	550
Suomi/Finland	9 966	10 877	1 249	1 253	8 894	9.836
Sverige	8 781	9 284	1 753	1 648	7 365	8 083
United Kingdom	5 405	5 829	10 635	11 557	1 105	1 269
Total EUR15	63 343	68 850	60 012	64 259	33 554	38 303

Source: CEPI

Table 8: Pulp
Production, apparent consumption and exports by grade (1)

(thousand tonnes)	Production		Apparent consumption		Exports	
	1993	1994	1993	1994	1993	1994
Mechanical	9 285	9 701	9 481	9 872	214	252
Semi chemical	1 701	1 781	1 797	1 967	148	145
Sulphite	2 172	2 166	2 423	2 410	685	745
Unbleached sulphate	4 074	4 129	4 031	4 088	240	264
Bleached sulphate	12 237	13 048	16 389	18 002	5 585	5 805
Chemical pulp (total)	18 546	19 388	22 906	24 545	6 510	6 815
Woodpulp for papermaking	29 533	30 870	34 184	36 384	6 872	7 212
Dissolving woodpulp	166	176	565	559	25	45
Woodpulp total EUR15	29 699	31 046	34 750	36 944	6 897	7 257

(1) Figures do not sum owing to inclusion of non-categorized chemical pulp.
Source: CEPI

companies reflecting their European strategies. Development of Europewide economies of scale by the larger European paper groups is reflected in their increasing restructuring to specialise in core product grades for sale across the EU's national frontiers, rather than owning groups of small, nationally oriented production facilities with a high degree of product diversification. Merger, acquisition and divestment activities have been aimed at economies of scale to match those of world competitors. Some are concentrating on graphic grades, some on packaging grades, some on household and sanitary grades and yet others on niche markets for high valueadded products. Some are acquiring and expanding merchanting networks for panEuropean marketing of specialist grades and converted products. Yet others, particularly in the packaging and newsprint segments, are managing increasing proportions of their own waste paper supplies.

The USA paper industry began pulling out of recession in 1993, earlier than the Europeans. Net pretax profit margins have risen in successive years since the 1992 level of 1.5% and by the first nine months of 1995 were 10.7%. A relatively weak USD in 1995, although strengthening slightly towards the end of the year, contributed to a surge in USA exports. Canadian Pulp and Paper Association data show that the highly-geared Canadian forestry industry made losses in 1991, 1992 and 1993, although the improving "lumber and panels" segment was profitable. In 1994 there was a dramatic return to overall profitability, helped by a weak currency, as the industry benefited from buoyant export markets, particularly in Europe.

Japan is an inwardlyfocused paper and board market. Reflecting its shortage of raw materials, it exports little and has high recycling levels. Its main influence on world markets is via imports of wood chips, pulp and waste paper. Reflecting Japanese economic conditions import volumes were depressed in 1993 but improved strongly in 1994 and 1995. Although sales decelerated in the second half of 1995, for the year as a whole paper output grew by 4%. Growth was helped by rapid growth in demand for printing papers, assisted by strong sales of personal computers and software information manuals. The ASEAN and Chinese paper markets are the fastest growing in the world, with consumption continuing to outstrip rapid growth in production capacity. Relatively weaker currencies have enabled North American suppliers to benefit more than their European counterparts but additional competition in the region is emerging from Indonesia. The graphics and niche

Table 9: Pulp, paper and paperboard
Woodpulp for papermaking by country

(thousand tonnes)	Production		Apparent consumption		Exports	
	1993	1994	1993	1994	1993	1994
Belgique/België	321	370	609	732	67	100
Danmark	54	54	75	75	34	34
Deutschland	2 013	1 934	5 240	5 461	156	187
Ellada	80	85	120	128	0	0
España	1 333	1 431	1 149	1 213	595	622
France	2 539	2 786	4 007	4 314	400	442
Italia	403	426	2 829	3 050	35	28
Nederland	119	119	700	800	65	184
Österreich	1 307	1 441	1 647	1 776	162	220
Portugal	1 520	1 539	540	574	1 044	1 046
Suomi/Finland	9 338	9 962	7 944	8 552	1 455	1 492
Sverige	9 953	10 097	7 264	7 479	2 839	2 837
United Kingdom	554	626	2 060	2 231	21	20
Total EUR15	29 533	30 870	34 184	36 384	6 872	7 212

Source: CEPI

paper grades, in which Europe excels, offer the most promising export opportunities.

Production process

Pulp, paper and board manufacturing is traditionally linked to the forestry and wood processing sectors. However there is increasing use of waste paper, fillers and other materials. Many major players are focusing on horizontal integration and drawing on a range of raw materials to produce a range of higher quality, specialised products within their chosen segment of the European and world markets as well as forward integration into the converting sector.

Innovation, modernisation and increasing scale economies are an integral part of the development of the new panEuropean groups. Major investment is ongoing in two areas: environmental technologies aimed at reducing and/or improving the environmental friendliness of emissions and effluents; and recycling technology, particularly in stock preparation. Considerable restructuring to obtain economies of scale has occurred amongst the sector's machinery suppliers. Investment costs are high, as are the labour and training costs associated with the increasing demand for higher technical skills. In these circumstances, many of the large groups are increasing their financial gearing.

INDUSTRY STRUCTURE

Companies

Although concentration is increasing, by world standards the European pulp, paper and board industry remains relatively fragmented even when the new Member States are included. Pulp & Paper International's list of the world's top 150 companies (based on 1994 financial data) lists 64 EU companies - 35 based in the EU12 and 21 in the new Member States, averaging company turnover of 0.72 billion ECU and 1.06 billion ECU respectively. The list also includes 41 North American companies with average turnover of 1.67 billion ECU, and 31 Asian companies averaging turnover of 1.04 billion ECU.

The picture is very different now that companies in the three new Member States are included, several of which have merged quite recently into much larger corporations. The list is now dominated by Scandinavian companies. Joining the current first four (three, now that PWA is part of SCA) are: Stora (S); United Paper Mills (SF) which merged with Kymmene (SF) in late 1995; SCA (S); EnsoGutzeit (SF) which merges with Veitsiluoto in May 1996; MoDo(S); AssiDomän (S); and Metsäliitto (SF). Most of these companies produce between one and seven million tonnes of paper and board, are integrated forwards into converting and some also into paper merchanting, while the largest have operations in from four to as many as 15 countries world-wide.

Table 10: Pulp, paper and paperboard
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	82.3	85.5	91.0	97.8	100.5	100.0	101.9	106.5	115.6	127.0
Unit labour costs index (3)	93.0	94.4	93.6	92.0	93.7	100.0	106.5	108.0	101.4	94.7
Total unit costs index (4)	94.9	89.8	89.7	93.1	100.1	100.0	99.3	98.1	91.3	92.6
Gross operating rate (%) (5)	11.3	14.5	14.1	14.7	14.2	12.6	12.1	8.5	7.4	9.6

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 11: Pulp and paper
Number of mills by Member State

	Pulp		Paper	
(units)	1993	1994	1993	1994
Belgique/België	2	3	12	14
Danmark	1	1	4	4
Deutschland	31	26	209	210
España	16	17	140	137
France	22	20	151	146
Ireland	N/A	0	1	1
Italia	16	16	213	211
Nederland	2	2	32	25
Portugal	8	7	75	75
United Kingdom	4	4	88	99

Source: CEPI

Table 12: Pulp, paper and paperboard
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	0.7	0.4
Deutschland	1.1	0.9
Ellada	1.1	1.1
España	1.3	1.1
France	0.9	1.0
Ireland	N/A	N/A
Italia	1.0	0.9
Luxembourg	0.0	0.0
Nederland	0.9	1.2
Portugal	3.4	3.0
United Kingdom	0.8	1.0

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

In recent years European paper manufacturers have been involved in internal restructuring, with the recession in the early 1990s proving the catalyst. The Single European Market (SEM) Programme and EU enlargement have also accelerated restructuring. The former also contributes to increasing sales, productivity and competition especially in price. The emphasis has been on disposing of peripheral operations and concentrating on chosen "core" activities. Acquisition activity has varied with the availability of finance and with swings in the business cycle. Many companies are highly geared and finance has been difficult to obtain. Over the last four years, however, and particularly in 1994 and 1995, acquisitions have picked up. Important deals have included:

- SCA's purchase of a 60% controlling stake in PWA (D) at the beginning of 1995;
- the merger, scheduled for May 1996 of Repola Ltd (SF) and Kymmene (SF) to create UPM-Kymmene
- the merger, also scheduled for May, 1996, of Enso-Gutzeit (SF) and Veitsiluoto (SF).

A third grouping is also emerging in Finland of Metsä-Serla and Myllykoski.

According to PPI data the average capacity of the 1 039 EU paper mills in 1993 was 46 000 t/y, compared with 205 000 t/y for the 112 Nordic mills and 155 000 t/y for the 659 North American mills. Many of the European mills are non-integrated and clearly further restructuring of the industry could involve shutdowns of uneconomic units. However, further restructuring would not necessarily entail expansion of the scale of the remaining mills. In many market niches the industry needs small, flexible production units proximate to their markets, while the risk associated with large production units producing a limited range of products is often daunting.

REGIONAL DISTRIBUTION

Increased recycling is also having effects on the location of the industry, although the changes are not so much regionally based as representing a shift towards major conurbations as new plants and expansions of existing plants are increasingly located close to waste paper supplies. This varies according to grade. It is particularly true for the new large scale, waste-based newsprint plants in Germany, France and Benelux, while the traditional Scandinavian suppliers are importing increasing quantities of waste paper to satisfy endusers' demand for increased recycled content. Packaging grades have always been intensively recycled so relocation is less apparent, although again recycling demand is putting pressure on Scandinavian supplies of the virgin pulpbased grades. Hygienic papers are affected in a similar way to the packaging grades with the Nordic and Italian exporters feeling the pinch. Recycling in the remaining graphic grades is least developed but is increasing and eventually similar trends towards relocation may emerge.

ENVIRONMENT

Although the industry was among the first to acknowledge the importance of monitoring the environmental sideeffects of its production processes and has always recycled high proportions of its output, it has become the target of several hard-hitting protest campaigns focusing on four main issues: the quantity of forest wood used in paper production; the high and growing consumption of paper; the proportion of paper which is recycled; and the use of chlorine and its compounds for bleaching pulp and paper to high levels of brightness.

In response to these pressures and a growing consumer awareness, the industry has a strong case to present. First, unlike other resourcebased industries, it is one of the few which regenerates its own raw materials and forestry area is actually increasing in the EU. In 1995, an international study group for the certification of Sustainable Forest Management (SFM) was established, and in February 1996 its 24 member countries (including EU Member States) committed themselves to the international environmental management standard, ISO 14000. The group's work is ongoing. Second, in 1994 the EU15 al-

ready recycled 43% of its paper consumption, a proportion which is being stepped up annually. Third, EU countries are increasingly accepting incineration with energy recovery as an effective means of disposal of poorer quality wastes which are costly to recycle. Finally, the industry has phased out elemental chlorine in favour of chlorine dioxide, producing "elemental chlorinefree" (ECF) products. However, "totally chlorinefree" (TCF) bleaching is now being phased in, albeit with controversy about the best method to use, and a major Swedish supplier is predicting that by 1996 the market share of TCF for printing papers will reach 6070% in the Germanic language countries (in 1993 it was 37%) and their Nordic suppliers, but still less (610%) in all other European countries.

REGULATIONS

Environmental issues underpin most important recent regulations governing the industry, at national and EU level. Reducing the volume of packaging and paper consumption is a key objective and responsibility for recovering and recycling waste is now placed on the industrial producers and users of packaging. National legislation includes Germany's strict Packaging Ordinance, together with similar legislation in France, Belgium and the Netherlands, with the UK introducing similar measures in mid1996. Variations in the timing of introduction and the relative strength of this legislation distorts trade flows. The initial effect of the German Ordinance, for example, was to flood the European market with waste paper, pushing prices down to negative levels for the lower grades in 1993, although demand recovery in 1994 corrected this.

Harmonisation at EU level to reduce such distortions is supported by the paper industry. The EU Packaging and Packaging Waste Directive sets a fiveyear target obliging members to recover between 50% and 65% of waste packaging. Between 25% and 45% must be recycled allowing for national variations. Some countries, however, feel the measure is not stringent enough to achieve an acceptable level of harmonisation; while others feel it does not go far enough to reduce the distortions caused by the stringent legislation of their neighbours. International competition, however, is forcing industry in countries with less advanced environmental legislation to adopt the standards of stricter countries.

The paper industry also supports the objectives of the regulation for a Community Ecolabel Award Scheme which promotes products with a reduced environmental impact during their life cycle and provides consumers with information on their environmental impact. The industry has participated in the review of the Ecolabel Regulation, having been profoundly concerned with its initial operation.

As an industry with a small number of major players, the EU competition authorities keep a watchful eye on proceedings. Major mergers are scrutinised and participants asked to divest subsidiary interests where deemed appropriate. There is equal scrutiny vis-à-vis potential cartels in this industry which show a highly uniform business cycle.

OUTLOOK

The profile of the EU pulp, paper and board sector has changed considerably with the accession of the three new Member States. However, companies in these countries were already rationalising but also expanding in readiness for EU membership. This process is continuing and from a strategic perspective, therefore, company objectives and policies remain largely unaffected.

Domestic demand and prices for the industry's products, having rapidly, possibly too rapidly, increased, are now moderating and in some cases weakening, and company profits are likely to level off and slip back in 1996 and 1997. Continued restructuring and industrial concentration seems likely and employment is forecast to continue slowly declining. Although moderating, economic growth is continuing in North America and the Pacific, providing ongoing opportunities for the industry's exports although hampered by the competitive value of the USD.

The business cycle is a key influence in the industry. Operating capacity rates and prices are now showing signs of turning downwards with further uncertainty about the course of the business cycle beyond 1996. The outlook for demand and supply conditions in the former Soviet Union and East Europe are factors contributing to this uncertainty as is EMU - currency instability is a recurring problem for the industry.

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Articles of paper and paperboard

NACE (Revision 1) 21

This sector is strongly influenced by the general situation of the economy. It is highly dependent on domestic demand and the EU external trade balance is small but expanding. Packaging products make up about 60% of total output, with hygienic products and stationery and office supplies making up the balance. The new Member States are significant producers of paper and board and exporters of converted products. Their accession in 1995 increased EU output by about a third and trebled the external trade surplus. In response to general economic trends, output growth in the converting sector was strong in 1994 but decreased in 1995. There were signs of a slow down, however, in late 1994. The industry is strongly influenced by supply, capacity and price conditions in its raw materials sector - in response to the sector's increasing demand for inputs, paper and board prices increased rapidly in 1994 and 1995 but have now levelled off. Ownership is fragmented, as is regional distribution of operating units, although there is sharp growth in merger and acquisition activity and forward integration into converting by the major paper and board manufacturers. Short term prospects are for a levelling off and possibly a slip in output growth, profits and employment. The sector's main concerns are the costs of participation in the various national waste management initiatives and reduction of costs generally, how to benefit from increasingly pan-European product marketing and profitably tap the potential of East European markets.

INDUSTRY PROFILE

Description of the sector

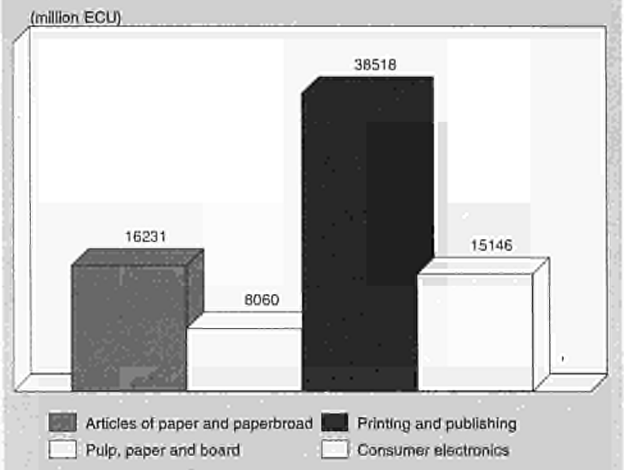
Articles of paper and paperboard covers all processing of paper and paperboard for their final applications in packaging, communications and other special uses. The sector covers a wide variety of products including packaging (often in combination with plastics and metal foils), stationery and office supplies, hygienic products, wallpaper, labels and many other products. There are a number of differences between coverage under the NACE 1970 and NACE Revision 1 classification systems. Most of the subsectors covered under NACE '70 472 group are now classified under NACE Rev.1 21.2. However, three subsectors have moved to NACE Rev.1 21.1, namely: manufacture of bituminised paper and paperboard for the building industry; manufacture of impregnated, waxed, composite, adhesive and similar paper; and manufacture of coated (other than machine-coated) and fancy paper and some products to printing and publishing, but these products are still articles of the paper and board converting industry.

These changes in statistical classifications reflect the considerable overlap between the converting sector and its paper and board supply and the printing and publishing industries, an overlap evident in ongoing acquisition trends. Increasingly, the major European paper producers are integrating forward along the production and distribution chain and becoming active in both the paper production and converting markets. However, this does not mean that the converting industry will be subject of the paper manufacturing or printing industry.

Recent trends

The volume and value of manufacturing output in this sector increased steadily in the EU during the 1985-91 period, slowed down in 1992, fell in 1993 and recovered rapidly in 1994 and 1995. Sharp growth in input prices in 1994 and 1995,

Figure 1: Articles of paper and paperboard
Value added in comparison with related industries, 1994



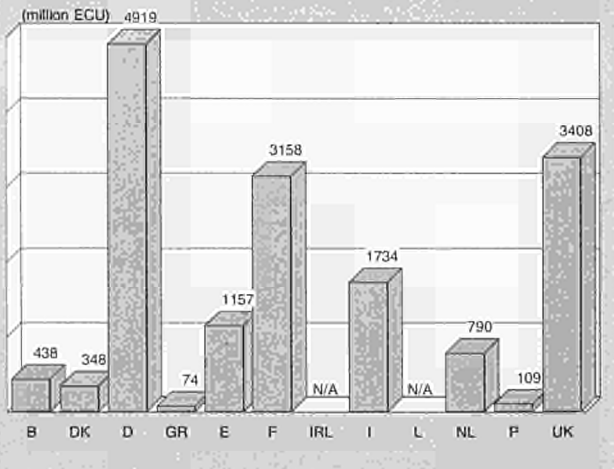
Source: DEBA GEIE

having fallen in the previous two years, fed through to paper and board and converted products, particularly in the packaging manufacturing, but also spreading to household and hygienic products in 1995. The end of 1995 saw raw material prices weaken as stocks were run down and prices of converted products levelled off.

For the EU, the external trade balance of the sector, though small in comparison to the chemical or investment industry, it became an important factor in the converting industry in the last years. It dwindled considerably in the late 1980s but between 1991 and 1994, the balance trebled to overtake its 1985 level, as imports levelled off and exports increased very sharply, particularly in 1994. Between 1991 and 1994 extra-EU imports increased by only 12%, while exports rose by a third. Approximately three quarters of total EU trade flows are within the EU.

In 1995, the incorporation of the new Member States radically altered the EU industry structure. These countries are major producers and large exporters of semi-converted and converted paper and board products to the EU. The external balance of the EU trebled with extra-EU imports reduced by over 40%

Figure 2: Articles of paper and paperboard
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Articles of paper and paperboard
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	30 038	39 792	44 073	46 913	47 309	45 011	46 306	53 175	69 600	74 310	79 650	85 780
Production	30 830	40 290	44 477	47 186	47 792	45 792	47 287	54 513	72 566	76 750	81 490	86 880
Extra-EU exports	2 380	2 870	3 016	3 172	3 368	3 644	4 229	4 814	5 006	5 390	5 830	6 340
Trade balance	792	498	404	273	483	781	980	1 338	2 967	2 440	1 840	1 100
Employment (thousands)	381	399	406	411	401	377	372	372	442	440	440	450

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Articles of paper and paperboard
Production in constant prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Belgique/België	1 104	1 182	1 189	1 296	1 354	1 516	1 359	1 371	1 235	N/A
Danmark	741	791	782	801	804	799	882	842	800	884
Deutschland	9 236	9 226	9 546	9 708	10 205	12 609	14 135	13 830	13 443	13 224
Ellada	310	N/A	311	288	276	263	252	261	235	238
España	2 172	2 308	2 479	2 523	2 759	2 810	3 028	3 036	2 996	3 194
France	6 356	6 659	7 454	8 267	8 829	8 846	9 086	9 195	9 204	9 750
Italia	4 329	4 254	4 504	5 102	5 471	5 994	5 862	6 220	6 454	6 972
Nederland	1 808	1 868	1 896	1 939	2 021	2 116	2 116	2 167	2 125	2 181
Portugal	264	276	309	319	289	274	287	286	264	265
United Kingdom	8 155	8 310	8 592	9 332	9 273	8 988	8 683	8 927	9 129	9 281

Source: DEBA GEIE, Eurostat, CITPA

Table 3: Articles of paper and paperboard
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.3	1.2	3.5	2.7
Production	5.0	1.5	3.4	3.3
Extra-EU exports	3.3	8.2	5.4	14.6
Extra-EU imports	7.6	5.0	6.5	7.4

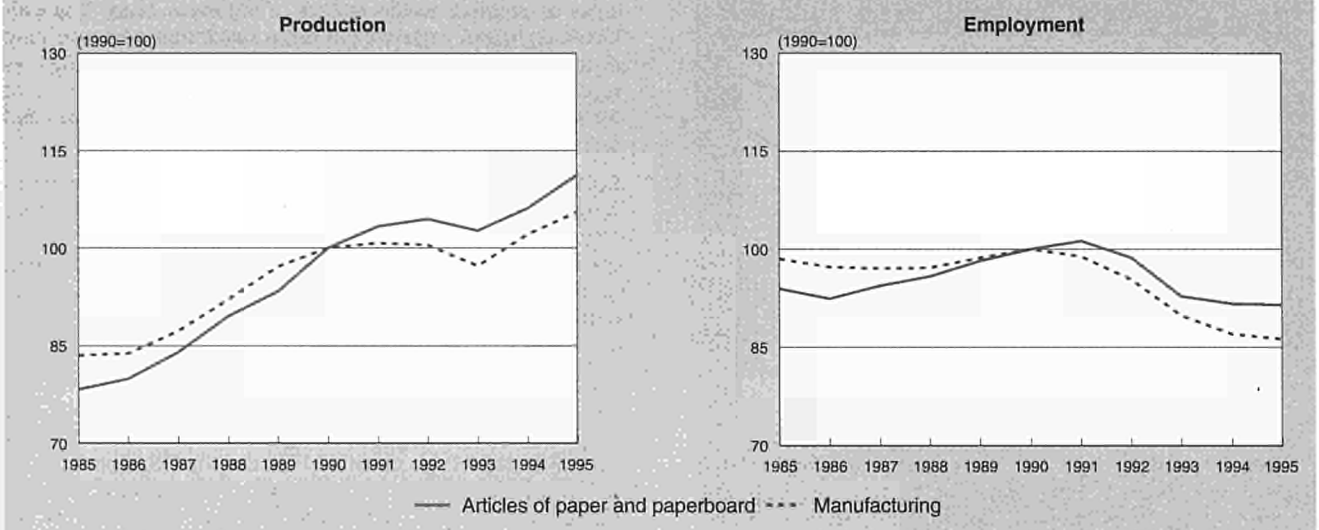
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Articles of paper and paperboard
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 379.5	2 204.8	2 231.0	2 519.1	2 870.1	3 016.1	3 172.4	3 368.3	3 643.9	4 228.8	4 813.9	5 006.2
Extra-EU imports	1 587.7	1 567.6	1 761.9	2 088.1	2 371.8	2 611.8	2 899.2	2 885.1	2 862.7	3 248.5	3 475.7	2 039.7
Trade balance	791.8	637.2	469.1	430.9	498.3	404.3	273.3	483.1	781.2	980.3	1 338.2	2 966.5
Ratio exports / imports	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.2	1.3	1.3	1.4	2.5
Terms of trade index	105.7	107.1	106.2	103.6	100.4	100.0	101.7	102.6	104.3	100.0	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Articles of paper and paperboard
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

and extra-EU exports increasing slightly. The addition of the new Member States in 1995 is estimated to increase EU output in the sector by nearly 16%.

Paper and paperboard processing industry is a major contributing sector to overall industrial activity, its value added in 1994 being twice that of its pulp, paper and board raw material supplying sector, and slightly larger than that of the iron and steel, and consumer electronics sectors.

The largest EU-12 producer is Germany, with 4.9 billion ECU value added in 1994, followed closely by the United Kingdom (3.4 billion ECU) and France (3.2 billion ECU).

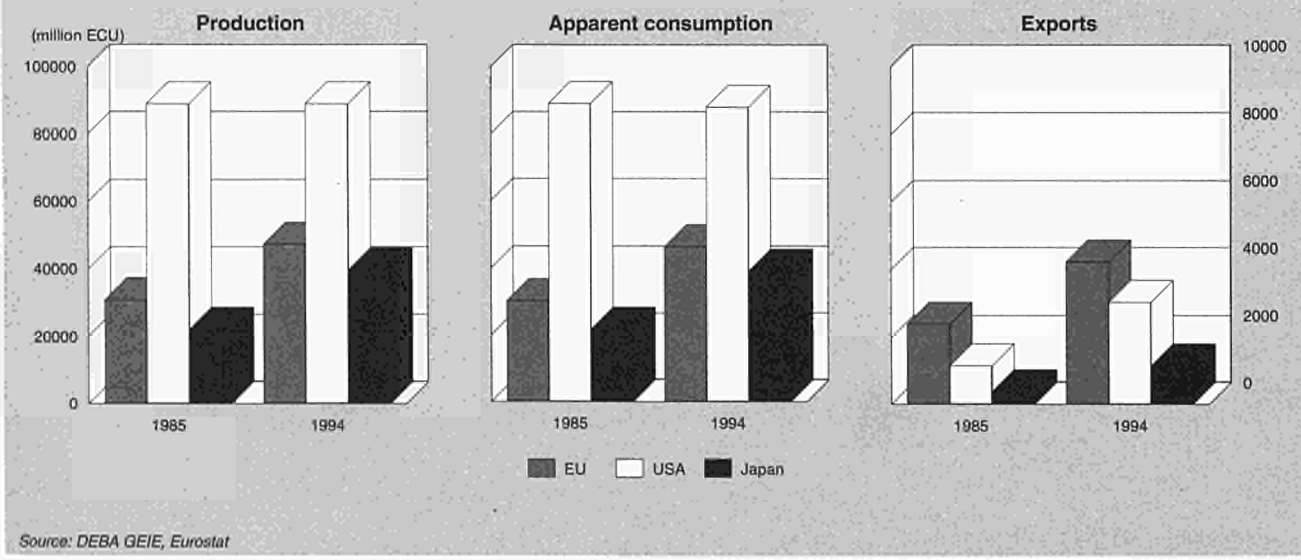
From 1985 to 1994, production in constant (1990) prices, grew more rapidly than in the EU manufacturing industry as a whole - 3.4% compared with 2.4% - and showed a similar cyclical pattern. The upturn in 1994 was a little more delayed, 3.3% for this industry compared with 5.0% for the EU manufacturing industry, but in 1995 sectoral growth outpaced industry as a whole. The cyclical pattern of employment was somewhat more pronounced than for EU industry in general, with employee numbers growing by 17 000 from 1985 to 1992 and falling by 40 000 from 1992 to 1995, but less steeply than the fall in employment in manufacturing industry in the EU overall. The addition of the new Member States in 1995 increased EU employment in the industry.

Average real growth rates for the EU during the 1985-94 period were 3.4% for both consumption and production. In both cases, growth was much slower in the last four years than the second half of the 1980s. Conversely, extra-EU exports have grown more rapidly in recent years, as have imports.

International comparison

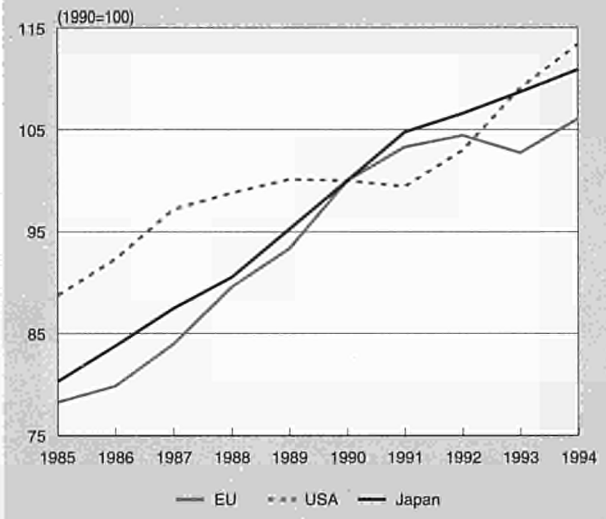
Comparisons between the EU's paper and board converting sector and those in North America and Asia are complicated by the wide range of activities the sector includes. In current prices the value of EU paper and board converting output in 1994 was 53% of that of the USA and 19% higher than that of Japan. However, it is estimated that the addition of the

Figure 4: Articles of paper and paperboard
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Articles of paper and paperboard
International comparison of production in constant prices



Source: DEBA GEIE

new Member States in 1995 increased the value of the sector's production by around a third, leaving it about 70% of the value of that of the USA. It is a much stronger exporter; extra-EU exports in 1994 were 39% above the USA and the EU-15's exports are probably around 45% higher. However, US (and Japanese) exports have been growing more rapidly than those of the EU assisted by the relative depreciation of the USD exchange rate.

The prosperity of the sector in all three regions is closely related to wider economic growth trends. In the 1985-94 period the real rate of output growth in the industry in the EU was 3.4% per annum, compared with 3.7% in Japan and 2.8% in the USA. Cyclical patterns, however, have differed: US output reached a nadir in 1991 and has since grown, albeit slowing a little in 1995; Japanese output has been growing more consistently but at a decelerating rate; and finally EU output experienced a sharp recession in 1992 and 1993, recovering in 1994.

Foreign trade

There is limited extra-EU trade in converted paper and board product and in general production in the sector is located as close as possible to the market to minimise costs. The volume/weight and value/weight ratios make transport over long distances uneconomic for many packaging products, and corrugated cases in particular. Long distance trade is more viable for hygienic products and stationery and office supplies and larger volumes of these are exported.

In 1995 the exports/production and imports/consumption ratios were an estimated 8.4% and 6.9% respectively. Both have been increasing since 1990. The accession of the three new Member States expands the size of the EU market, resulting in a fall in extra-EU export orientation and in import penetration.

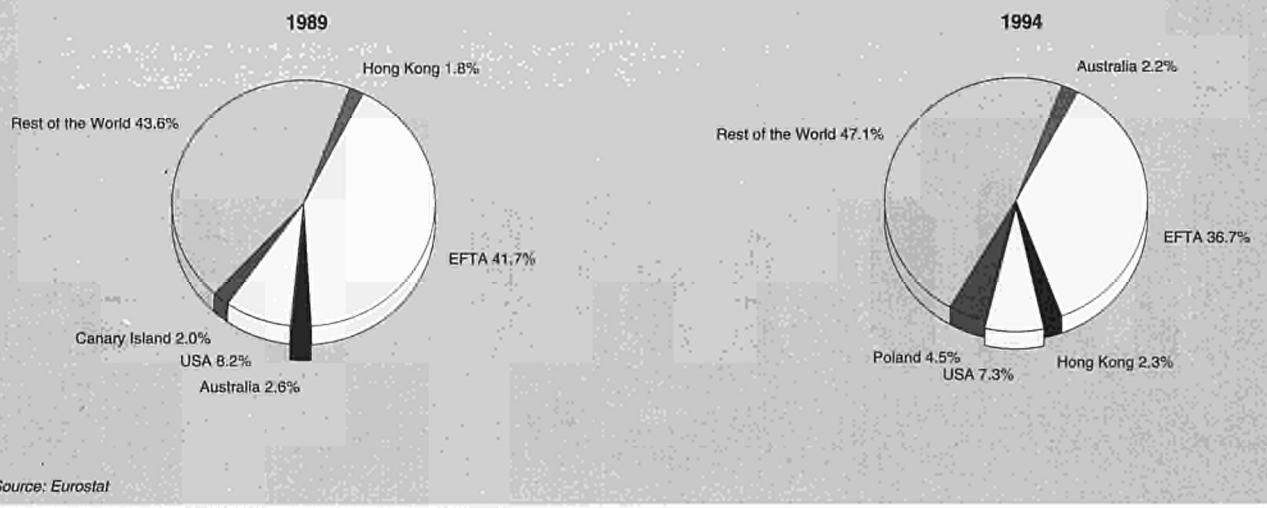
The main trading partners of the EU in 1994 were the EFTA countries which accounted for 37% of extra-EU exports and 66% of imports. The USA took only 7% of EU exports and originated 13% of imports. A significant and increasing proportion of exports go outside EFTA and the USA, particularly to former developing countries, now on the way to being called industrialised, a proportion which will probably increase.

MARKET FORCES

Demand

Packaging products account for about 60% of the value of the industry's output, and include corrugated and solid fibre board, folding and rigid board boxes and containers, flexible packaging, paper packaging and carrier bags and other wrappings for consumer products. In 1994 the demand for packaging products increased, as did prices, particularly for board packaging. The recovery continued in 1995, but slowed down sharply in the second half of the year, with prices peaking and showing signs of weakening in the fourth quarter. In the UK, for example, prices of corrugated and board products in September 1995 were 46% higher than in January 1994 but by November had fallen back tremendously. In Germany and France they were also 30-40% higher in the third quarter of 1995 but dropped in the end and in 1994 compared with the first quarter of 1994. The northern Member States benefited most from the 1994/95 recovery in packaging consumption.

Figure 6: Articles of paper and paperboard
Destination of EU exports



Source: Eurostat

Table 5: Articles of paper and paperboard
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	83.3	86.4	89.0	93.5	95.0	100.0	102.1	105.9	110.7	115.7
Unit labour costs index (3)	91.8	91.8	92.9	94.5	97.9	100.0	105.3	107.1	107.0	105.8
Total unit costs index (4)	88.1	86.1	87.7	91.9	97.8	100.0	103.2	102.4	100.2	99.9
Gross operating rate (%) (5)	9.8	11.4	10.7	10.1	9.3	9.8	9.5	10.4	10.1	10.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Recent growth followed a fall in overall demand and prices for packaging products in 1992 and 1993. Economic slowdown coincided with a sharp increase in packaging waste management efforts and a "packaging minimisation" movement throughout Europe as evidenced by anti-waste legislation, particularly in Germany, Belgium, the Netherlands and France. Implementation of UK waste legislation has been delayed until mid-1996 but is now firmly committed so there could soon be some disruption in this market. The resolute growth of container transport is adversely affecting demand for secondary packaging, while competition from rigid and collapsable plastics packaging continues in a multi-transport system to increase.

Household and hygienic paper goods are the second largest proportion of production in the industry. Demand for high quality products used in nursing, baby care and feminine hygiene has grown rapidly in the past two decades, as has that for lower value added products such as toilet paper, kitchen towelling and handkerchiefs. The market was already reaching saturation levels by 1992, particularly in northern Europe, so the recession hit hard and overall demand fell slightly in 1993. 1994 showed a modest improvement in demand but strong competition held down prices, particularly of disposable sanitary goods. In 1995 prices increased in response to input costs, particularly of waste paper, and volume demand levelled off. Consumption per head of most of these products in the EU is, on average, lower than that in the USA but has potential for growth, particularly in southern Europe.

Stationery and office products made of paper and board is the third largest field. It includes envelopes, labels, printing and copying paper and products for special applications such as facsimile and photographic papers, exercise books, agendas, albums and office files. Developing information technology has shifted demand from education and mail-related stationery such as envelopes, notebooks, ruled papers and ledgers, towards information technology-related stationery such as facsimile, computer, label and photocopying papers. The growth in overall demand for office supplies, is slowly and steadily rising as information technology, which is still a long way from saturation levels, spreads to smaller businesses and to private consumers. While 1993 saw a limited setback to sales of these products, there was a modest resumption in growth and prices in 1994, levelling off in the second half of 1995; in the UK stationery prices, for example, were 21% higher in September 1995 than in January 1994. There is an increasing competition due to climbing imports from the Far-East especially Indonesia of exercise and note books on the basis of GSP-agreement.

Supply and competition

During the recession of 1992 and 1993, lower raw material prices were more than offset by increased costs of labour,

Figure 7: Articles of paper and paperboard
Origin of EU imports

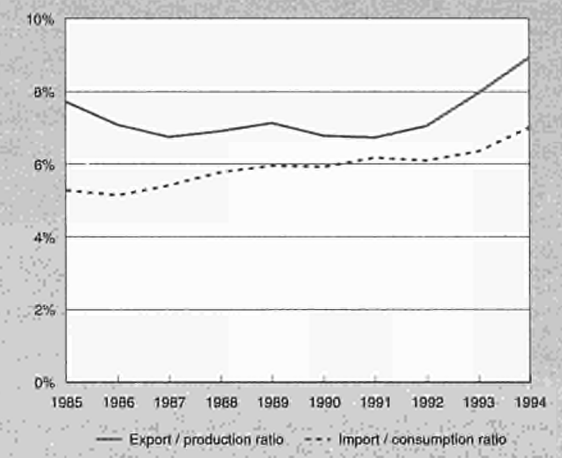
Source: Eurostat

Table 6: Articles of paper and paperboard
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.9	0.8
Danmark	1.2	1.2
Deutschland	0.9	0.9
Ellada	0.8	0.8
España	0.9	1.0
France	1.0	1.0
Ireland	N/A	N/A
Italia	0.9	0.9
Luxembourg	N/A	N/A
Nederland	1.1	1.1
Portugal	0.7	0.6
United Kingdom	1.4	1.3

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Articles of paper and paperboard
Trade intensities



Source: DEBA GEIE, Eurostat

transport, energy and investment finance. These effects were combined with depressed final prices due to the bargaining power of the sector's customers, including the food and consumer products processors and the increasingly-integrated major retail chains. The spread of pan-European product marketing by these integrated distributors, together with signs of heightened co-operation among the major players, has increased pricing pressures, especially for the medium-sized and smaller non-integrated paper and board converters. Similarly, part of the benefits of the 1994/95 recovery in demand were eroded by rising raw material prices which were extremely difficult to pass on to powerful customers.

One reaction to these pressures is the integration of the industry's customers backwards into paper and board converting. The most common trend has been forward integration of paper and board manufacturers into converting and sometimes into distribution. These merged companies have been building their own pan-European chains with operations proximate to Europe's major urban markets. In the packaging converting segment many of these developing groups are headquartered in the Nordic countries and have had a significant positive impact on the productivity of EU-based industry. The accession of Sweden and Finland to the EU has given a further boost to the development of these groups.

The hygienic products segment is dominated by several North American groups including Kimberly-Clark (recently merged with the Scott Paper Corporation), Proctor & Gamble and James River Corporation, which have introduced a vigorous consumer-oriented marketing approach. The merger of Sweden's SCA with PWA (D) was another important competitive move in this segment. In the office supplies sector the two majors are KNP BT (NL) and Arjo Wiggins Appleton (UK), both of which continue to developing merchanting networks, as well as converting operations.

Production process

In many areas, and particularly in the conversion of packaging materials, the sector is integrated upstream with paper and board production, but as a whole it still remains a fragmented industry of small and medium-sized firms with a variety of different production processes. However, the increasing concentration of groups of production units is boosting productivity in the branch generally, providing access to large investment funds, interchange of technology and know-how, guaranteed raw material supplies and joint product marketing.

INDUSTRY STRUCTURE

Companies

There are a number of large European paper and board companies which are integrated forwards into conversion of various types.

The inclusion of companies from the three new Member States has considerably strengthened this list both in terms of raw materials supplies, converted products in all main categories and export orientation beyond Europe. The list is now dominated by Scandinavian companies. Joining the current first four (three, now that PWA is part of SCA) will be: Stora

Table 7: Articles of paper and paperboard
Purchase of goods and services

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Belgique/België	676	732	799	845	929	1 034	1 018	1 072	996	N/A
Danmark	400	413	413	463	491	513	571	522	520	565
Deutschland	5 039	5 154	5 377	5 763	6 421	8 317	9 565	9 204	9 005	8 682
France	3 682	3 864	4 316	5 000	5 726	5 932	6 003	6 068	5 997	6 246
Italia	2 794	2 647	2 856	3 343	3 963	4 324	4 267	4 436	4 084	4 316
Nederland	1 060	1 046	1 162	1 238	1 360	1 456	1 442	1 466	1 524	1 580
Portugal	N/A	N/A	N/A	N/A	N/A	186	306	309	284	288
United Kingdom	4 751	4 273	4 570	5 470	5 768	5 623	5 758	5 507	5 381	5 520

Source: Eurostat, CITPA, DEBA GEIE

(S); UPM-Kymmene (SF), a merger effective from May 1996); SCA (S); Enso-Gutzeit (SF) which merged with Veitsiluoto in May 1996; MoDo (S); and AssiDomän (S). All these companies are integrated backwards into paper and board.

Only two of the European companies, KNP BT (NL) and Stora (S), were among the world's top ten paper and board companies in 1994, but the spate of mergers since then could bring two or three other European companies into this league.

In the 1985-1994 period, the distribution of the sector's product specialisation index has changed little across the EU-12 with the UK, Denmark and the Netherlands leading the list and Portugal and Greece at the bottom.

Strategies

Acquisition activity in Europe has varied with the availability of finance and swings in the business cycle. Many companies are highly geared and finance has been difficult to obtain. The recovery in 1994 and 1995 has stimulated mergers and acquisitions. The largest recent mergers were: the creation of KNP BT (NL) in 1993; the acquisition by Jefferson Smurfit (IRL) of the Saint-Gobain Paper-Wood interests and later of a 27.5% stake in Nettingsdorfer (A); SCA's purchase of a controlling stake in PWA (D); the merger, scheduled for May 1996 of Repola Ltd (SF) and Kymmene (SF) to create UPM-Kymmene; and the merger, also scheduled for May, 1996, of Enso-Gutzeit (SF) and Veitsiluoto (SF). More modest acquisitions include: AssiDöman (S) of NcB and later of MoDo Packaging; and David S Smith (UK) of Kaysersberg (F) in 1991 and of Spicers (UK) in 1993.

Most major manufacturers in the sector were involved in internal restructuring during the recent recession. The main emphasis was on disposing of peripheral operations in order to concentrate on chosen "core" activities. Modest investment in Europe continues to be made by North American companies, while Sappi (South Africa) and Amcor (Australia) have also appeared on the European scene as part of a general world-wide expansion. Despite these developments there is still a large number of small non-integrated converters throughout the EU.

The impact of the Single European Market (SEM) process on the products of paper and paperboard transforming is largely positive. Free movement of goods and services within the sector has stimulated intra-EU trade, and resulted in increased M&A activity. While Single Market measures have encouraged larger companies to reorganise distribution channels, industry location, which is dependent on the sector's raw material sources, has not been as significantly affected.

REGIONAL DISTRIBUTION

Since the industry produces higher value/weight ratio products than the commodity grades of pulp, paper and board and its production runs are short, location is widely scattered, with production units located near markets rather than materials. However, to the extent that demand is stronger among clusters of more developed EU regions there is some variation in regional locational patterns. Increasing acquisition activity by the suppliers of input materials is by no means always reflected in physical integration. The tendency for input materials suppliers to locate near their waste paper supplies also coincides with the market location requirements of the converting operations. This tendency towards a widely dispersed distribution of production units is assisted rather than hindered by the increasing trans-national ownership of the industry.

ENVIRONMENT

This sector's environmental concerns are twofold: they reflect the concerns of the pulp, paper and board sector via the demands of its own customers to use "environmentally friendly" paper and board raw materials; and, more directly, by the sector's own need to use environmentally acceptable processes and to participate in Europe's developing national waste management initiatives.

In the context of the SEM process, the industry regards the lack of harmonisation of some environmental and technical regulations as a remaining internal barrier. A level environmental playing field for countries outside the EU is also regarded as a major priority.

The paper and board converting sector already manufactures products meeting modern environmental standards. Waste paper is the most important raw material and accounted for 57% of the total fibre furnish for the EU-12's paper and board output in 1994 while waste paper recovery represented 41% of total new supplies of paper and board. The two rates have increased steadily over recent years. In the tissue and board packaging manufacturing the percentage of recycled fibres used ranges between 60% and 100%.

In the office products and stationary production, the use of paper and board based on recycling or recovered fibres, is lower but increasing rapidly. For non-recycled fibres, "elemental chlorine-free" (ECF) bleached pulp has been phased in across Europe, and "totally chlorine-free" pulp is now being phased in, particularly in the northern Member States.

REGULATIONS

There is a growing amount of legislation at national and EU level stemming from environmental awareness. This is largely aimed at holding down the volume of packaging and paper used, and places responsibility for recovering and recycling waste upon the industrial producers and users of packaging. National legislation includes Germany's strict Packaging Ordinance, together with similar legislation in France, Belgium and the Netherlands. The United Kingdom is introducing similar measures in 1996, and other Member States are at various stages in their waste management strategies. Variations in the timing of introduction and in the relative strength of this legislation from country to country tends to distort trade flows. The German Ordinance, for example, initially led to saturation of the European market with waste paper and a resultant collapse in prices.

After several disputed drafts, the EU Packaging and Packaging Waste Directive was approved by the European Parliament and adopted by the Council of Ministers at the end of 1994, following rewording to allow for Belgium's concern that its postponed Eco-tax on packaging was endangered. The Directive sets a five-year target obliging Member States to recover 50-65% of waste packaging, and to recycle 25-45%, leaving room for composting and incineration. These ranges allow for national variations in the progress of waste legislation, although some Member States would prefer a more stringent approach and greater harmonisation. Others feel it does not go far enough in reducing the distortions caused by the stringent legislation in their neighbouring countries. International competition, however, is forcing industry in countries with less advanced environmental legislation to adopt the standards of stricter countries.

OUTLOOK

Demand and prices for the sector's products are now levelling off and some prices are falling, so that the industries profitability is likely to deteriorate. Employment, therefore, seems unlikely to grow and may continue to slowly fall. The positive trade balance generated by the EU is small, representing only about 1.6 % of the value of the sector's total output in 1995, but the addition of the three new Member States doubles this figure to about 3.7%. There is likely to be a continued growth in investment by the sector in Central Europe, and to a lesser

extent in East Europe and the former Soviet Union although the benefits of this investment could take some time to develop.

Restructuring and concentration in the industry is likely to continue, concentrating ownership of the industry and financially underpinning a continued improvement in productivity. It will, however, have less effect on the relatively fragmented regional distribution, and small average size, of operating units.

The main concerns in the sector in the longer term are the increasing cost of environmental measures together with labour costs and additional expenses. Participation in the various national waste management initiatives across the EU is causing a significant increase in costs, and the paper and board converters have to find new ways of responding to this, and to the increasing strength and pan-European nature of their major customers. This will force the sector's companies to look into new market possibilities in Central and Eastern European countries, the Baltic Rim and Russia. The Baltic Rim with its Russian exclave Kaliningrad, in particular, has a central and unique geographical position on the cross-roads between north, east and west trade routes. This area is a valuable gateway to new international co-operation in Europe. Continuation of the SEM integration process will also benefit the industry. In particular, a level environmental playing field within and outside the EU, greater harmonisation of technical regulations and reduced currency instability are all regarded as potential benefits.

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Publishing, printing and reproduction of recorded media

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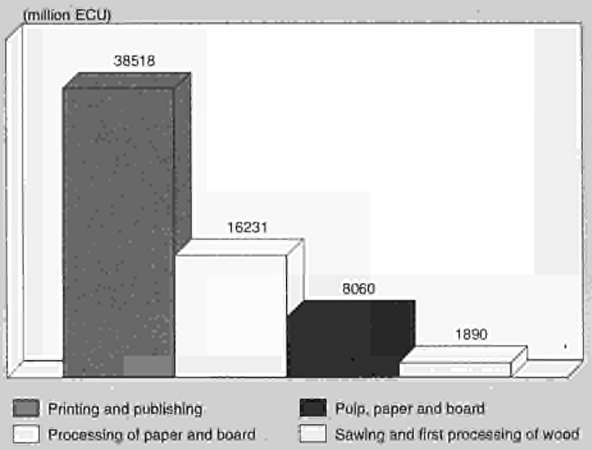
Printing and publishing, with all its historical and cultural importance, is a mature sector which achieved rapid growth up to the late 1980s but saw a slowdown in production in the first half of the 1990s. Traditional forms of reproduction of recorded media also constitute mature markets with low to moderate growth potential. The sector is constantly restructuring as ongoing developments in information technology and telecommunications threaten the future of paper-based production, although the changes implicit in this process can only occur over the long run. In the medium term the economic upturn and increasing demands for information in all its guises will underpin steady growth in output. Rising costs, especially of paper, are contributing to competitive pressure in the short term.

Figure 1: Printing and publishing
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

The printing, publishing and reproduction of recorded media sector comprises all the stages necessary to transform a piece of creative writing, art or information into a product available for distribution to the public. It encompasses all of NACE Rev. 1 category 22, which in turn incorporates all of the old NACE categories 473 and 474, together with former NACE 316.91 (founding of printing type) and NACE 345.20 (manufacture and reproduction of gramophone records and pre-recorded audio and/or video tape). The finished products of the sector are diverse and include books, encyclopaedias, daily and periodical press, maps, musical scores, cassettes and, increasingly, computer discs and on-line information services (with the latter categories not included in this chapter's statistics). The publishing sector overlaps into computer and other services which produce written reports and secretarial support services. Because of the diversity of the publishing sector and its close links with the printing industry - globally, publishers absorb 40-50% of print production - EU statistics cover both sub-sectors together. To date, the statistics for the sector do not cover published information in electronic form - hence the growth of that medium may be recorded as a competitive threat to printing and publishing, though it might be more usefully analysed as a new product range within the overall ambit of publishing.

Recent trends

As mentioned, statistics for this sector only cover printing and publishing (and not the reproduction of recorded media or newer, electronic published products). This should be borne in mind in the review of recent trends and later sections.

EU apparent consumption and production in current prices rose by 67-68% between 1985 and 1994. Overall consumption growth slowed down in 1992 to about 1% and fell by 2.7% in 1993, reflecting the recession in the EU, but recovered by slightly over 2% in 1994. Production followed similar trends, but the 1994 recovery petered out in 1995 as the current value of production stagnated. The accession to the EU of Austria, Finland and Sweden added 13.5% to total EU production values (on the basis of 1995 estimates).

Employment in the sector grew steadily from 1986 until the onset of recession in 1991 when EU printing and publishing employment peaked at 882 654; by 1995, it had fallen to an estimated 817 318 - a loss of 65 336 jobs over that four year period. In 1995, Austria, Finland and Sweden employed a total of 91 500 people in the printing and publishing sectors.

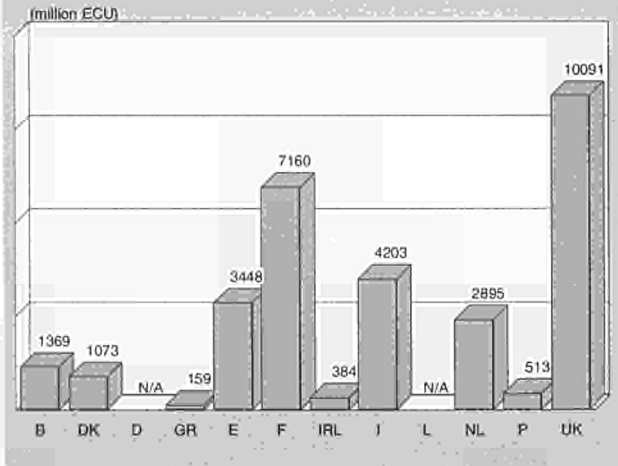
International comparison

The USA remains the world leader in printing and publishing. In 1994, USA production was worth 53% more than that of the EU, partly due to sustained growth in the USA since 1991 - compared to the much more uneven EU production performance. Japanese production in 1994 was worth almost 20% more than that of the EU, though it still fell below USA levels; Japanese production growth rates have constantly outstripped those of both the EU and the USA over the last decade.

Foreign trade

The EU trade balance with the rest of the world is in surplus. While in the 1985-1994 period extra-EU exports grew less rapidly than extra-EU imports, extra-EU export growth was higher than import growth in 1993/94. As a result the extra-EU

Figure 2: Printing and publishing
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Printing and publishing
Main indicators in current prices (1)

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)
Apparent consumption	51 666	54 629	60 657	69 035	77 404	82 996	86 683	87 580	85 235	87 042	N/A	N/A
Production	53 620	56 445	62 542	70 921	79 400	85 133	88 786	89 834	87 682	89 645	89 312	101 343
Extra-EU exports	3 257	3 060	3 109	3 248	3 557	3 778	3 969	4 161	4 450	4 722	N/A	N/A
Trade balance	1 954	1 816	1 885	1 885	1 996	2 137	2 103	2 253	2 447	2 602	N/A	N/A
Employment (thousands)	801 632	786 388	811 048	832 383	865 421	882 281	882 654	858 355	835 020	818 263	817 318	908 818

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Printing and publishing
Average annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	9.9	6.0	1.2	2.1
Production	9.7	5.9	1.3	2.2
Extra-EU exports	3.0	5.7	4.2	6.1
Extra-EU imports	4.7	6.6	5.6	5.8

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Printing and publishing
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	3 256.9	3 060.1	3 108.5	3 247.5	3 556.5	3 778.4	3 969.1	4 161.4	4 450.0	4 721.8
Extra-EU imports	1 303.1	1 243.9	1 224.0	1 362.1	1 561.0	1 641.5	1 866.4	1 908.3	2 002.8	2 119.4
Trade balance	1 953.8	1 816.2	1 884.5	1 885.4	1 995.5	2 136.9	2 102.7	2 253.1	2 447.2	2 602.4
Ratio exports / imports	2.5	2.5	2.5	2.4	2.3	2.3	2.1	2.2	2.2	2.2

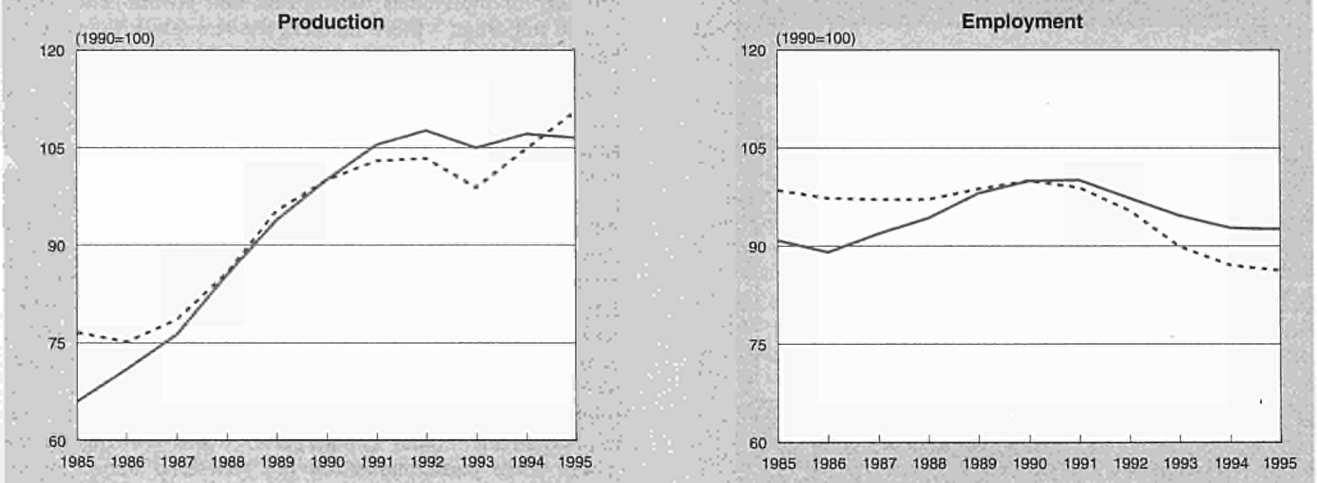
Source: Eurostat

Table 4: Printing and publishing
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	81.1	85.7	89.8	94.9	97.6	100.0	99.7	102.1	103.6	107.0
Unit labour costs index (3)	96.7	95.2	94.5	94.5	97.7	100.0	107.4	109.4	109.6	108.8
Total unit costs index (4)	87.1	86.9	89.6	92.8	97.6	100.0	105.1	106.4	105.7	106.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
Source: DEBA GEIE, Eurostat

Figure 3: Printing and publishing
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

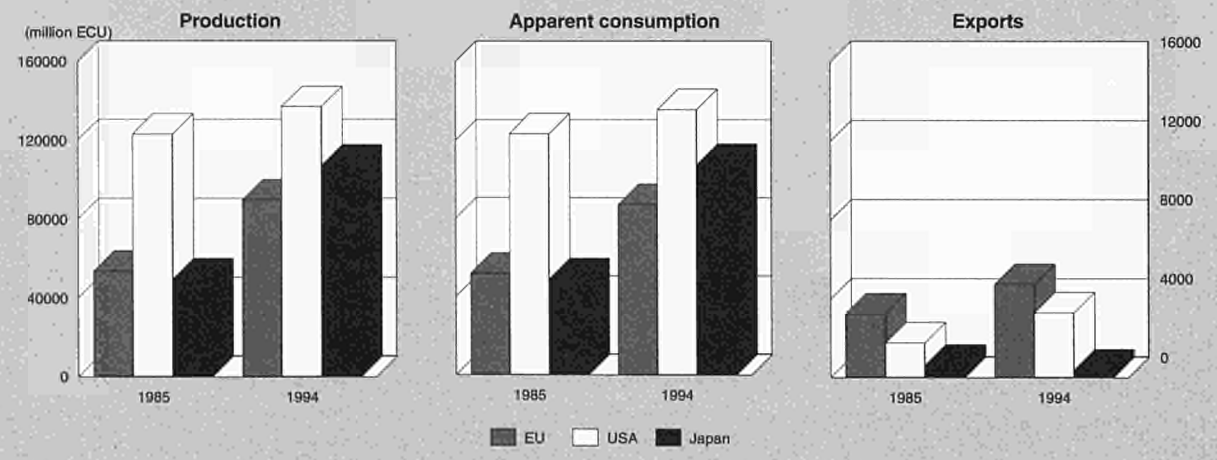
trade balance has increased, with especially rapid growth since 1991. In 1994, the value of EU exports in the printing and publishing sector was almost 2.3 times the value of imports.

The EFTA countries (some of whom have now joined the EU) have traditionally been the EU's main export markets in the printing and publishing sector, surpassing trade with the USA: Sweden and Austria alone took 17.3% of EU exports in 1994. The USA is the most important source of EU imports (37.5% in 1994). Intra-EU trade is growing compared to trade with the rest of the world. The accession of Austria (which contributed 10.1% of EU imports in 1994), Finland and Sweden to the EU further increases the relative importance of intra-EU trade.

Trade intensities are very low in the printing and publishing industry: the export/production ratio is commonly between 4% and 5%, and the import/consumption ratio, while rising in recent years, still fell below 2.5% in 1994. This mainly reflects the fact that most of the output of the industry is based on locally or nationally specified demand preferences, especially with respect to language - thus, national suppliers tend to dominate national markets.

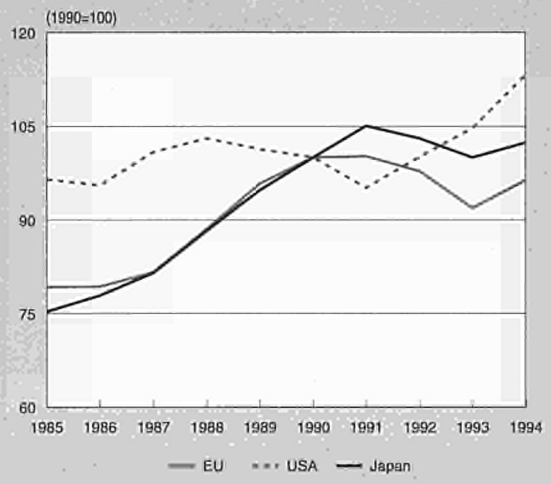
Although language considerations predominate in matters of trade, new markets are developing as economic frontiers expand. Within the EU, the wide use of the English language has allowed the United Kingdom to benefit the most from the Single European Market, closely followed by the Netherlands. The United Kingdom is becoming a crucial centre for European publishers, as well as an important entry point for North American printers and publishers wishing to establish themselves in the European market. Strong demand growth in Asia is also creating new export opportunities (again, principally English language-based).

Figure 4: Printing and publishing
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Printing and publishing
International comparison of production in constant prices



Source: DEBA GEIE

MARKET FORCES

Demand

The potential market for the output of the printing and publishing sector in the EU is all persons above a very young age, reflecting the very high levels of literacy which prevail. For newer products, different types of literacy (notably in computers) are prerequisites - while lower than basic literacy levels, these newer skills are becoming more widespread.

Developments in the book, magazine and newspaper trade (in either their traditionally or electronically published formats) depend on a complex variety of factors. For private consumers these include economic and social aspects such as demographics (with, for example, computer literacy higher amongst the young), education, leisure trends, number of public libraries, and purchasing power.

Demand from the commercial sector is related both to the overall level of development of particular economies and current economic conditions. Print, in particular, is a sensitive indicator of economic activity - the current situation of short paper supply and relatively high price reflects, in part, buoyant macroeconomic conditions. While the publishing sector is the key market for printing output - newspapers alone account for 20% of printing output - and is slightly less susceptible to the vagaries of economic cycles than other media (though newspaper advertising is highly market-sensitive), commercial printing for individuals, businesses, and government bodies is also important - these markets are strongly influenced by business cycles.

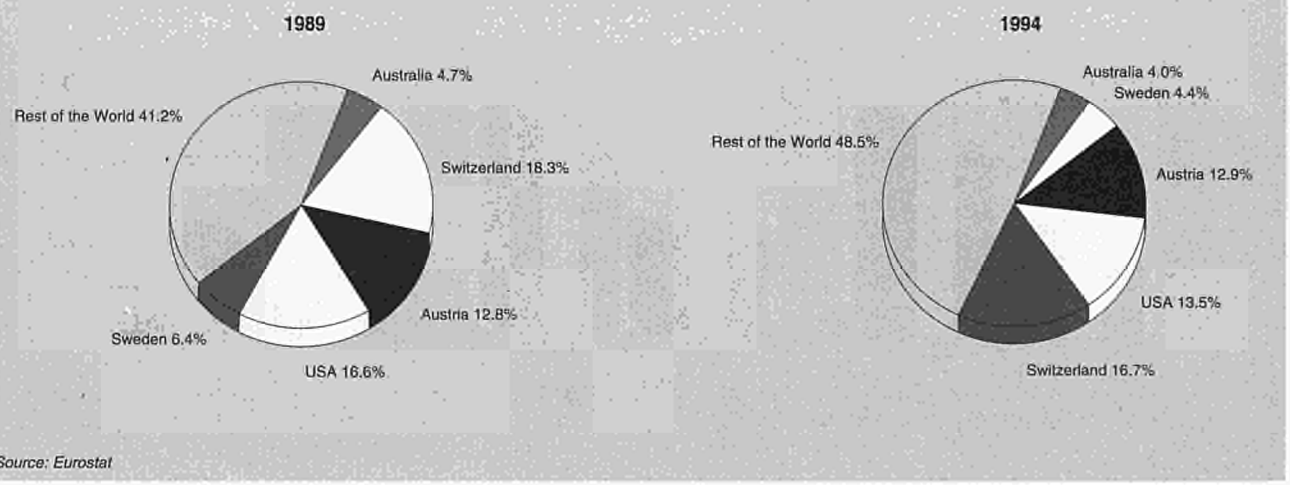
Propensity to read is positively correlated with the level of education attained, income levels and age. However, this varies across countries with the importance of these factors more evident in Southern European Member States where the market is less mature. For example, on average, 93% of graduate Italians read regularly - compared to a figure of 26% for those less qualified. On the other hand, analysis in the Netherlands indicated that the aggregate explanatory power of sex, age, education, profession, income and wealth on book reading was low. Rather, it was concluded that there were people in all strata of society in the Netherlands who are intensive readers with others who hardly read at all. In general, it was found females read more than males and people under thirty read more than their older counterparts. While growing female labour force participation has the beneficial impact of increasing household incomes, it will, however, create time pressures which reduce leisure time available for reading.

Analysis of consumption trends for books reveals a marked difference between the South and the North, with Southern Europe characterised by relatively weak reading habits. However, Spain records one of Europe's highest levels of per capita expenditure on books despite the fact that 63% of the population is estimated not to read for pleasure - at least part of the paradox is explained by high book prices in that country. With improved education and changing cultural habits the importance of reading in Southern Europe is increasing, with the most committed readership among the young. (Somewhat similar trends are taking place elsewhere in the world - for example, rising literacy levels and increased leisure time are amongst the factors prompting strong demand growth in Korea, Taiwan, Malaysia and Indonesia).

The market for the press in Southern European countries also remains relatively underdeveloped. Huge disparities are shown by the following figures on the ratio between daily newspaper circulation and population: Sweden and Finland are top ranking in the EU with 472 and 471 copies respectively sold daily per 1000 inhabitants in 1994 against 155 in France, 105 in Spain and only 38 in Portugal.

In contrast to Southern Europe, slow population growth, the impact of the economic cycle and technological factors will

Figure 6: Printing and publishing
Destination of EU exports



Source: Eurostat

be key variables influencing demand in Northern Europe. The ageing of the Northern European population will boost demand to the extent that the newly retired will have increased leisure time to devote to reading, but the decline in the younger age groups will impact negatively on demand. The interplay of these factors will be particularly critical in Germany, which is by far the largest market in Europe - German book purchases alone were worth almost 6.6 billion ECU in 1993, over twice the level recorded in any other country. Falling school entries intensify negative trends, as a reduction in the number of children has not been offset by wider provision of education.

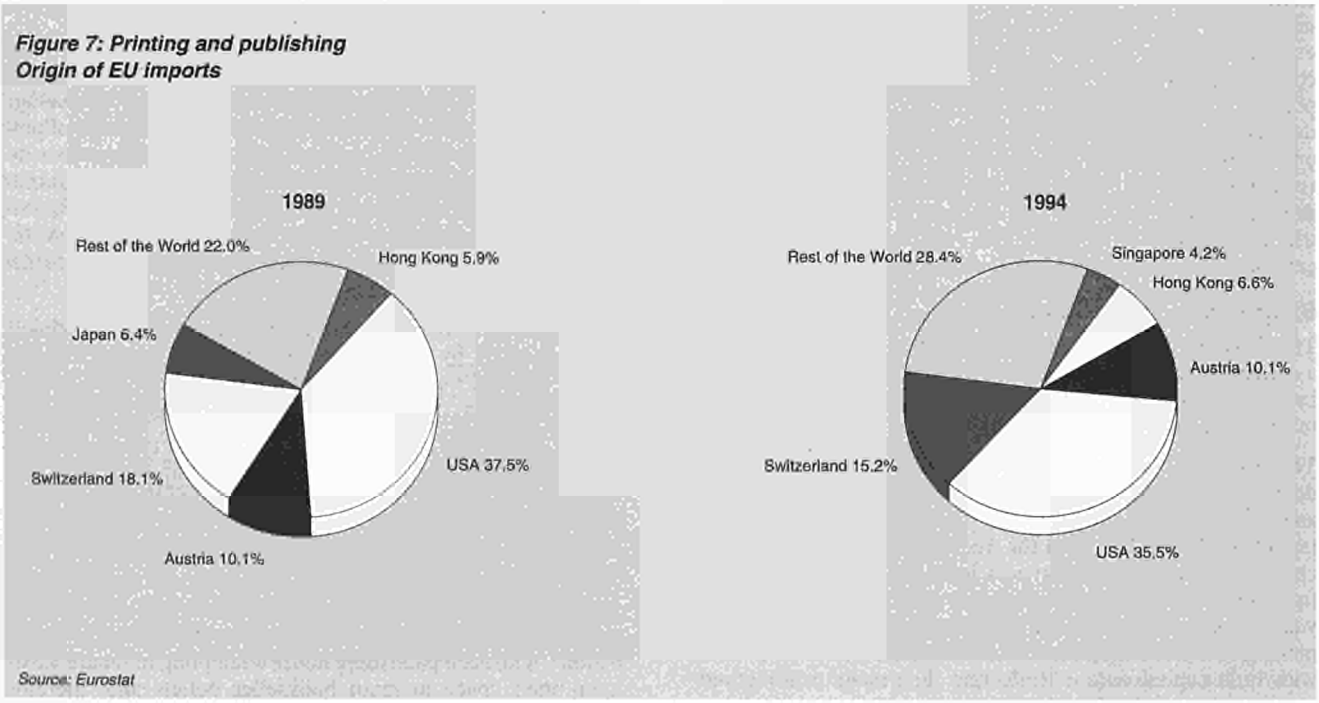
For a long time, children have been considered prime consumers, increasingly as "leisure consumers" in their own right but principally in relation to educational demand. Educational success is a key factor for professional development and, thus, one of the main sources of parental concern. Textbooks, encyclopaedias and dictionaries, as part of the educational publishing sector, represent rapidly expanding markets. With the future health of the publishing, and by extension much of the printing, sector linked to overall levels of education, there is considerable potential for demand expansion in non-EU markets as levels of education and literacy improve worldwide (see the earlier discussion of Asian trends). The impact of improvements in primary and secondary education in Southern EU Member States on demand for publications is already indicative of this potential. Furthermore, third level education, the provision of which is increasing most rapidly in the less-developed EU Member States, is the most "intensive" in terms of publication requirements. The educational publishing sector is, at the same time, at the forefront of technological innovations (discussed in more detail below): for example, encyclopaedias may be readily made available in CD-ROM format, while on-line services may allow teachers design their own textbooks. Whether rising demand in Southern Europe and elsewhere will, therefore, be met by traditional published products will partly depend on the pace of technological development and its absorption.

At a more general level, the impact of new technologies on demand for the output of the publishing and printing industry is multi-faceted. For example many book publishers have successfully exploited the Internet and similar services to improve their advertising and marketing performances. And the market for published manuals has been boosted by the growth of new electronic products. However, there is no doubt that as information technology advances become increasingly diffused across a wider population the market for "electronic" as opposed to "printed" information will expand. CD-based and on-line publishing presents an increasing threat to the printing industry.

Currently, CD-ROM (Compact Disc - Read Only Memory) is capable of storing up to 550 million characters - the equivalent of about 25 000 printed pages - and this capability will expand over the foreseeable future. Reflecting this, CDs are becoming increasingly important storage mediums for activities such as archiving, data banks, and directories. A CD-ROM title can also integrate text with images and sounds. The number of CD-ROM disc drives sold world-wide is projected to grow by almost 50% this year - from 30 million to 44 million at the end of 1996. The value of published titles sold in CD-ROM format went from 176 million ECU in 1993 to 312 million ECU in 1994, and is estimated to reach 114 billion ECU by 1999. The main areas of CD-ROM publishing expansion are scientific, technical and medical (STM); special interest segments (such as history, literature and music); as mentioned, educational (including language teaching); and encyclopaedias, bibliographies, and dictionaries. Increased popularity and improved technology is reflected in a fall in the average European consumer CD-ROM disc price from 40 ECU in 1994 to less than 24 ECU at the end of 1995. Specialist services can cost a great deal more, though relative price differentials are often much more marked - for example, an Amdahl computer manual costs almost 40 times more in printed hard copy than in CD-ROM version.

Information supplied on electronic on-line services - such as the Internet - also challenges traditional printing and publishing markets (though it is probably more correct to describe them as expanding the range of publishing products, broadly defined). Again, the key markets to date have been specialised ones - such as in the legal, scientific, medical and financial sectors. The leading publishing group Wolters Kluwer (NL) - specialists in business and legal publishing - currently supply 8% of their product in electronic form (both CD and on-line) and expect that figure to reach 15% by the year 2000. But the market penetration is extending beyond the specialist subsectors: 60 US newspapers now offer electronic editions of their products, and some literary agents already sell the electronic rights to their clients' works separately. A key constraint to the further expansion of this latter subsector (electronic

Figure 7: Printing and publishing
Origin of EU imports



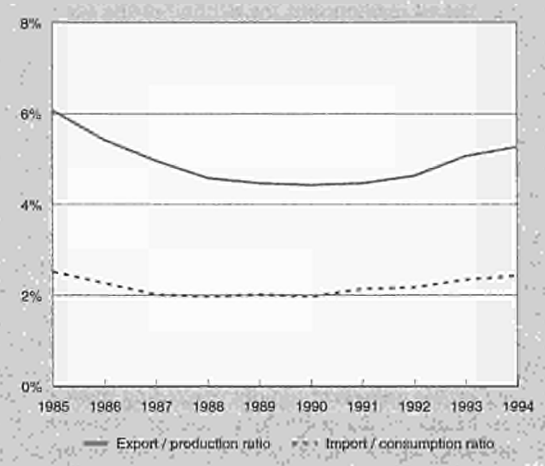
Source: Eurostat

Table 5: Printing and publishing
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.81	1.02
Danmark	1.62	1.35
Deutschland	N/A	N/A
Ellada	0.51	0.67
España	0.81	1.28
France	1.16	1.13
Ireland	0.75	0.74
Italia	0.91	0.79
Luxembourg	N/A	N/A
Nederland	1.60	1.74
Portugal	0.73	1.08
United Kingdom	1.53	1.60

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Printing and publishing
Trade intensities



Source: DEBA GEIE, Eurostat

books) will be the ability to monitor and enforce copyrights - a task much occupying minds in the industry at the moment.

Technological progress has also increased the capabilities of mainstream businesses (and to a lesser extent individuals) to carry out printing jobs in their own offices (or homes) which might otherwise have been contracted to specialist printing firms. This may not necessarily reduce overall demand - some of the "in house" printing being undertaken would not have occurred had the firms not acquired printing capabilities, while they often require extra inputs such as stationery, labels, compliment slips and manuals to facilitate their additional printing activities. Where threats to the printing industry are more marked within the business sector are in areas such as on-line (rather than printed) marketing, in the use of video training facilities (rather than printed manuals), and in data/archive storage. At present, an estimated 80-90% of corporate information is in printed rather than electronic format, a percentage certain to fall over the next few years, with consequent falls in demand for printed and (traditionally) published products.

The above trends clearly indicate a growing market for new forms of recorded media. More traditional forms - such as exclusively audio CDs and VCR cassettes - are better described as markets at or approaching maturity. The market may be expanded by the advent of digital video discs (capable of considerably superior sound and image quality) which can play both films and music, and which can also store computer data. However, there is unlikely to be significant market growth until these discs allow for recording on the part of the user (something the first entertainment-orientated versions do not do), and unless the price can be kept reasonably low from the early stages of development (which is not usually the case with new products of this sort).

Supply and competition

The European printing and publishing sector remains more a collection of national industries than an integrated European industry. This is evident from the small proportion of industry turnover accounted for by exports.

The absence of an "international" industry is particularly evident in the printing sector where many contracts are small and often awarded informally to local suppliers whose track record is known. The need for frequent contact between purchaser and supplier also favours local producers as does the time-critical nature of much of the work. Technological advances, particularly in DTP (desk-top publishing), are also making it increasingly easy to enter the publications market with little capital outlay. Reflecting this, many printing and publishing companies in the EU are small firms employing less than 10 workers - less than 1.0% of printing firms employ more than 500, according to Intergraf data, while 85% of companies have less than 20 staff.

A further barrier to 'Europeanisation' of the industry is the multiplicity of languages in use across the EU (though the consequent need for translations adds to industry output). There are at the same time strong internationalising trends within the industry, as there are also towards concentration, and international publishing is growing, particularly in English which as well as being an important first language is also the most important second language in the world. Already, 40 % of the global book market is English language-based. This presents a market advantage to English-language publishers, mainly in the UK and the USA, reflected in their dominant position in the publishing industry. Some of the larger Continental European publishing conglomerates - such as Bertelsmann (D) and Matra Hachette (F) - have responded by acquiring anglophone subsidiaries. The importance of the Spanish, French and (particularly in Eastern Europe) German languages provides opportunities for operators in those countries. In contrast, while Italy has a well-developed publishing industry it is more or less confined to its national market.

Stagnant sales in the European book market in recent years have held down growth in the number of titles published. This trend has contributed to a fall in the size of average print runs and price rises through increased unit costs of production. A study jointly undertaken by Intergraf and consultants PIRA (UK) indicates that in major European countries the average book run length has decreased, while the number of titles has risen and overall production volume fallen. Increasingly shorter print runs is a universal trend amongst other print media, as well as books.

The problem of flat sales has been compounded for printers and publishers by rising costs, especially of paper. With the global demand for newsprint estimated to grow by 2.7% per annum between 1995 and 1997, and with supply only likely to grow by 1.2% a year, these rising costs are set to continue for at least another two years (at which stage some new production capacity should have come on stream). The result in some cases has been a newsprint shortage for some newspaper groups and a general trend towards heightened competition in the face of falling margins.

A strategy of differentiation practised by the major publishing groups can be seen, to some extent, as "competition by attrition", with each publishing house attempting to secure maximum shelf space in retail bookseller outlets and, literally,

crowding out its competitors. Similar competitive practices are reflected in the trend towards abandonment of price maintenance arrangements between publishers and retailers - such as the Net Book Agreement in the UK - which may have the effect of squeezing out smaller publishing companies and retailers who find themselves unable to compete with the discount pricing practices (especially regarding bestselling titles) of the larger publishers and retail chains.

Book publishing has been affected by developments in audio-visual media, but the press has been affected even more. While overall advertising expenditure, the principal source of finance for the press, has risen sharply over the last ten years, advertising spending in the newspapers has dropped continuously (though this is less pronounced for regional and local newspapers). In particular, press market share has been lost to TV advertising. Liberalisation of the broadcasting sector is an ongoing threat as governments loosen restrictions on advertising on TV and the importance of satellite broadcasting grows. On the positive side, for the publishing industry, as the number of available TV stations grows and audiences become increasingly fragmented, TV may become progressively less cost-effective as an advertising medium. Despite forecasts that dailies, weeklies and periodicals would disappear as a result of the rise of audio-visual media, the principal newspapers have maintained profit levels. However, the role of newspapers is changing and, while they continue to carry news, increasingly their emphasis is on comment and analysis. And, as mentioned above, some are themselves venturing into new technology-based areas, such as on-line services.

The growth of TV advertising also affects the printing industry directly. Intergraf estimate that almost two-thirds of turnover in the graphic industry depends either directly or indirectly on advertising with the result that the industry's development is susceptible to media advertising shares. Rising TV advertising share is not necessarily as gloomy a prospect for printers as it is for the press. While TV is used to create general awareness, printed mediums remain the key to dissemination of much of the background factual information needed to sell goods and services. Furthermore, market research and increasing ranges of electronic databases enable progressively finer market segmentation for targeted advertising using printed materials. Similarly, changes in the nature of press advertising have contributed to increased newspaper bulk with "advertorial" features and inserts increasingly being used. Soft-sell publications, often provided for free, in-flight airline magazines for example, are also proliferating.

As discussed in the previous section, the printing and publishing industry will be progressively challenged by technological developments. Given the enormous text and image/data storage capacity and know-how of CDs and on-line technologies, these will play a major role in shaping future competitive conditions for publishing and printing. The idea of completely paperless reference libraries, for example, may be utopian, but the capacity for relatively compact electronic archives to replace bulky paper-based stocks (with high maintenance costs) clearly exists.

Production process

A high dependence on skilled personnel is the key characteristic of the printing and publishing sector. In Denmark, where manpower is particularly expensive, printing labour costs represented about 38% of total costs in 1993. This compares with 17% of total costs in Portugal, a relatively low labour cost country. Labour costs as a proportion of total costs have, however, fallen across EU Member States. The fall is most evident in Southern European countries such as Portugal where modernisation of the industry's technological base and the achievement of scale economies transformed the printing and publishing sector during the 1980s.

The main stages in the manufacture of a book are: editing the work following acceptance of the author's manuscripts; a technical stage where typesetting and pagination allow a calculation of the costs of production and the raw materials needed; return of the composed text to the publisher in proof form; initial correction; layout and illustration with preparation of a "dummy" copy for the printer; checking printer's final proofs; printing a determined number of copies; distribution of the requisite number of copies to points of sale; and acceptance of returns or unsold copies at the publisher's expense. A special feature of publishing is the cost burden of "returns", unsold copies. This burden is all the more difficult to bear in a period of recession. Publications which are not sold are burned and destroyed/recycled. In the book market part of the problem is that available sales space tends to remain constant, whereas the number of titles on the market continues to grow. Inevitably, this disparity leads to a reduction in the time a book is on display, and its overall life-span. Volume and speed of returns has affected some book publishers disproportionately, with several experiencing rates of return of over 60%.

Computer-assisted publication (CAP) and desk-top publishing (DTP) are changing the nature of production in the printing and publishing sector. As CAP is suitable to limited print runs it is particularly cost-advantageous to smaller publishers. Computerisation of design and manufacture has allowed considerable gains in time and cost, but CAP adds to salary costs in the short term, since the process requires new skills on the part of the workforce. An Intergraf/PIRA report suggests that lack of suitably skilled personnel is likely to remain a serious problem for the printing and publishing sector. On the one hand, training may not keep pace with the industry's needs while, on the other, the sector's image as old and declining may deter many high quality graduates from joining it.

Computer applications and the growth of computer power will continue as the major factors shaping publishing and printing technology in the medium term. According to the Intergraf/PIRA study, in 10 years' time computers are expected to be 40 times more powerful at an equivalent or reduced cost to today. Software programmes are also being developed rapidly to utilise the associated increases in computer speeds and memory sizes. The digitisation of all means of communication is generating vast quantities of digital information which the printer needs to be able to process as an alternative to "camera ready copy". In these circumstances, pre-press systems have seen more rapid development than any other production machinery used by printers and publishers. At the pre-press stage, the impact of falling costs of equipment and simpler systems of mono and colour origination has been compounded by many new processes including Photo-CD, digital photography and colour calibration, high fidelity colour, and stochastic screening. Even small printing and reproduction firms now use fully electronic pre-press systems.

Photo composition has replaced hot metal as the main technology at the printing stage. New and improved (including electronic) printing systems are developing rapidly - including automatic/computer make-ready, waterless litho, laser printing and platemaking, and short run colour copiers and printers. Much of the new equipment is intended for 4-colour short runs up to A3 paper size. The growth of computers' capacities is assisting these trends. Micro-publishing (desk-top publishing) has also brought about considerable changes in the sector by facilitating PC-driven integrated text and image processing. Many measurement and control functions are now also carried out by computer.

These technological innovations imply improved qualifications for staff and increases in productivity. EU labour productivity rose by 32% in the ten years to 1994 while unit labour costs increased by just 12.5%. (Labour productivity

in the three new EU entrants is higher than in the pre-existing 12 Member States). In time, machines will be available which unskilled operators can use in offices to produce short runs of high quality colour print - with clear implications for contracted out printing. At the same time, this technology is opening up opportunities for small printers such as "network or "in-plant" printers to large companies or groups of companies, and DTP kiosk ordering systems in precinct locations where the customer does the job and pays by credit card.

Competing with printed media, digital electronic media (where information is held in digital form) are developing rapidly - including electronic books, prototype electronic newspapers, but, above all, new forms of published product such as CD-ROM and CD-I. For example, a 9-volume dictionary weighing 50 kg can now be captured on 6cm disc weighing a few grams and the entirety of its information accessed in a matter of seconds. The main barriers to development are lack of software standardisation, a limited installed hardware base for CD-ROM drives (though this is growing - see above) and lack of good portable devices for reading digital media of all types, but in all these cases the barriers are being overcome.

Publishing firms are constantly examining ways of becoming more involved in these developments through, for example, investment in data-processing units, data banks and videotext. Printers have, for the most part, remained dedicated to the more strictly technical operations, according to Intergraf.

INDUSTRY STRUCTURE

Companies

Europe's printing and publishing industry is highly fragmented. Most of the sector's constituent companies are small in size (a typical printing firm employs less than 20 people) and serving local or regional markets. This is particularly true in the printing industry. There are, however, a number of major players whose activities involve both publishing and printing as well as a wider range of economic activities involving paper-based and other media. The main groups such as Bertelsmann (D), Matra Hachette (F), Pearson (UK) and the Anglo-Dutch group Reed Elsevier range even further afield. Pearson, for example, is heavily involved in the tourist sector. Other important companies include Groupe de la Cite (Havas) (F), Grupo Planeta (E), and Wolters Kluwer (NL). Axel Springer (D) tops PIRA International's listing of Europe's top newspaper groups. Non-EU multi-media groups such as Time Warner (USA), Paramount Communications (USA), News Corporation (AUS) and Readers Digest (USA) have presences in all the main mass media markets (books, cinema, television, press), including EU markets.

There is, therefore, in effect, a polarisation of the industry between, on the one hand, the largest publishing and media conglomerates and, on the other, an enormous number (tens of thousands) of small companies serving national markets. Within each EU state, the ten largest publishing companies (or their associates) usually control 50-70% of industry turnover. The business strategies adopted by companies in the sector vary according to their size.

Strategies

The larger companies have adopted strategies of concentration, globalisation, and diversification or specialisation depending on the activity under discussion.

The 1980s and early 1990s saw a trend towards concentration by acquisition and merger. Smaller, specialist publishing companies were particular take-over targets - their expertise and knowledge of often lucrative niche markets could usefully be wedded to the greater capital resources of the larger concerns. However, in the UK at least, there is now some evidence of renewed growth in smaller, independent publishing houses on the grounds that the qualities of flair and intimate customer relationships which are critical to publishing success were being lost within the structures of the larger companies.

Recent evidence also suggests that acquisitions activity is becoming more specialised on the part of the big companies. For example, Reed Elsevier is disposing of its newspaper interests to concentrate not only on publishing but on specific subsectors within publishing, especially in the medical, legal and scientific fields - the acquisition of the French legal publisher Editions du Juris-Classeur is a case in point. Pearson is also moving away from the newspaper sector and has purchased the educational publishing arm of the HarperCollins Group to, again, concentrate on this more specialised activity.

Apart from a desire to obtain some scale economies, this recent acquisitions activity is based on a desire to expand into those sectors of the market where the most fruitful interaction is possible between "traditional" and "electronic" publishing. Thus, Pearson intend that an increasing proportion of their educational publishing will be available in CD-ROM and other electronic formats and, with this in view, also own Mindscape - a dedicated CD-ROM publisher. Reed Elsevier similarly aim to have an expanding percentage of their specialist publications available in CD-ROM or on-line formats and, in late 1994, acquired the US legal and business on-line company Lexis-Nexis to help exploit that potential.

Recently, some of the larger companies have been diversifying to ensure they have footholds in multiple media forms - print-based publishing, audio-visual, etc. This is to ensure that as the market for multi-media products expands (such as CD-ROMs with text, images and sounds) the bigger companies will have copyright access to all of the media involved and will also have knowledge of how each aspect of the business works. Apart from the HarperCollins deal, Pearson's main expansion in 1995 was into the TV sector.

At the level of the smaller firms, independent publishing houses have, as mentioned, a capacity for creativity and flexibility which allows them to stay in the market. In addition, the nature of the market - in terms of technologies which facilitate small-scale production and the existence of geographically defined niche markets - will continue to enable small firms to prosper, particularly in printing. For firms such as these to grow outside their local/national markets, arrangements such as the sale/purchase of publishing rights and/or co-publishing deals are vital; recognising the growing importance of international links within the overall European market, Intergraf has established a service to facilitate cross-border cooperation between small and medium-sized printing firms.

REGIONAL DISTRIBUTION

Book consumption in the EU is dominated by Germany, France and the UK - these three markets are worth almost 2.7 times those of Italy, Spain and Portugal. Because most production continues to serve national markets, these statistics serve as proxies for production concentration also. For printing and publishing as a whole, Denmark, the Netherlands and the UK exhibit the highest levels of EU production specialisation in the EU. Indicators such as these indicate the extent to which the sector remains, relatively, dominated by Northern Europe.

This picture is, however, changing somewhat. In some cases, major EU publishing and printing firms are now looking beyond their own national boundaries for cheaper methods of production. In sectors where time is not one of the critical factors, where economies of scale are important and transport costs form a relatively low proportion of output value, European companies have been searching production, or parts of production, elsewhere. This has favoured the sub-contracting of work such as mail order catalogues. UK companies have favoured locations such as Singapore and Hong Kong. German companies have been looking towards Eastern Europe and firms in all Northern European countries have transferred ca-

pacity to Mediterranean Member States such as Portugal and Spain. Alongside rapid production growth, consumption in these latter two Member States also grew rapidly during the latter half of the 1980s and into the 1990s, thus increasing their attractiveness for investment by Northern European firms. While the pattern established in Portugal and Spain may be followed in Eastern and Central Europe, plants in these countries are well behind EU technological standards.

There is little or no concentration of the printing industry in different regions within countries, though publishing tends to be more important in and around the major cities.

ENVIRONMENT

The production processes of the printing and publishing industries are relatively not polluting. Nevertheless, in North America there have been protests directed against newspaper and magazine publishers on the grounds of their promoting allegedly unsustainable forestry practices. Firms in the industry are responding by trying to make their operations more environmentally friendly. This includes the introduction of new technologies aimed at reducing the amount of solvents used (both in inks and cleaning fluids), limiting VOC (volatile organic compounds) emissions from web-offset printing, more environmentally sensitive handling of liquid waste, encouraging the recycling of other waste and greater use of recycled paper. A key improvement in production technology has been the shift towards dryer and cleaner technologies and use of more environmentally-friendly inks (e.g. vegetable-based).

Recycling is only one of the pillars of the EU strategy towards conserving natural resources with reduction in use being regarded as equally important. Legislation such as a proposed Packaging Directive is based on the philosophy that packaging, and hence printing output, should be reduced as well as encouraging recycling. The use of recycled paper is increasing. The publishing industry is itself involved in the debate about collection and recycling. Research is being carried out, not merely on how to increase paper recycling, but to analyse the overall environmental economics of the paper chain. New areas of interest include the valorisation of the energy content of paper fibres that underwent different life cycles and have lost their useful mechanical properties.

REGULATIONS

There are no regulations at EU level which pertain specifically to the printing and publishing industry although this is not the case at national level. As a cultural product, books, it has often been argued, ought to remain affordable to consumers. For this reason, most European countries applied various forms of resale price maintenance, Portugal being a notable exception. For example, in the United Kingdom, the Net Book Agreement governed the fixing of book prices and it was for the publisher to decide whether his/her books should be sold at a free or an imposed price - as discussed above, this agreement has been, in effect, abandoned with the likely impact being a reduction in price for bestselling titles (possibly accompanied by higher prices for other products) and increased pressure on smaller publishers and retailers. In response to increased competition (arising in part from higher paper and other costs), comparable informal, regulatory arrangements are under pressure in other EU countries also.

Books, newspapers and magazines benefit from zero (Italy, Portugal and the United Kingdom) or low rates of VAT in a number of EU Member States. Another key benefit in some Member States is preferential postage rates. Harmonisation of VAT rates across the EU was postponed from January 1992 and now has to be tackled no later than 1997 - full harmonisation would probably raise the costs of printing and publishing throughout the EU, thus raising consumer prices and depressing demand. The industry is currently lobbying to safeguard the possibility of having zero VAT on printed products.

Competition in the printing sector is sufficiently strong not to attract the interests of EU competition authorities. However, there is growing concern both within some Member States and at an EU level about concentration of media ownership, especially when the owners concerned are non-EU agents. At an EU level rules are likely to emerge defining permitted levels of media concentration and proposing criteria for approving major mergers and takeovers.

OUTLOOK

The traditional printing and publishing sector is best described as a mature sector with potential for moderate growth. The same holds true for traditional forms of reproduction of recorded media (such as CDs and video cassettes). Higher growth rates are projected for newer, electronic products - multimedia products, electronic books, etc.

However, printed media are, and for the short- to medium-term future are likely to remain, the major players in the communications market. They currently represent around 60%, by value, of the total consumption of communications media in Europe. This is because, while information technology races ahead, corporate and individual consumers take time to adjust not just to the new leisure and information possibilities offered but to acquire a familiarity which allows them to forsake the printed products which have dominated their normal needs in this regard. To date, information technology advancements have largely complemented rather than substituted for the written word. In fact, those countries which have emerged as the prime consumers of images are also those which remain most attached to the written word.

But looking to the longer term, new products derived from books or developed from synergy between different media - sound, images, text and data - can be expected to multiply and stimulate global markets. As businesses and other consumers become more familiar with emerging information technology applications the rate of substitution of electronic means of communication for paper-based media will increase. The emergence of this new information-driven economic paradigm, however, remains sufficiently unclear to make firm predictions on its net impact on printing and publishing. For example, there is little doubt that alongside the growing importance of digital technologies the demand for "information" itself will also expand rapidly. The synergy between traditional publishing activities and the demands of the users of new information technologies will also encourage the major firms in the industry to diversify into relevant information technologies, thus capturing growth potential within the "traditional" sector itself.

In terms of printed product sectors, prospects vary. The electronic media are likely to impact on corporate sector printing the most, hitting business forms in particular. A second area where "traditional" products are vulnerable is books, particularly reference books and educational text books as sources of information and technical documentation (the comparative advantage of electronic media being very strong here). Newspapers will tend to acquire the characteristics of periodicals and will increasingly develop interfaces with electronic communications. Promotional printed products will be impacted in a limited way by their delivery by fax and by electronic shopping, with catalogues probably least, and advertising in newspapers and periodicals most, affected. In all of these cases, of course, the message is that publishers need to deliver their products across a wide and changing spectrum of media, and printers need to collaborate closely with them. The most promising subsectors of the publishing industry are those connected with knowledge itself - teaching, professional training, business information and specialised interests. Product markets

which will gain include dictionaries, encyclopaedias, textbooks, practical guides and books, research reports and special interest publications. As the importance of post-compulsory education and 'training, both for adults and post-secondary students increases across Europe and service, particularly knowledge-based services, industries continue to expand so will the demand for information in all its guises.

In the medium-term the ongoing economic recovery in Europe, and indeed throughout the world economy, will contribute to relatively rapid growth in consumption and production. Reflecting the increasing internationalisation of the sector, exports are expected to outpace production growth. With the accession of three new Member States, the importance of intra-EU trade will grow substantially but, abstracting from the statistical implications of the accession of these new members, the EU's trade surplus in the publishing and printing sector will expand.

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Printing and services related to printing

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Comprising some 60 000 firms and employing some 962,000 people, the graphic industry in the 15 countries of the Community handles a turnover of about 73 billion ECU. The industry consists mainly of small enterprises, as 85% of them employ fewer than 20 persons.
The graphic industry is a modern, high-technology industry, often placed at the forefront of technical progress. Keeping up with the latest manufacturing processes has been requiring heavy investments in new machinery over the last few years. The printing industry is more than ever challenged by trends which affect the whole communication market, and has consequently to be able to respond to an increasing competitive environment, rapidly changing markets and fast developing technologies.

INDUSTRY PROFILE

Description of the sector

Printing firms produce a wide variety of products ranging from visiting cards printed in one colour to bulky, four-colour direct mail catalogues. The smaller firms work mainly with local clients for whom they produce personal or commercial printed matter whereas bigger firms often deal with a more widespread clientele and supply for example printed advertising material, books or continuous stationery. Besides their printing activity some large enterprises run a publishing house specializing in newspapers and magazines.

In some countries of the Community, some larger firms involved in gravure printing produce catalogues, magazines and advertising material for the international market. The majority of printing companies operate however on a local or regional market as a consequence of their size and their products.

Besides printing firms which cover the whole production chain in house, there are enterprises, which are involved in part of the production process, and offer services to printers or clients. Such firms are mainly involved in tasks occurring at both ends of the chain. They offer for example pre-press (typesetting and imaging), and binding and printfinishing services.

Recent trends

The modest upturn in business trends all over Europe in the 1994-1995 period resulted in a slightly improved market for printed products. However, in most countries the degree and the nature of the recovery in the printing industry remained disappointing. The demand for print continued to fluctuate widely. The erratic flow of orders in several segments of the market undermined the confidence of printers and strained cash flow. Adequate pricing policies are still difficult to be enforced because of sharp increases in prices for paper and other supplies over that period of time. Peaks in increases for paper prices were recorded in the first half of 1995 and they reached up to 60% for some qualities in some countries. The need to absorb these increases to a reasonable extent led to some further cuts in jobs.

Investment has picked up in comparison with 1993. It was however directed towards taking advantage of new technologies and to raising efficiency, rather than to expand capacity.

Foreign trade

The production of graphic products in EU-Member States is mainly determined by the internal demand. The export rate, that is the percentage of the industry's turnover achieved by exports, is in general below 10%. This relatively low rate is due to several characteristics of the industry, such as the need for frequent contacts with the client, the great need for communication during the work, linguistic barriers or the relatively high costs of transport.

Exports concern mainly large runs or special contracts, such as catalogues or other printed advertising material, books or magazines. Exports are in general made by a small number of large firms working in gravure or web-offset.

Most of the external trade with non-EU countries is done with other Western European countries. The amount of printed work done by EU-printers for outside clients has increased considerably in recent years. Trade with Eastern countries remains low but is expected to develop in the near future. Exports to non-EU countries are about twice as important as imports.

MARKET FORCES

Demand

In the graphic industry there is a direct link between demand and production, because this sector supplies mainly to order or to long-term contracts in the case of publishing and packaging. Printing firms are rarely able to manufacture for stock as other industrial sectors can.

Table 1: Printing
Turnover

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 (1)
Belgique/België	1 853	2 059	2 150	2 323	2 522	2 728	2 867	3 049	3 109	3 140
Danmark (3)	1 747	1 975	2 096	2 200	2 224	2 355	2 348	1 995	1 914	N/A
Deutschland (2) (6)	10 905	11 849	12 756	13 518	14 660	16 296	18 605	18 911	18 996	19 372
España	3 174	4 147	4 550	5 160	6 173	7 424	7 628	7 142	N/A	N/A
France (5)	N/A	N/A	12 196	13 680	14 875	15 930	15 777	15 276	9 716	9 424
Italia (2)	3 242	3 233	3 738	4 231	4 505	4 427	4 412	4 453	4 479	4 630
Luxembourg	N/A	N/A	89	97	104	114	132	138	N/A	N/A
Nederland (2)	3 376	3 513	3 604	3 832	4 014	4 836	5 018	5 109	4 973	5 064

(1) Estimates or provisional figures.
(2) Enterprises with 20 or more employees
(3) Enterprises with 6 or more employees until 1987, and 20 or more employees from 1988 onwards
(4) Enterprises with 5 or more employees
(5) Enterprises with 10 or more employees
(6) Data from 1991 onwards includes former East Germany
Source: Intergraf

Table 2: Printing Employment

(thousand units)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 (1)
Belgique/België	26.9	26.9	27.1	28.4	29.4	29.4	28.6	27.9	23.0	N/A
Danmark (2)	N/A	N/A	37.5	37.4	37.3	36.9	34.8	34.3	25.9	N/A
Deutschland (3)	211.4	214.7	220.2	222.5	227.2	234.4	244.9	264.4	253.2	241.6
España	76.5	78.0	78.1	82.0	85.0	85.0	92.1	85.2	N/A	N/A
France	N/A	N/A	134.0	136.6	139.4	140.0	140.9	135.8	107.5	105.4
Italia (2)	49.5	46.4	48.3	48.4	48.8	48.3	47.2	46.3	45.4	44.9
Nederland	47.8	49.1	54.5	53.2	53.7	55.7	57.0	56.8	56.6	54.3
Österreich (2)	18.1	18.3	17.9	17.2	17.5	22.6	22.5	16.9	15.3	14.5
Portugal	17.9	24.2	24.8	23.6	N/A	27.9	29.0	28.3	N/A	N/A
Suomi/Finland	38.5	38.3	37.7	38.0	37.7	37.4	35.5	33.0	30.2	30.5
Sverige	42.6	42.6	42.7	42.7	43.4	41.8	53.7	47.9	54.3	53.6
United Kingdom	N/A	N/A	293.5	301.3	313.5	312.3	299.4	N/A	N/A	N/A

(1) Provisional figures.
(2) Enterprises with 20 or more employees.
(3) Data from 1991 onwards includes former East Germany.
Source: Intergraf

Table 3: Printing External trade at current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	866.4	930.2	1 008.4	1 004.3	1 095.4	1 204.5	1 263.2	1 285.2	1 473.3	1 649.9
Extra-EU imports	390.9	505.4	466.8	493.9	572.5	612.9	722.9	717.4	729.5	808.5
Trade balance	475.5	424.8	541.6	510.4	522.9	591.7	540.3	567.7	743.8	841.4
Ratio exports/imports	2.22	1.84	2.16	2.03	1.91	1.97	1.75	1.79	2.02	2.04

Source: Eurostat

Demand for printed products is influenced by a number of demographic and economic factors such as population growth, composition of households, training and education as well as economic growth. The graphic industry, just like the publishing sector, is above all a supplier of products which disseminate information and knowledge and cater for leisure activities. Its role stems from its cultural, intellectual and educational vocation within the context of the exchange of ideas and information in democratic societies. Despite the low growth of population, the number of households and managerial jobs continues to grow as does the proportion of income available for education and information. All this continues to stimulate the demand for newspapers, magazines, periodicals and books. Consequently, the number of books printed has never been so high. New technologies have opened up new and ever growing markets, such as for computer manuals and educational material.

Advertising expenditure by trade and industry is one of the most important factors influencing demand and production in the graphic industry. Almost two thirds of the industry's turnover depend directly or indirectly on advertising. Any political decision affecting advertising, in general or in particular also affects the graphic industry and consequently can jeopardize employment.

The printing of catalogues, advertising brochures, pamphlets and company reports, as well as advertising inserts in newspapers and magazines, are steadily increasing.

Another determining factor for the graphic industry are orders for printed products either for private or commercial use. This market includes for instance visiting cards, tickets, notepaper and all kinds of forms. The majority of small printing firms produce such printed products for local circle of private or business customers, such as authorities, small trades, industrial or commercial companies. These printed products in single sheets remain an important and stable market segment.

Forms produced as continuous stationery - with a side perforation intended to adapt to the printing units of computerized systems -are generally produced by larger printing houses, which operate on a transregional market area. Production for this market declined however over the last years and trends are expected still to worsen considerably. The market for this kind of forms is adversely affected by the growing use of laser printers, desktop publishing systems, and of electronic data interchange (EDI). To ensure the maintenance of a reliable market, forms producing companies have to offer customers flexible and multi-functional products by mixing, coupling and combining documents using the new IT, IC and digital printing technologies. Developing niche services likely to bind customers to the printer is the key for success.

Labels, printed packaging products, wall calendars, illustrations and postcards form another sector of the graphic industry. These products are often printed by specialised firms.

Demand is generally stimulated by developments in both new and existing products. At the same time, printers are trying to cater for special requests. Quality standards reached by printed products considerably rose. Multicolored pictorial information is increasingly required for advertisements, magazines and company reports, and newspapers are now also making a considerable use of colour printing.

Figure 1: Printing
Destination of EU exports

Source: Eurostat

Information needs are satisfied by an increasing variety of electronic means and communication devices. Nevertheless, the permanence and high degree of information stored in the printed product have enabled it to retain its position as a simple, easily accessible and efficient means of communication.

In future specific information will also be conveyed via electronic media, either by means of diskettes or CD-ROM, or via data transmission networks (ISDN), as it is the case for online data banks and E-mail (electronic mail). In some countries, Italy for instance, tariffs applied by the State, in a situation of monopoly, are very low and cause a fast shift of economic operators towards electronic mail.

Multimedia is also to be mentioned among the new communication media. It presents information involving text, images (static or in motion) and sound (speech or music). Multimedia is consequently the meeting point of many skills in the various communication services, and printers will increasingly have to find their way in new partnership circles.

These new forms of distribution and presentation of information have a direct impact on some products of the printing industry. For instance, some kinds of books (encyclopedia, directories, scientific or legal reference books) are also available on CD-ROM. It is also the case for some magazines or catalogues. Online data banks increasingly make available similar information to the one provided by printed products. Although a few printed products are expected to be replaced by these new media, in most cases the new media will be complementary to the printed products. Opportunities for new markets can consequently be expected for printing companies.

Supply and competition

Publishers remain one of the printer's main clients, and account globally for about 40 to 50% of production.

The printing of newspapers is almost exclusively carried out for publishing firms. Furthermore, in this area, publishing houses and printing houses often form a legal entity and belong to one owner. The printing of newspapers accounts for just under one-fifth of the total printing production.

Publishing houses are also important clients of magazine printers. In countries such as Germany, consumer magazines are often produced by printing houses which are owned by publishing houses. In other countries, Great Britain and France for instance, such a situation is rare: printing and publishing represent two distinct and different activities. These publishing houses are increasingly operating on international markets. Other types of publications, such as specialised periodicals - religious, scientific or trade magazines - are printed for independent publishers or for publishing houses linked to printing houses. The production of periodicals accounts for just under one-fifth of the total print production.

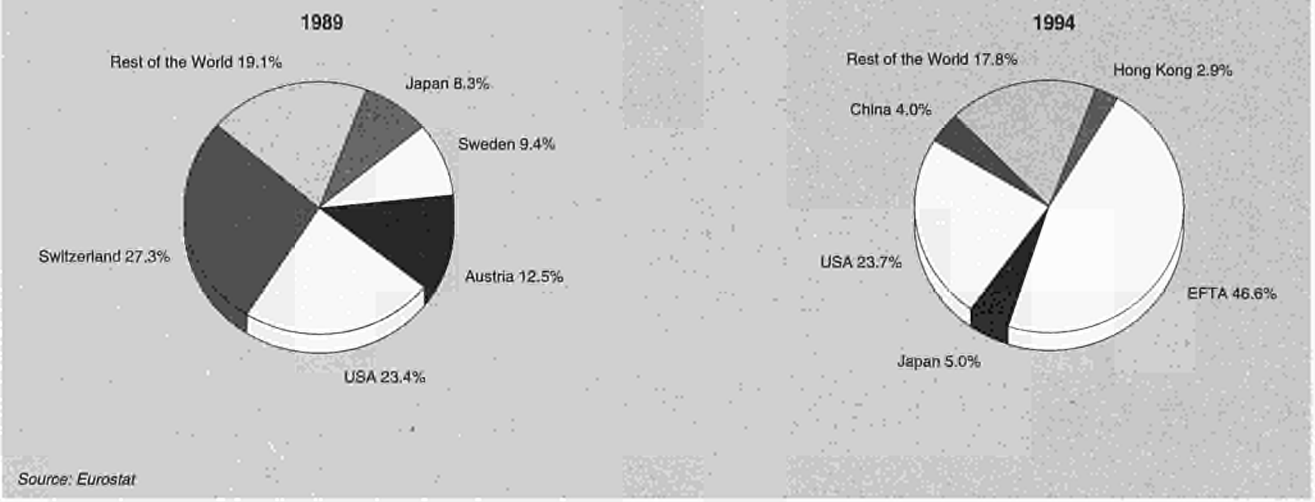
Book printing follows a similar pattern. Orders for book printing, paperbacks or hardbacks, do not come exclusively from book publishers - independent or linked to printing houses. Industry, public authorities and other organizations are also regular customers. Book printing accounts for about one-tenth of the total printing production.

The market for printed advertising material consists of a wide range of goods, such as direct mail catalogues, prospectuses, advertising inserts, posters or leaflets. The structure of this market is as diversified as its products as a large proportion of the clients are made up of direct mail companies, commerce and industry. Political parties and other organizations are also big consumers of printed advertising material. This sector has grown considerably over the last few years, stimulated mainly by the development of new forms of advertising, such as direct mail. The production of printed advertising material accounts for a quarter of the total printing production.

Printed matter for individuals and professionals is often taken on by the small printing firms. These cater for the municipalities, various organizations, industry, commerce and local individuals to whom they supply visiting cards, business forms, headed paper, invoices and also possibly transport tickets. These small firms often print in single sheets. Larger, or more specialised firms deal with continuous printing and produce different types of continuous forms, completed on computer by the clients themselves. Some highly specialized firms are involved in the production of another category of printed products, i.e security printing. The production of such printed matters accounts for about one-fifth of the total printing production.

Printing production also includes various products such as calendars, fine-art prints, postcards and greetings cards, cartographic products etc. Alongside these products the sector also produces rubber or polymer stamps, reprographic products such as photocopies, overhead foils and microfilms.

Figure 2: Printing
Origin of EU imports



Source: Eurostat

Services such as the design of printed matter and the production of layouts and dummies are also offered to the client. In the future, firms which will offer new services through desk-top-publishing processes will complete the existing structure of the graphic industry.

There is also a range of services offered in connection with printed products, or which constitute additions to it. In the preparation stage, there are services such as design and concept. Pre-press firms offer printers, and other customers, typesetting and image manipulation services, preparing images for print. Independent bookbinders offer printers, who do not have sufficient printfinishing capacity in house, e.g. stitching, binding, diecutting, embossing and laminating services. Some binding houses specialize however in specific parts of the process or in specific types of products.

Another area of services deals with the manipulation of digital data (completing, selecting and networking) with a view to prepare multi-media products (e.g. CD-ROM). Traditional services such as reprographic services (copying, transparencies for overhead projectors) or rubber stamps also drop into this category.

Production process

Current developments in the industry indicate a close link between the printing sector and progress in communication and information technologies.

Innovations in equipment and graphic machinery have put the printing industry in the forefront of technological progress. Equipment has therefore a major impact on the type, the quantity and the flexibility of the work carried out, as well as on the professional skills and the organization of the work in general. Many aspects of the print production process are now commonly automated, measured and controlled by computers.

There have been particularly fast changes in the pre-press sector. Even small printing and reproduction firms now use totally electronic pre-press systems.

New digital colour printing machines are gradually being introduced in workshops. This new type of machinery is mainly intended for 4-colour short runs up to DIN A3 size. Such colour presses are likely to affect the printing-on-demand market segment for existing products such as advertising material, and also to enable the emergence of markets for new products and new services.

Digitalization is also increasingly applied to traditional presses and finishing equipment. Microprocessors allow for the operation of presses, as well as for measurement and control functions. Technology and knowhow developed by machinery manufacturers are exploited world-wide. The printing industry in almost all West-European countries operates consequently under rather similar technological conditions.

The use of electronics in information and communication now plays a significant role on the whole printing process. A particularly significant effect is that the transmission of information from client to printer is now in most cases carried out through electronic media. The transmission of information within a printing house - for example, in newspaper printing, from the editing department to the printing floor or in the case of magazine printing, from one printing department to another - has become quite common.

New technology areas of growing interest for printers are cross-platform information transfer linked to a multiple media publishing work structure, remote proofing and remote calibration of colours on screen and printing presses. Digitalization of the total workflow is another important issue. It involves computer-to-plate, computer-to-press and possibly computer-to-paper printing systems.

On the other hand, publishing firms have tried to evaluate the impact of this new communication technology on printed products and are looking into ways of becoming more involved in these areas. Publishers and printer/publishers have often invested in such areas as data-processing units, data banks, videotext and even local radio stations, whereas the printers tend to remain faithful to purely technical operations.

INDUSTRY STRUCTURE

Companies

The graphic industry in the Community, is made up of small and medium-sized companies. A typical printing firm employs fewer than 20 employees, as some 85% of all the firms belong to this category. The remaining 15% are essentially firms employing between 20 and 500 workers. Only a very small number of printing firms employ over 500 workers; in Germany this category stands for 0.3% of all the firms and this percentage is even lower in a number of other countries.

Printing has traditionally been a high wage industry, reflecting the above-average levels of skill required from its labour force. Printers have also often been among the first to benefit from improved working conditions - shorter hours, longer holidays

and other advantages. In half the Community countries the working week is 37.5 hours or less. In most other countries it is below 40 hours. Only Portugal still has a basic week of 43 hours. German printers already enjoy 6 weeks annual holiday and in five other countries they have at least 5 weeks.

At the same time, wage costs have a considerable impact on total production costs and have even increased in the last few years. Furthermore, important investment costs need to be made to ensure that the necessary qualified personnel is available.

Training goals have been adapted everywhere over recent years to attract trainees with the necessary qualities to the industry, to give them broad- based knowledge of new technologies. Printing technology, which has undergone great changes in the last quarter of a century, is still evolving to become faster, more automated and better controlled with the help of electronics. The industry's labour force has to be receptive to continuous training to adapt to the changing and improved techniques with a view to greater flexibility, in which print workers are not limited to a single speciality.

ENVIRONMENT

The European Graphic Industry is an industrial branch which has only a marginal impact on the environment. Nevertheless, the industry is devoting increased resources to meeting the stricter environmental requirements. For example, it has invested large amounts of money to limit emissions caused by web-offset printing, to improve the quality of water and to encourage the recycling of waste.

In some EU-countries the graphic industries federations collaborate closely with government departments to agree on the best measures for environmental protection. At international level, the international association for the graphic industry, Intergraf, is co-operating with the EU-Commission to define appropriate directives in this area. To maintain fair competition, the Single Market requires the harmonization of laws and directives in all EU-Member States, and this also in the field of the environment. The graphic industry considers it has a responsible role to play in safeguarding the environment and therefore our living space.

OUTLOOK

The following significant trends are expected to be become increasingly relevant to the printing industry, as a result of the structural changes in communication media, and call for deep modifications in organizational structures:

- parallel production of information and communication items takes place across media;
- the life-cycle of print media is shortened;
- needs for customisation and individualisation of information items are increasing;
- wider product complexity;
- better portability and structuring of information are required;
- shorter runs and on-demand publishing and printing represent a wider share of demand.

In order to meet these new market trends, flexibility of systems and employees, customer/supplier co-operation and coordination, and above all, new business concepts built on new technologies are essential.

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Reproduction of recorded media

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Driven by the growth of the music, film and computer industries, companies involved in the duplication of recorded media have witnessed significant growth since 1985, but experienced a slowdown in 1992-93, particularly in value terms. Companies in this sector seek to achieve economies of scale and must monitor the evolution of reproduction technologies in line with the development of new media carrier formats which can alter the industry structure.

INDUSTRY PROFILE

Description of the sector

The reproduction of recorded media comprises three subsectors:

- the duplication of sound recordings: it includes the duplication of music recordings on Vinyl Discs, Cassettes and Compact Discs
- the duplication of video recordings: it includes the duplication of films on videocassettes or Digital Video Disc (DVD)
- the duplication of computer recordings: it includes the reproduction of software programmes and data on floppy disks or CD-ROMs

This sector covers only the industrial duplication process of the different media. Under the previous NACE classification, the industrial activity of reproduction was amalgamated within the broader segments of music, film and software publishing.

Reproduction of sound recordings includes major international players based in the EU such as PolyGram (75% controlled by Philips (NL)), Thorn EMI (UK) and Bertelsmann (D) through its Sonopress division. These EU companies control around 40% of the world music market.

Duplication of videocassettes is usually undertaken by manufacturers acting as sub-contractors to video distributors such as Buena Vista, Warner Home Video, CIC Video and Columbia TriStar HV. Major EU competitors include Technicolor (UK) and Rank Video Service (UK): duplication facilities are located in countries such as the UK, Netherlands, Germany and Italy.

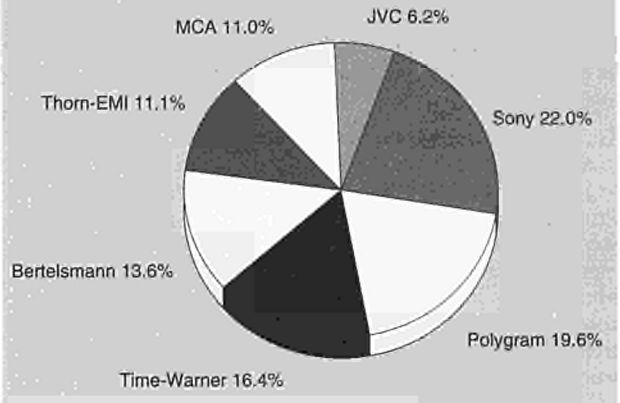
The duplication of software programmes is related to the broader sector of software publishing. It involves primarily USA-based companies such as Borland, Lotus and Microsoft. The duplication of floppy disks and CD-ROMs can be done either internally by the publisher or externally by a sub-contractor. Germany and Austria represent more than 25% of sales in Western Europe, followed by the UK and Ireland with around 24% and France with 16%.

Recent trends

Unit sales of music recordings follow a cycle which is linked to the introduction of new technologies. Vinyl LPs peaked with 1.2 billion units sold world-wide in 1981; cassettes reached a plateau in 1989 with 1.5 billion units; CDs have reached 1.7 billion units in 1994 and further growth is expected. Unit sales of music recordings in the EU increased by 10% from 1993 to 1994. Nominal value of sales has increased by close to 6% over the period 1989-94.

EU sales of pre-recorded videocassettes (in units) have grown at an annual rate of around 17% from 1991 to 1994. Many EU countries also experienced a turnover growth superior to 15% in 1995. Concurrently, the number of pre-recorded videocassettes sold to rental outlets has decreased at a rate of approximately -9%.

Figure 1: Reproduction of sound recording
World market share of main music publishing companies, 1993



Source: IDATE

Duplication of computer software is a booming sector. Unit sales for Western Europe were up 69% in 1994 compared to 1993, but turnover increased by 4% due to declining prices; for the first three quarters of 1995, unit sales were up 54% compared to the same period in 1994.

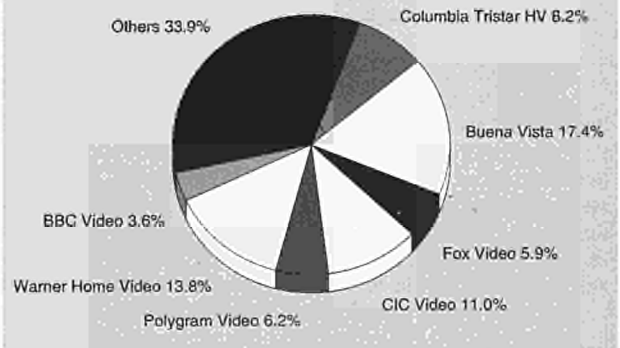
International comparison

In 1994, the EU represented over 25% of world unit sales in most segments of musical recordings: 30% of CD sales, 27% of LP sales, 35% of Single sales, but only 12% of MC sales. The EU stands ahead of Japan in terms of consumption, but behind the USA. The entry of three new Member States has increased the EU share of world sales.

The sales and rental of pre-recorded videocassettes are linked to the penetration of VCRs in households with a television. In 1994, VCRs had a 61% penetration rate in the EU, while this rate stood at 82% in the USA and 77% in Japan.

North America is the main market for computer software programmes and operating systems, with around 41% of world sales, followed by Western Europe with almost 28%, the Asia/Pacific area with nearly 23% and the rest of the world with 8%.

Figure 2: Reproduction of video recording
Leading European video distributors, 1994 (1)



(1) Excludes France and Germany.
Source: Screen Digest

Table 1: Reproduction of sound recording
World music sales, 1994

(million units)	Singles	LPs	MCs	CDs	Total sales (million ECU)
Belgique/België	3.5	0.0	1.3	18.8	336.4
Danmark	0.7	0.4	1.6	13.6	221.3
Deutschland	40.3	0.7	38.2	166.2	2 397.1
Ellada	0.0	2.2	1.2	3.5	83.9
España	0.9	2.0	19.8	34.2	442.4
France	16.3	0.1	27.7	95.2	1 602.8
Ireland	0.9	0.0	2.0	1.9	54.6
Italia	4.4	0.0	15.3	28.1	445.6
Nederland	5.9	0.3	1.3	34.6	524.5
Österreich	3.1	0.1	2.7	15.6	288.5
Portugal	0.0	0.1	2.6	34.2	90.3
Suomi/Finland	0.4	0.1	3.8	5.8	93.0
Sverige	2.8	0.1	2.6	332.0	276.7
United Kingdom	63.0	4.5	56.0	116.4	1 972.0

Source: IFPI

Table 2: Reproduction of sound recording
CD player penetration (1)

(%)	1993	1994
Belgique/België	67.4	75.5
Danmark	62.2	76.1
Deutschland	78.8	98.5
Ellada	12.0	17.2
España	30.0	36.9
France	61.8	83.9
Italia	21.8	25.1
Nederland	112.7	127.3
Österreich	35.0	45.0
Portugal	19.0	24.9
Suomi/Finland	42.6	44.3
Sverige	68.4	78.9
United Kingdom	59.1	73.8

(1) Figures are as % of households and include in-car and personal CD players.
Source: IFPI

Table 3: Reproduction of sound recording
Number of music plants in operation, October 1995

Belgique/België	2
Danmark	2
Deutschland	21
Ellada	2
España	5
France	9
Ireland	2
Italia	7
Nederland	11
Österreich	3
Portugal	1
Suomi/Finland	1
Sverige	3
United Kingdom	5

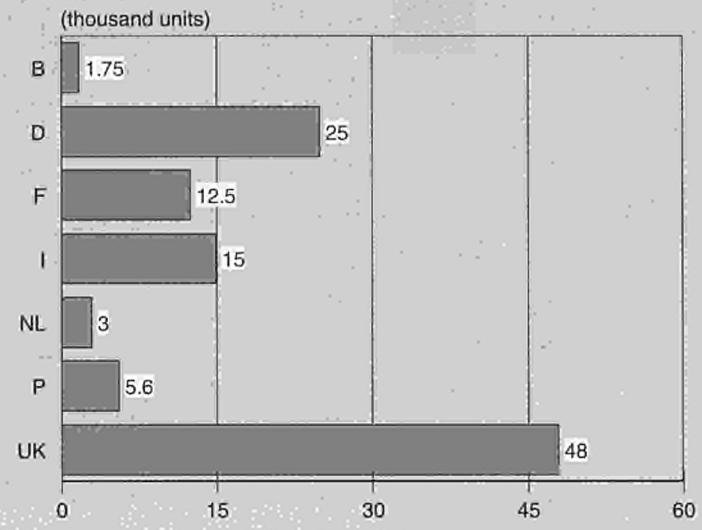
Source: IFPI

Table 4: Reproduction of computer media
Western European PC application software sales

(million ECU)	1991	1992	1993	1994
Benelux	86.6	107.1	102.7	114.9
Deutschland, Österreich	335.1	377.8	486.3	398.9
Ellada	N/A	N/A	2.0	3.3
España, Portugal	44.6	41.1	43.1	48.5
France	225.1	234.8	253.9	242.3
Italia	42.2	46.7	96.2	92.4
Scandinavia (1)	110.2	130.4	138.9	168.6
Switzerland	31.3	53.2	73.4	83.4
United Kingdom, Ireland	239.4	315.7	361.1	363.7
Total Western Europe	1 114.6	1 306.8	1 557.7	1 516.0

(1) Denmark, Iceland, Norway, Finland and Sweden.
Source: SPA (Software Publishers Association) Europe

Figure 3: Video industry
European estimated employment, 1994



Source: International Video Federation, European Video Directory, 1995

Foreign trade

Because of their global market positions and low transport costs, record and software companies (or sub-contractors responsible for duplication) tend to organise manufacturing independently of market locations: they centralise manufacturing in a few large production facilities in each trading area. On the other hand, foreign trade for videocassettes has remained limited between trading blocks partly because of the importance of being geographically close to one's market and to differences in the coding of visual signals across the world (the SECAM system in France, PAL in the rest of Europe and NTSC in the USA).

MARKET FORCES

Demand

The correlation between GDP growth and "music value growth" over the period 1984-94 shows that the subsector of reproduction of music recordings is linked to general economic conditions.

Demand for pre-recorded videocassettes is linked to the increasing number of VCRs. In 1994, there were 86 million households with at least one VCR: Germany represented 26% of this total, the UK 19% and France 16%. These three countries represented around 69% of pre-recorded videocassettes shipped by dealers in 1993. Distribution of videocassettes through mass retail outlets and promotions in partnership with fast-food or petroleum companies have increased consumer demand. Seasonal demand also depends on the number of blockbuster movies being released on videocassettes.

Demand for computer software and operating systems is correlated with sales of computer hardware. In 1994, world-wide unit sales of PCs were up 27% over 1993 while sales of CD-ROM drivers increased from 11 to 20 million units. Household demand for computers is linked to consumer spending, while demand by businesses depends on economic cycles and investments in information technology. Computer sales and the constant development of new applications support the demand for computer software and thus for duplication.

The music and computer software subsectors are also influenced by the "technological cycle" that links demand to new hardware development. This is true in the case of CDs, but probably less for Digital Compact Cassettes (DCC) and Mini-Discs. While CDs have grown in the EU by more than 20% per annum since 1989, LPs have declined by more than 35%. The situation is similar in the software subsector where sales of floppy disks (the preceding technology) are stagnating in value while sales of the new CD-ROMs are increasing rapidly.

The video subsector is different since the VHS videocassette format has remained the standard for the last fifteen years and no new moving picture carrier format has gained significant market share. There is a constant increase in the number of households with a VCR. Still, video duplication itself is challenged by the importance of movie channels. Pay TV represents an increasing share of total spending on movies, from 25% in 1992 to 31% in 1994. In the mean time, spending on videos (rental and sell-through) decreased from 38% to 33%.

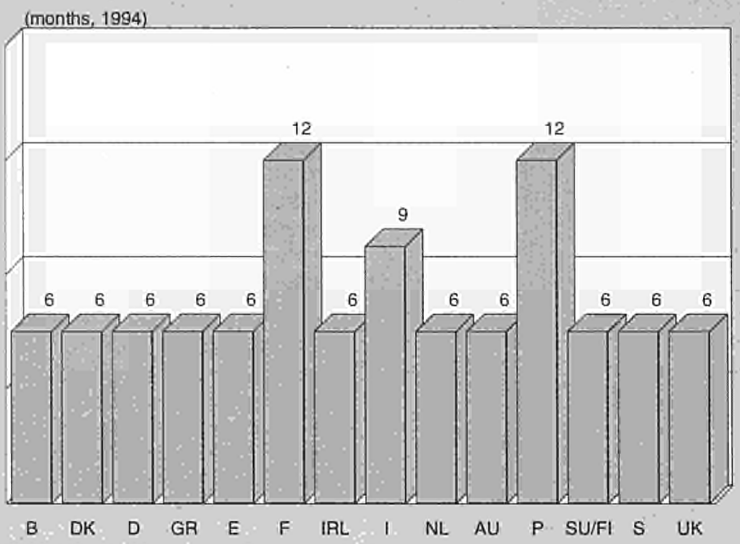
Supply and competition

There are 74 plants in the EU dedicated to the duplication of music recordings: 21 are located in Germany, 11 in the Netherlands and 9 in France. Most of them are owned by major record companies, but some independent companies remain such as MPO (F) and Nimbus (UK). The music recording industry is capital-intensive and competitiveness is a function of economies of scale. The cost of manufacturing a recording can represent less than 20% of the selling cost.

Duplication of videocassettes in the EU is more fragmented since many companies limit their activities to their national market. These companies act as sub-contractors to multinational film distributors. Competitors try to achieve economies of scale and must invest heavily in the productivity of their manufacturing process. Among other criteria, video duplicators are evaluated by clients on price, quality, capacity of production and availability of storage.

Many large players in the software subsector are based in the USA, but some maintain duplication activities in the EU, such as Microsoft in Ireland. Usually, software companies outsource additional floppy disc and CD-ROM duplication to sub-contractors. The software industry has been characterised since 1993 by rapidly increasing volumes but declining prices. The market of software and data duplication for government services and other companies not involved in software publishing represents less than 20% of the turnover in this subsector and smaller national companies tend to be present on this market.

Figure 4: Video industry
Length of windows throughout Europe, in months, 1994 (1)



(1) A window is the time frame between a video's various exploitation platforms; here, it refers to the rental period.
Source: International Video Federation, European Video Directory, 1995

Production process

The strong development of the CD and of multimedia-based applications has had a serious impact on the reproduction of recorded media industry. The CD format, developed over a decade ago for and by the music record industry, is now used by other industries, such as the video and the computer software industry, due to its strong data-carrying capability. Indeed, the CD can be used to record sound, data and video, or a combination of all three.

CDs rejuvenated musical duplication by offsetting LPs decline. Two technologies have tried, unsuccessfully so far, to redefine the market: the DCC by Philips (NL) and Matsushita (JPN), and the MiniDisc by Sony (JPN) which also has recording capacity. The DCC was developed to offer digital quality with a medium close to traditional cassettes; DCCs also have a portability superior to that of CDs. MiniDiscs offer recording facility, but they are not back compatible like DCCs. In Europe, the sales of these two devices have remained marginal.

Innovations have also occurred to combat CD piracy. The Source Identification Code (SID) programme was started in 1994 by the International Federation of the Phonographic Industry (IFPI) and Philips Consumer Electronics: it is a voluntary programme in which CD manufacturing plants opt to identify uniquely the source of manufacture at both mastering and replication stages with a distinct SID Code. These codes are used by more than 60% of known CD plants in the world and are useful to control CD piracy.

The duplication of video recordings has not been driven by technological innovations since VHS and VCR standards have remained the same for the last 15 years. The D-VHS (Digital VHS) is an improved version of the same standard. To fight piracy, some techniques such as Macrovision were developed in order to muddle the video signal if it is duplicated from a legitimate tape to another tape. The result is a virtually unwatchable copy.

Despite the dominance of the VHS, new products could alter the market structure. The CD-I (Interactive Compact Disc), commercialised by Philips, can be linked to a television or a computer for multimedia uses. Philips has not reached its sales objectives in 1994 and the CD-I faces competition from the CD-ROM, which also offers video capacities.

The most important development of the recorded media industry occurred in September 1995 when the biggest producers of consumer electronics came to an agreement on the standard for the development of the Digital Video Disc (DVD), on which entire films can be stocked. The DVD can store sound, data and films: consequently, it has the potential to replace audio CDs, videocassettes and CD-ROMs. Companies involved in the duplication of recorded media will have to adapt their production facilities in order to manufacture this new carrier format coming to the market in 1996. The DVD will operate at first in a read-only mode but engineers are already working on the development of its recording capacity.

INDUSTRY STRUCTURE

Companies

The five leading companies involved in the reproduction of music recordings are usually integrated in publishing, hardware and/or retail. They are PolyGram (75% controlled by Philips), Sony Music Entertainment (JPN), Thorn EMI (UK), Time Warner (US) and Bertelsmann Music Group (BMG, D). Three of the five world leaders are EU companies, representing close to 40% of world market sales. These five major players control 70% of the world market for the reproduction of audio CDs, leaving the remaining 30% to about 20 independent competitors. Sonopress, a division of BMG Entertainment, is also the EU leader in CD-ROM production. MPO (F), which focuses solely on reproduction, is the first duplicator of audio CDs amongst independent competitors with a world market share of around 9%. In the EU, MPO also has an important market share in the duplication of MiniDiscs and CD-ROMs.

The two main EU players in the video duplication subsector are Technicolor Video Services (UK) and Rank Video Services (UK). Other competitors with a more regional focus include CINRAM (Canada) through its French subsidiaries, Duplico (E) and Video Print (UK). In France, five companies control 80% of the market but their activity outside France is limited.

The computer software subsector is in constant evolution, but US companies have a dominant position in the EU. Major

Table 5: Reproduction of computer media
Estimated piracy rates (1)

(%)	1993	1994
Belgique/België, Luxembourg	65	57
Danmark	69	31
Deutschland, Österreich	51	31
España	85	76
France	66	62
Italia	66	68
Nederland	78	56
Portugal	85	71
Suomi/Finland	76	26
Sverige	66	52
United Kingdom, Ireland	55	31
Norway/Iceland	79	52
Switzerland	62	26
Western Europe	63	45
Asia, Pacific	75	62
Latin and South America	83	66
USA, Canada	41	25
Worldwide total	57	49

(1) Comparison of the number of Personal Computer hardwares sold in a year with the number of applications sold;
data refers to application software sales excluding system software.
Source: SPA Europe

thus have to make large investments in technologically advanced manufacturing equipment in order to remain competitive. It is also possible to focus on the quality of the manufacturing process. Indeed, all system components must be of a high quality and reliability to minimise downtime and rejects. These quality requirements are even more stringent for CD manufacturing, since the injection moulding process, metallisation and coating must be performed under clean room conditions.

Second, companies must decide upon the integration of their activities. Usually, music groups are integrated in publishing, duplication and sometimes retail. The film subsector is more fragmented since film companies and distributors are hardly involved in the duplication of videocassettes. Software companies tend to undertake only part of the duplication requirements internally.

Third, companies must try to invest their resources in the right carrier format for duplication. Companies which focused only on the duplication of vinyl discs faced serious difficulties when CDs overtook the market as the main carrier for musical recordings. A similar situation will occur when the VHS format is replaced by a new digital standard for duplicating films. Some companies invest heavily in research and development in order to develop a new carrier format, but only a few large companies can afford to create and support a new format until this new device becomes an industry "standard". Indeed losses can be important if the device does not become a standard and production has to be discontinued.

Table 6: Reproduction of video recording
Video Cassette Recorder penetration rates of TV homes

(%)	1990	1991	1992	1993	1994
Belgique/België	45.8	50.1	53.8	57	60.6
Danmark	49.5	53	58.2	60.7	63
Deutschland	45.6	50.2	54	57.1	59.7
Ellada	27	30.2	32.1	32.3	32.6
España	42.9	47.2	50.6	53	55.4
France	49.7	55.1	59.6	62.6	65.3
Ireland	51.6	57.3	59.6	61.4	62.7
Italy	26.8	33.2	38	43.4	47.5
Luxembourg	46.2	50	53	55.6	56.6
Nederland	52.6	58.3	59.4	60.2	65.2
Österreich	40.2	47.6	52.6	56.4	61.4
Portugal	31.5	34.7	35.6	36.7	37.5
Suomi/Finland	49.9	56.6	61.7	64.8	68.9
Sverige	55.6	60.3	63.7	67.8	71.7
United Kingdom	71	73.9	76	77.4	79.2
EUR15	47.2	51.9	55.4	58.4	61.1

• *Source: International Video Federation, European Video Directory, 1995*

US companies include Borland, Claris, Lotus, Microsoft, Novell and Stream International. Large software companies have internal duplication facilities but also maintain relationships with sub-contractors. Along with the aforementioned competitors, Supply House (B) has an important position in the duplication of magnetic discs and CD-ROMs in the EU.

Strategies

The duplication sector seems to face three strategic imperatives.

First, companies involved in the sector generally have a strategy geared towards economies of scale. Each subsector is involved in the mass duplication of identical goods through a process that must be efficient and automated. Companies

ENVIRONMENT

Environmental issues do not appear to be of relevance to the industrial process of duplication, but there is a focus on the material being used for the packaging of duplicated products.

REGULATIONS

The issue of Intellectual Property Rights (IPR) is of major importance for the three subsectors. Over the last decade, an estimated ECU 10.2 billion were lost in the world as a result of piracy of cassettes and CDs. Similarly, the video industry lost an estimated ECU 810 million in 1994 due to European copyright theft. For the computer software sub-sector, the

Table 7: Reproduction of video recording
VCR sales

(thousand units)	1990	1991	1992	1993	1994
Belgique/België	300	300	315	300	305
Danmark	235	225	210	195	200
Deutschland	3 300	3 325	3 230	3 010	3 000
Ellada	175	175	120	47	50
España	760	950	950	925	900
France	2 250	2 175	2 250	2 150	2 300
Ireland	75	80	85	85	85
Italia	1 450	1 800	1 600	1 650	1 650
Luxembourg	9	10	10	10	9
Nederland	420	650	560	520	550
Österreich	210	275	250	250	260
Portugal	100	125	125	140	140
Suomi/Finland	150	175	130	102	125
Sverige	270	275	210	275	275
United Kingdom	2 150	2 160	2 210	2 400	2 500
EUR15	11854	12700	12255	12059	12349

Source: International Video Federation, European Video Directory, 1995

Table 8: Video industry
Breakdown of the European distribution market

(%)	1990	1991	1992	1993	1994
Belgique/België	2.7	2.4	2.7	3.2	3.7
Danmark	2.3	2.2	2.0	2.6	3.2
Deutschland	17.2	19.6	16.5	18.1	16.6
Ellada	0.4	0.3	0.2	0.1	0.1
España	6.5	5.4	6.6	5.7	6.3
France	18.6	22.0	23.0	22.6	23.6
Ireland	1.3	1.1	1.2	1.2	N/A
Italia	9.0	10.7	11.2	9.2	8.9
Luxembourg	0.1	0.1	0.1	0.1	N/A
Nederland	3.0	3.3	3.2	3.6	3.8
Österreich	1.4	1.6	1.2	1.1	1.2
Portugal	1.4	1.8	1.7	1.2	1.2
Suomi/Finland	1.7	1.4	1.3	1.0	1.1
Sverige	3.5	2.8	2.2	2.5	3.4
United Kingdom	31.0	25.3	26.8	27.6	26.9
EUR15 (million ECU)	1584.3	1851.0	1917.3	2050.4	2279.2

Source: International Video Federation, European Video Directory, 1995

rate of piracy of business software in Western Europe was estimated at 45% in 1994: this represented potential losses of over ECU 840 million.

A number of professional counterfeiters have access to mass duplication resources and large-scale distribution networks. Counterfeit products thus lead to a loss of business activity for legitimate manufacturers. Similarly, many software programmes are not used in accordance with copyright laws and applicable software licences. The software subsector is regulated by the EU Directive 91/250/EEC on the legal protection of computer programmes.

The first step to fight piracy has been to ensure that EU countries had comprehensive copyright laws. The next step will be to provide adequate means to enforce the regulations.

OUTLOOK

Technological developments and the emergence of the sector in new countries offer positive prospects for the duplication of music recordings. Firms anticipate competitive technological developments and should benefit from the opening of new markets in Eastern Europe or Asia.

For video recordings, VHS should remain the standard for the next 5 - 10 years but one cannot underestimate the potential of digital technology. A shift from the VHS standard to the digital process of devices such as DVDs will alter the industry structure.

Also, since the duplication of videocassettes remains relatively fragmented along national lines, some integration might take place in the EU. Companies will try to develop operations in more than one country and this could intensify the internationalisation of the sector and Intra-EU competition.

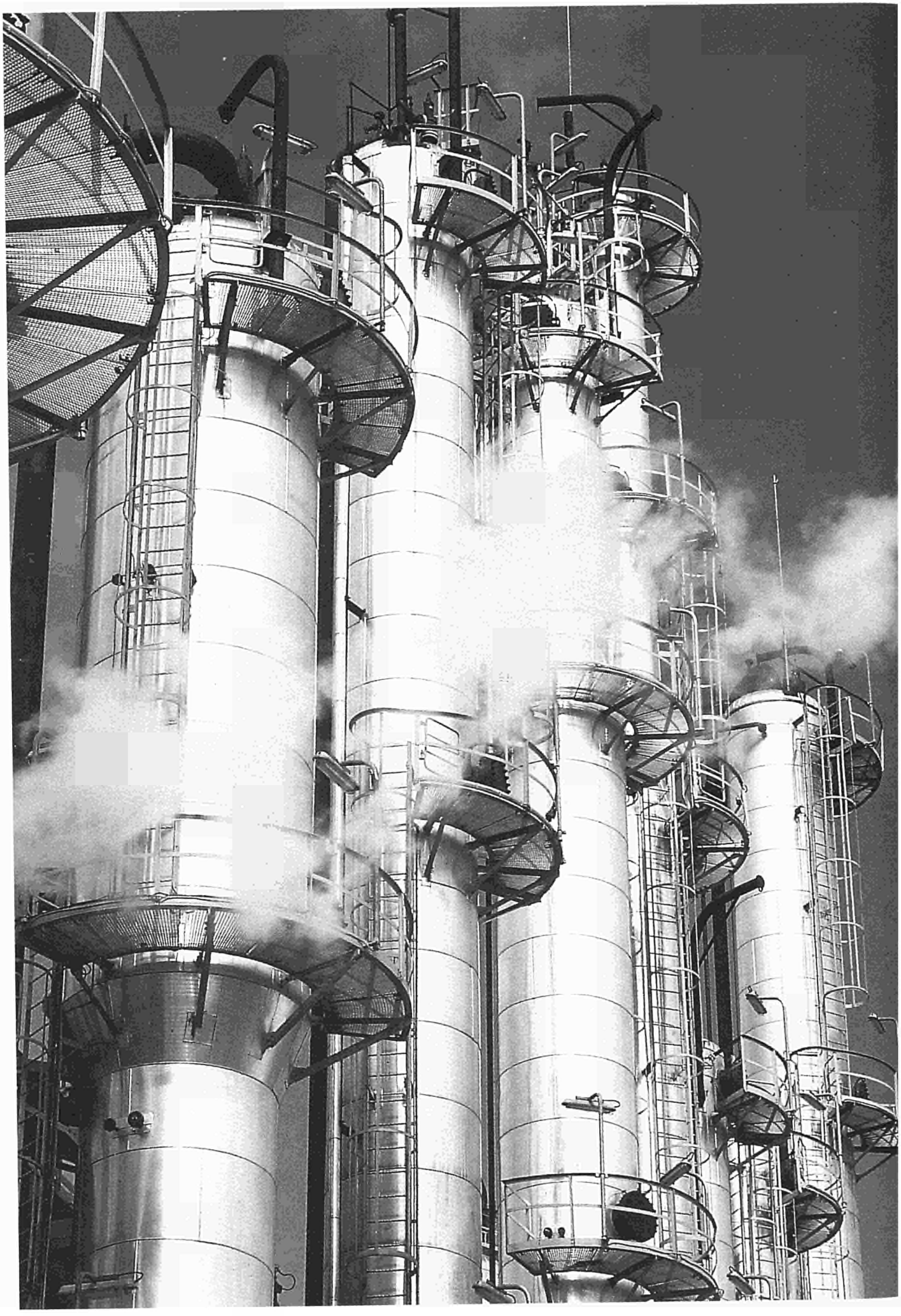
Growth prospects in the software subsector are favourable and there is no sign of stagnation ahead in terms of unit sales.

The whole industry faces a potential threat from the development of on-line and interactive services. If recorded music, films and software programmes become widely available on-line and can be downloaded easily to the customers' multimedia

equipment, companies involved in the duplication of recorded media might face a decline of their industry. All subsectors could also be affected by the emergence of a single carrier format as the standard for all recorded media. Some players in the industry suggest that the DVD has the potential to replace videocassettes, floppy discs, CD-ROMs, audio cassettes and even CDs for musical recordings at the turn of the century.

Written by: LEK

The industry is represented at the EU level by: International Federation of the Phonographic Industry (IFPI). Address: Square de Meeus 19/20, B-1040 Brussels; tel: (32 2) 511 9208; fax: (32 2) 502 3077.



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The EU is the world's leading producer of chemical products. European chemical producers experienced a slowdown after a big increase in 1994. While there has been a considerable slowdown in the general economy, chemical production growth almost staggered to a halt early in 1995. During that year, consumer spending dropped, chemical shipments declined, exports to Asia were down as China cut imports, and a big inventory build-up at the end of 1994 cut into production. Chemical production has been weak in most of Western Europe. The current slowdown, however, is expected to be a pause before weak recovery in 1996 rather than the start of a new recession. Apart from increasing investments in order to increase productivity growth and profitability, the strategy of major chemical companies continues to hinge on the creation of strategic alliances and joint ventures to achieve rationalisation in research, production and access to markets.

INDUSTRY PROFILE

Description of the sector

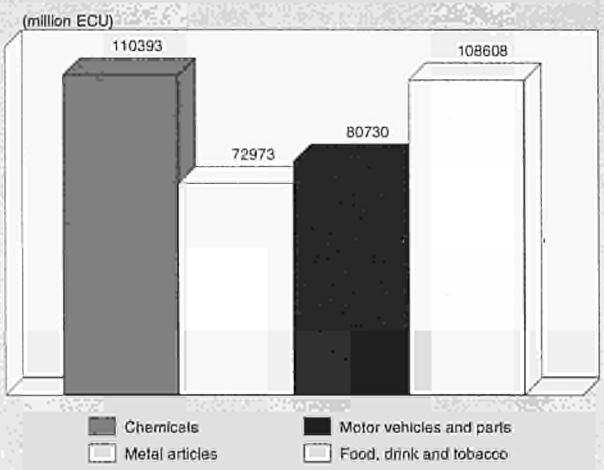
Previously, the chemical industry was represented by Nace 70 groups 2500 and 2600. The chemical industry is an industrial branch of very heterogeneous character in which the main activities consist of chemically transforming materials into diverse substances, giving them new physical and chemical properties. For these activities, the chemical industry employs raw materials from the petroleum, mining and extractive industries such as oil, minerals, metals and certain agricultural products. The main activities of the chemical industry correspond to the following product groups: basic chemicals, which include basic organic and inorganic chemicals; fertilisers and nitrogen compounds; processing of plastic in primary form and synthetic rubber; pharmaceutical and medical products; and specialty chemicals, which include pesticides and other agrochemical products, paints, varnishes, and other similar coating products, soaps and detergents, cleaning and polishing preparations, perfumes, toilet preparations, and man-made fibres. The largest sector in terms of turnover is pharmaceuticals (23%), followed by basic chemicals, such as organics (15%) and plastics and synthetic rubbers (13%).

The industry includes two upstream branches constituting basic chemicals (basic inorganic chemicals and basic organic or petrochemicals) and a series of downstream branches such as pharmaceutical products, agrochemicals, detergents, etc. The upstream sectors' outlets are almost exclusively the downstream sectors, which themselves supply either other industries (agriculture for agrochemicals, the plastics transformation industry for plastics in primary form) or end users (soaps and detergents, for example).

There is not necessarily a link between production and added value in the sector. In value added, Germany is, by far, the largest EU producer of chemicals. With more than 35 billion ECU, the German chemical industry accounts for almost one third of EU value added in this sector. France and the UK account for the second and third place, respectively, with a value added of more than 19 billion and 18 billion ECU, respectively. Other large EU producers are Italy (11 billion ECU), Spain (8 billion ECU), the Netherlands (6 billion ECU) and Belgium (5 billion ECU).

Within Western Europe, Belgium accounted for the highest annual real growth rate in the 1980-1994 period for the chemical industry (4.0%), followed by the Netherlands (3.9%),

Figure 1: Chemicals
Value added in comparison with related industries, 1994



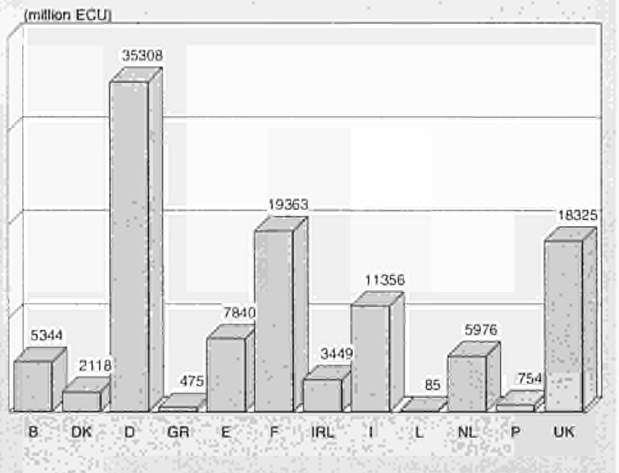
Source: DEBA GEIE

France (3.5%) and the United Kingdom (3.4%). These growth rates are relatively high compared to the respective real growth rates of 1.1%, 1.2%, 0.8% and 1.7% of total industry in these countries.

Recent trends

During the 1981-1994 period, the chemicals industry had an output growth rate of 3.2% (in volume). Following the recession at the beginning of the eighties, the growth of West European chemical output picked up again, responding to the revival in world GDP and trade from 1983 and the decline in oil prices thereafter. In the last recession (1991-1993), the West European chemical industry has, once more, shown its ability to resist better than industry as a whole. The 1994 pick-up was stronger for chemicals than for other manufacturers.

Figure 2: Chemicals
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Chemicals
Main indicators in current prices (1)

(billion ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	223.1	276.3	278.3	281.5	267.1	288.5	321.0	337.0	350.0	370.0	390.0
Production	242.9	287.4	290.5	294.8	290.6	314.0	345.7	357.7	370.0	390.0	410.0
Extra-EU exports	46.4	45.0	47.8	50.1	59.5	66.8	72.1	66.6	70.0	70.0	80.0
Trade balance	19.8	11.1	12.2	13.2	23.5	25.5	24.7	20.7	20.0	20.0	20.0
Employment (thousands)	1 738.2	1 765.4	1 743.4	1 707.9	1 641.5	1 583.3	1 532.2	1 599.4	1 580.0	1 570.0	1 560.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Chemicals
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Man-made fibres	7 844.2	7 545.6	1 333.3
Paints and varnishes	13 356.0	15 615.0	2 494.0
Pharmaceuticals	70 778.1	78 028.4	14 312.8
Soaps, detergents and toiletries	34 604.8	38 923.3	5 357.6

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Chemicals
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.2	1.7	2.5	2.7
Production	3.1	2.5	2.8	6.1
Extra-EU exports	0.3	5.9	2.8	27.6
Extra-EU imports	0.3	0.8	0.5	4.9

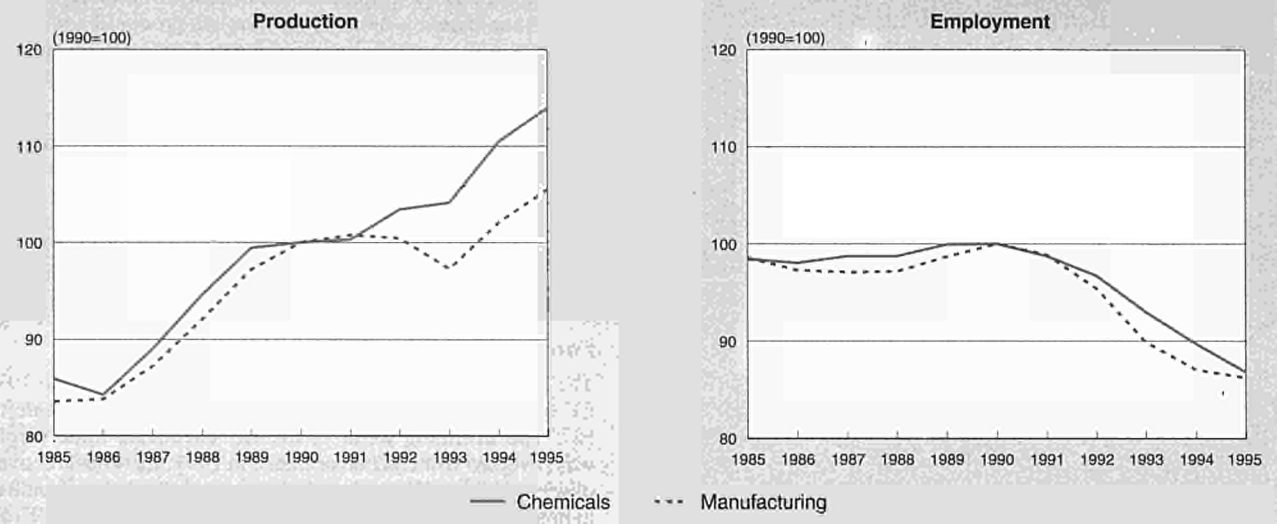
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Chemicals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	46 421	39 042	38 968	42 816	46 290	45 030	47 797	50 077	59 544	66 757	72 132	66 591
Extra-EU imports	26 620	23 577	23 919	27 559	32 689	33 895	35 573	36 855	36 035	41 301	47 481	45 913
Trade balance	19 801	15 466	15 049	15 257	13 601	11 136	12 224	13 223	23 509	25 455	24 651	20 677
Ratio exports / imports	1.7	1.7	1.6	1.6	1.4	1.3	1.3	1.4	1.7	1.6	1.5	1.5
Terms of trade index	135.6	126.6	123.3	116.7	106.2	100.0	100.5	101.9	124.4	100.0	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Chemicals
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates,
Source: DEBA GEIE, Eurostat

In 1995 European chemical producers experienced a slowdown after the big increase in 1994. During 1995, consumer spending dropped, chemical shipments declined, exports to Asia were down as China cut imports, and a big inventory build-up at the end of 1994 cut into production. However, the current situation is probably a temporary slowdown before growth resumes in 1996, rather than a return of recession.

In the chemical industry between 1990 and 1994, producer prices rose only by 2.8%, while consumer prices in Europe increased by 18%. In 1995, producer prices rose by more than general inflation, while most consumer prices decreaseIn particular, products close to consumers fell further in 1995, but also at the heavy end of business, prices were falling. In 1996, a recovery is expected. On average in 1996, chemical prices are expected to increase again. Because this increase will be small (0.5%), the erosion against general inflation will continue.

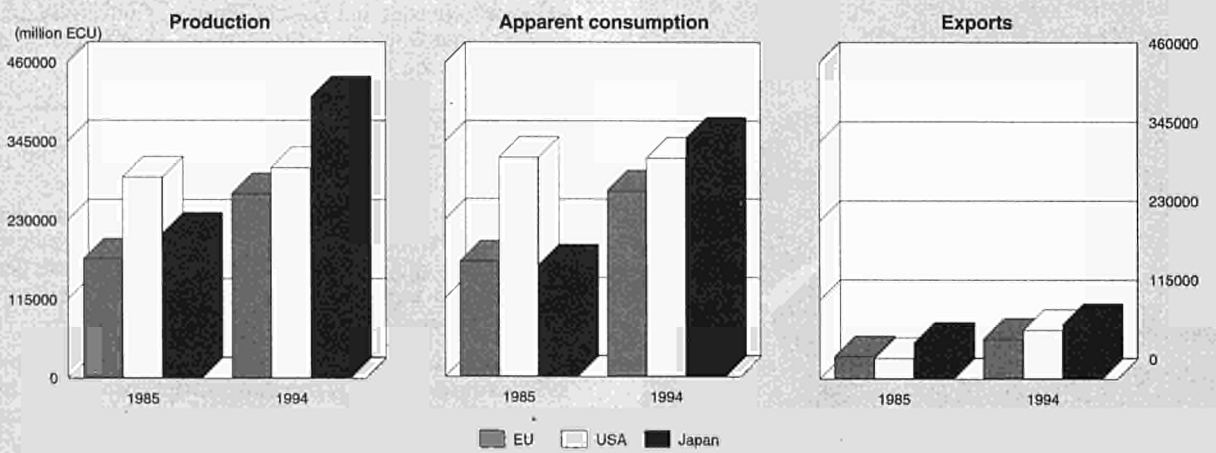
The restructuring of the industry, partly in response to the fall in real chemical prices, has had a substantial impact on employment. Since 1990, employment in the industry has fallen by about 250 000 to about 1 750 000. It is expected, to stay at that level in 1996.

Because of its close relationship with the economy as a whole, the chemical industry follows a similar cyclical pattern. But, owing to the extent of stockbuilding both in downstream customer sectors and within the chemical industry itself, fluctuations in output tend to be greater, especially for basic chemicals.

International comparison

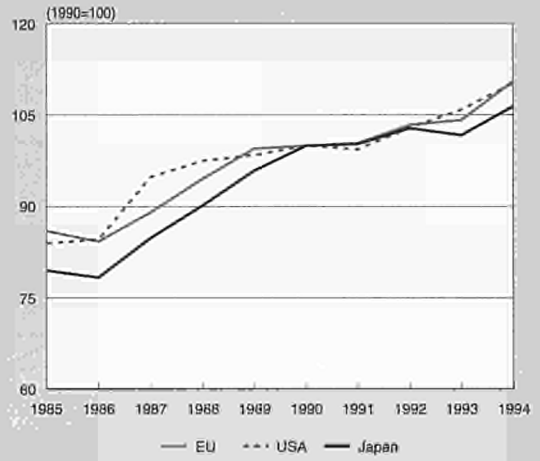
The average annual real growth rate in the chemical industry during the 1980-1994 period amounted to 3.0% for Western Europe which was less than that of Japan (4.2%) and more than that of the US (2.5%). Total industry growth rates were 1.4%, on average, for Western Europe, 2.6% for the US and 2.3% for Japan.

Figure 4: Chemicals
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Chemicals
International comparison of production in constant prices



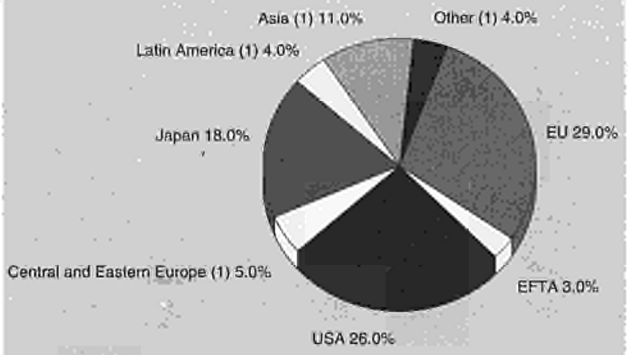
Source: DEBA GEIE

Between 1985 and 1994, the unit labour cost expressed in national currencies hardly increased in the US and EU chemical industries, whereas it went down slightly in Japan. With unit labour costs expressed in a common currency (US dollar), however, the picture is completely different as a result of the strong US dollar depreciation. While the unit labour cost increased by 6% in the USA, the cost jumped in 1994 by some 65% and 126%, respectively, in the EU and Japanese chemical industries compared to 1985, thereby dramatically impairing their international competitiveness.

In 1992, the most recent year for which an international comparison is available, the average labour cost in the EU and US chemical industries amounted to respective values of USD 44 000 and USD 52 000 per employee per year, as compared to USD 46 000 in Japan.

One can anticipate a dramatic increase in the share of Southern and Eastern Asia (excluding Japan) in the global chemicals market. This share will increase from a present value of 15% to 19% by the year 2000 and, ultimately, to 23% by the year 2010. The established chemicals regions of the industrialised countries will lose shares. This result applies to the aggregated world chemicals market, taken as a whole. For individual sub-markets the results differ on two points. The world fibres market will, in the future, be dominated, even more strongly than in the past, by Asia. World plastics production will likewise grow most strongly in Southern Asia, with an increase of 8% annually. It is yet to be seen what growth rates will occur in the European chemical industry in the same period.

Figure 6: Chemicals
Geographic breakdown of world chemicals turnover, 1994



(1) Estimates.
Sources: ESCIMO, UNIDO Industrial Statistics & CEFIC - Ecostat analysis

The European investment/turnover ratio of this industry is low compared to these ratios of the US and Japan. Over the last few years, investment has been stable at around 8% of turnover in the US, whereas it has declined dramatically in Japan to about 6% of turnover, down from 10% in 1990. In Europe, chemical industry investment has been declining since the 1990 peak, from 7% to less than 5% of turnover.

Foreign trade

The EU is the world's leading exporter of chemicals. In 1994, EU companies exported 21% of their production outside the EU. The declining trend of the EU chemicals trade surplus was reversed from its performance in 1991. Its robust recovery observed in 1993-1994 may be related to the concomitant depreciation of the real effective exchange rate of ECU and the weakness of domestic markets in 1993. Poor demand conditions at home slowed down imports and simultaneously forced chemicals manufacturers to find new outlets outside Europe.

The changes in exports and imports mirror those of demand and production. After rising very slowly in 1993, export volume jumped sharply in 1994 as world chemical demand accelerated in the fast phase of recovery as well as the anticipatory stock building. Import volumes also recovered strongly: from a small fall in 1993 to an increase of nearly 11% in 1994.

In 1995, with the slowdown in demand mainly within Europe, the growth of both exports and imports has weakened markedly. This true for imports more so than exports. Indeed, trade in chemicals again particularly within Europe seems to have been fairly flat through 1995. A further slowdown is forecast for 1996 for both imports and exports. The export forecasts reflect the view that demand from Asia in 1996 will remain much the same as this year while there will be some weakening of demand from the US.

Overall, the EU exports mainly refined chemicals, while the EU imports mostly basic chemicals. To a certain extent, the EU imports basic chemicals in order to export refined chemicals. Competitive discipline created by imports is, therefore, higher for basic chemicals than for refined chemicals.

The main destination for EU chemicals exports are the EFTA countries (21.8% of total exports), the US (14.5%), the developing countries and Eastern Europe . Conversely, imports mostly come from the US (23.2% of total imports), Japan (19.7%) and the EFTA countries (17.9%).

MARKET FORCES

Demand

On the basis of the production and trade forecasts, demand for chemicals in Western Europe is expected to increase at a little faster rate than it did in 1995. Through 1996, demand is forecast to grow at much the same rate as chemical production, which is about 3%.

There was substantial stockbuilding from the latter part of 1994 onwards. It seems that downstream chemical customers purchased ahead of demand to try to avoid price increases and were caught by weakening demand. There was also some involuntary stocking within the industry itself. At the same time, export demand weakened as China decreased its imports.

Table 5: Chemicals
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	87.3	86.0	90.2	95.8	99.5	100.0	101.6	106.9	112.0	123.2
Unit labour costs index (3)	86.8	91.9	93.1	92.6	94.5	100.0	105.1	105.6	103.9	97.1
Total unit costs index (4)	99.9	91.7	91.0	92.6	97.9	100.0	101.9	100.7	98.6	98.1
Gross operating rate (%) (5)	11.3	12.8	13.4	15.3	14.2	12.3	11.3	11.2	11.4	13.2

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

The chemical industry supplies virtually all sectors of the economy. Initially, however, the major share (33%) of chemical products is further processed within the chemical industry itself. In many instances, it is only after several processing stages that the products go to outside customers. An important share of chemical production (9%) is also further processed by the rubber and plastic processing industries from which chemicals represent 39% of total inputs.

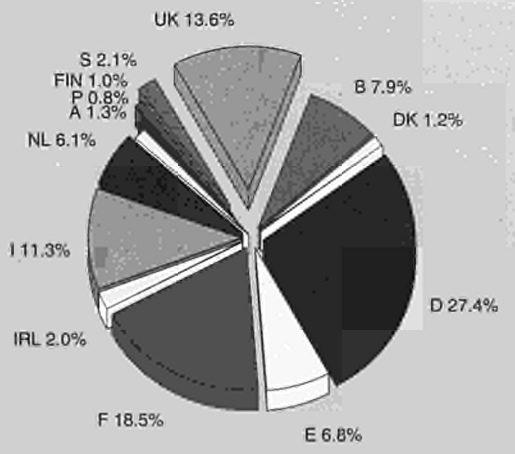
Basic chemicals require further treatment within the chemical industry itself in order to be converted into downstream chemicals. Downstream chemicals are destined either for industry and agriculture or directly for consumer markets. Downstream chemicals for industry and agriculture are used as auxiliary materials such as adhesives, paints, unprocessed plastics, dyes or fertilisers. Consumer chemicals are sold directly to final consumers: pharmaceuticals, cosmetics, household products, paints etc. The big industrial customers of chemicals are the metals, mechanical & electrical industries, textiles & clothing, wood & paper and the automotive industries.

Supply and competition

Labour cost accounts for a significant share of the chemicals production costs, far more in the EU (20%) than in the USA (17%) or in Japan (13%). It is, therefore, a major factor in competitiveness for Europe. The labour cost per employee in the EU chemicals industry increased by an average 5.8% per annum over the years 1980-1994. The impact of labour cost increases on profitability was dampened by substantial productivity gains, especially in 1994. The labour cost in the chemical industries of emerging and transition economies was up to 20 times lower. But labour productivity was also lower in those countries, so that, on balance, their cost advantage was not so strong.

Asian competitors will increasingly push towards Western Europe with their products. The Asian competitors are not only producing bulk products and standard chemicals, but also organic intermediates, pharmaceutical chemicals, and dyes and vitamins. The penetration of these competitors into Europe is happening not just through imports but also through direct investments.

Figure 7: Chemicals
Turnover of European chemical industry, 1994



Source: ESCIMO & CEFIC - Ecostat analysis

Production process

The main supplier of raw materials to the chemical industry is the mineral oil industry with petrochemical products like naphtha, gas, oil, heavy and gaseous mineral oil fractions and natural gas. The chemical industry also purchases a broad variety of natural or processed starting materials, e.g. metals, minerals and agricultural raw materials (sugar, starch, fats, etc.).

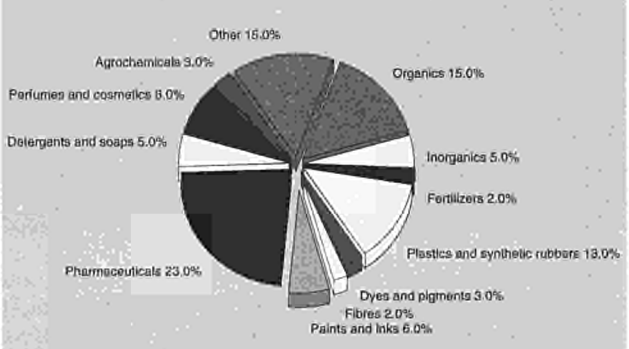
From the energy sector, the industry consumes coal, oil products, natural gas and electricity, using them both as raw materials (feedstocks) and as fuels. The chemical industry is an intensive energy user. The energy use is concentrated in the upstream basic chemicals subsector. For some basic chemicals, the energy content can account for more than 60% of the production cost.

In addition to providing for customer's present needs, the chemical industry, at the forefront of modern technology, is constantly developing new and improved products and processes, creating and serving completely new markets. This enables other industries to be more efficient and productive as they use more effective substitute materials and products.

In 1995, chemical companies in Western Europe are placing extra importance on innovation. Not only is innovation regarded as essential to maintaining the industry's powerful position in the global chemical sector, but it will also play a role in tackling the industry's major problem of high production costs. Unlike many other European industries, it has a trade surplus with the rest of the world. Yet, the region is struggling to survive because of the heavy burden of economic, social, and regulatory costs. Some of the larger companies have recently been taking steps to reinvigorate their research activities.

The EU chemical industry is a leader in capital spending with a share of 17% of the total investments of the manufacturing industry. In the second half of the 1980s, corporate investment strategies switched to expansion. Investment/turnover ratios went up and reached new heights. However, investment has been declining since the 1990 peak in Europe, from 7% to less than 5% of turnover. This ratio is low compared to the ratio of the US and Japan. The extra-EU direct investment flows by the EU chemical industry showed a surprisingly

Figure 8: Chemicals
Sectorial breakdown of West European chemical industry turnover, 1994 (1)



(1) Estimation based on data from Germany, Spain, France, the Netherlands and United Kingdom.
Source: ESCIMO & CEFIC - Ecostat analysis

downward trend over the years 1985-1993. They reached a high of about 5 billion ECU in 1990, that is almost one-fourth of domestic investment in that year. Direct investment by non-EU investors in the EU chemical industry have been low on average. They do not show any clear pattern over time.

INDUSTRY STRUCTURE

Companies

The 10 largest companies in Europe are: Hoechst (D), BASF (D), Bayer (D), Rhône-Poulenc (F), ICI (UK), AKZO NOBEL (NL), SmithKline Beecham (UK), Glaxo Wellcome (UK), Henkel (UK) and L'Oreal (F). The top 10 chemical companies world-wide include Du Pont (US), Dow (US), Ciba-Geigy (CH) and Merck & Co (US) The top three world-wide consists of European companies. Europe considers itself to be a global leader in chemicals. Seven of the world's ten largest chemical companies are European-based.

The formation of larger groups has been necessary to internationalise operations and to implement global strategies in order to be competitive on a world-wide basis, especially during the last decade. A major objective is to reap the benefits of large scale production and of the international division of labour in order to secure the comparative advantages in terms of market skills and production costs offered by the different regions of the world. The top 30 world chemicals majors - of which 18 have their headquarters in Western Europe account for 28% of world chemical turnover.

In spite of its relatively high degree of concentration, the EU chemical industry is made up of about 33 000 enterprises, 98% of which have less than 500 employees. These account for 44% of turnover and 39% of employment. Of these firms, more than 80% comprised less than 20 employees, while less than 7% of the companies comprised more than 100 employees. As a consequence, only 7% of the companies were responsible for almost 82% of the employment in this industry.

Strategies

In order for West European chemical industries to compete in the global market place, further restructuring, and cost reduction must occur. It is clear that companies have shown substantial caution in investment behaviour. To some extent the investment pattern may reflect diversion of projects to areas outside Europe for market, exchange rate and cost reasons. But more importantly, companies have been rebuilding financial positions, restructuring and avoiding unwarranted capacity expansions.

The years, 1994 and 1995 have seen intense mergers & acquisitions (M&A) activity compared with the slowdown of activity between 1990 and 1993. M&A activity has been particularly intense in the pharmaceutical and the basic chemicals segments of the chemical industry. While in the early 1990s, many companies tried to disinvest from non-core businesses they had acquired in the 1980s, in 1994/95, a number of companies which had finished with their disinvestment program were strengthening their core businesses through acquisitions and joint ventures, although this has been less the case in France and Germany.

Investment in fixed assets and research and technical development are major sources of productivity growth and profitability. They are therefore indispensable engines for ensuring the future competitiveness of the European chemical industry. In turn, high profit rates provide resources to self-finance new investments and support research and development efforts. Investment is responsive to the profit rate, with an average time lag of 2 years. Investment can, therefore, be expected to rise again over the next few years in Europe, unless financial resources are increasingly lured into faster growing economies. The European chemical industry will expect losses of market share resulting from the increased Asian competition. These losses, as well as reduced export opportunities, can be offset by, for instance, investing on the spot.

Strategic partnerships between chemical manufacturers and suppliers of logistic services (transportation, storage, and distribution companies) are coming under increased scrutiny in Europe. Excellence in logistics management is one of the few areas left where chemical companies can create competitive advantages. The chemical industry is demanding fewer, larger, and more internationally oriented chemical carriers which goes hand in hand with stronger development and integration of partnerships. The number of partnerships per chemical company is increasing dramatically, from less than two in 1989 to almost six in 1994. It is expected to amount to 14 in 1999. The proportion of out-sourced volume the

Table 6: Chemicals
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	31 560	81	7	5
20-99 employees	4 644	12.0	10.9	8.3
100 or more employees	2 636	6.8	81.9	86.4

(1) Estimates for EUR15.
Source: Eurostat Enterprises in Europe

Figure 9: Chemicals
Destination of EU exports

Source: Eurostat

number represents has increased as well and is expected to continue to increase from more than 30% to 60% during the period 1989-1999.

Leaders in strategic partnerships focus on and excel in six key dimensions: business integration, process integration, in-depth knowledge of each other's business, co-operating operating styles, open information exchange, and compatible values. Concentrating on improving these dimensions will help achieve competitive advantage. Chemical companies and logistics service suppliers expect customer service improvements of 29%; a lead time reduction of 23% and 25%, respectively; and an average cost reduction of 17% and 19%, respectively.

Chemical companies view partnerships as a tool to help improve end-customer satisfaction through improved delivery reliability and service at lower cost. They can simplify internal supply chain and focus more on core businesses. Moreover, flexibility and adaptability can be increased, leading to improved competitiveness and greater profitability. Other benefits include improved control, decreased safety risks, and a more consistent image.

REGIONAL DISTRIBUTION

In 1994, the West European chemical industry realised 83% of its sales in its own regional market: 44% in domestic markets and 39% in foreign markets inside Western Europe. Only some 17% are exported outside the West European area, mainly to Asia and North America.

Proportionally to GDP, Spain, Belgium, Luxembourg, the Netherlands and Ireland have chemical industries bigger than that of other EU countries. With regard to product segmentation, the German, Dutch and French industries are more oriented towards basic chemicals and plastic materials, while the United Kingdom and Italy have a greater share of pharmaceutical and, a few other, everyday consumer products.

ENVIRONMENT

The problem raised by the chemical industry with regard to the environment can be separated into the pollution caused during the production process, and the downstream pollution that occurs during consumption and disposal of the industry's final products.

Table 7: Chemicals
The 15 largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Hoechst	D	25 813	547	165.7
BASF	D	22 712	668	106.3
Bayer	D	22 580	1 024	146.7
Rhone-Poulenc	F	13 121	402	81.3
Imperial Chemical Industries	GBR	11 857	243	67.5
Akzo Nobel	NL	10 299	581	70.4
Smithkline Beecham	GBR	7 833	116	52.3
Glaxo Wellcome	GBR	7 415	1 708	47.2
Henkel	D	7 316	205	39.9
L'Oreal	F	7 240	450	39.0
Solvay	B	6 619	194	39.9
Zeneca Group	GBR	5 781	572	30.8
L'Air Liquide	F	4 827	373	24.6
Christian Dior	F	4 387	252	19.3
The Boc Group	GBR	4 274	147	39.4

Source: DABLE

Table 8: Chemicals Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.5	1.4
Danmark	0.7	0.7
Deutschland	1.0	0.9
Ellada	0.7	0.8
España	0.9	1.0
France	1.0	1.1
Ireland	1.1	1.6
Italia	0.9	0.9
Luxembourg	0.1	0.3
Nederland	1.5	1.4
Portugal	1.1	0.6
United Kingdom	0.9	1.0

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Over many years, the European chemical industry has made strenuous efforts to improve efficiency, by reducing energy consumption per unit of output. In 1993, energy consumption per unit of output was about 25% lower than in 1980. This constant progress in energy efficiency was by no means related to oil prices.

In 1993, total environmental spending as a percentage of turnover amounted to 3.9% in Western Europe. Total environmental spending is made up of operating costs (3.0% of turnover) and capital spending (0.8% of turnover).

REGULATIONS

A number of European Union directives, agreements, research support programmes and other regulations are applicable to and/or affect this industry. The Precautionary Principle (as stated in Article 130r of the EU Treaty) is a leading policy principle in environmental matters which has great influence on the law making process. The chemical industry subscribes to the Precautionary Principle as an important policy guiding principle in environment matters. The interpretation of the Precautionary Principle must be worked out in accordance with the idea of Sustainable Development. The chemical industry initiative, Responsible Care, which is a separate voluntary commitment of the chemical industry, is in harmony with this approach.

OUTLOOK

In 1996, a recovery is expected. On average in 1996, chemical prices are expected to increase again. Since this increase will be small (0.5%), the erosion against general inflation will continue. For the next three years the European chemical industry output is expected to increase by approximately 4-5% annually. Demand is expected to increase slightly more than production. Therefore, despite increasing exports, the EU trade surplus will decrease.

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The industry is represented at the EU level by: European Chemical Industry Council (CEFIC). Address: Avenue E. Van Nieuwenhuyse 4, B-1160 Brussels; tel: (32 2) 676 7211; fax: (32 2) 676 7300

Basic industrial chemicals

NACE (Revision 1) 24.1

Despite good performances in 1994 and 1995, the European basic chemicals industry still faces structural problems. Demand is continuing to decline in some segments, such as fertilisers. In addition, prices of certain basic chemicals such as plastics in primary forms are expected to decline. It is vital for the basic chemicals sector to continue its restructuring process to reduce costs. However, demand and prices are expected to rise again in 1996 as customers are depleting stocks. Nevertheless, by 1998 extra-EU imports are expected to surpass extra-EU exports by almost 40 billion ECU, resulting in a significant trade deficit.

INDUSTRY PROFILE

Description of the sector

This industry was formerly covered by NACE 1970 classes 251, 252, and 253. It consisted of the manufacture and the further processing of basic industrial chemicals products (251), the manufacture of chemicals obtained from petroleum (petrochemicals) and from coal (252), and the manufacture of other basic industrial chemicals (253). The activities of the first class is not identifiable in NACE Rev.1 terms. The activities of the second class are included in the following NACE Rev.1 classes: part of 24.14, 24.16, 24.17 and part of 24.41. The third class, finally, is to be found in 24.12, 24.13, part of 24.14, part of 24.15, part of 24.41 and part of 24.66.

Group 24.1 of NACE Rev.1 comprises different classes including industrial gases (Class 24.11), dyes and pigments (Class 24.12), other basic inorganic chemicals (Class 24.13), other basic organic chemicals (Class 24.14), fertilisers and nitrogen compounds (Class 24.15), plastics in primary forms (Class 24.16) and synthetic rubber in primary forms (Class 24.17).

The basic chemicals industry includes units exclusively or primarily engaged in the manufacture of inorganic chemicals (including industrial gases and fertilisers), electrochemical products, organic chemicals (including those obtained from petroleum and coal), synthetic rubber and plastics materials, mineral pigments and organic dyestuffs, etc. Considered in this classification are not only the units producing such basic chemicals but also those units which both produce and process them into finished products.

The petrochemical industry includes activities including the cracking of ethylene and other olefins such as propylene and butadiene; the manufacture of aromatic products such as benzene, toluene and xylenes; and the manufacture of other products such as ammonia, methanol and carbon black. Petrochemicals also include the manufacturing of the intermediate products such as ethylene oxide or ethylene glycol, vinyl chloride, acrylonitrile, etc. Petrochemicals are based on the processing of first derivatives of oil (such as naphtha) and natural gas. Because of the relative importance of the petrochemical sector (part of 24.14, 24.16 and 24.17), which accounts for more than half of basic chemicals sales, developments specific to that segment are covered in a specific monograph which follows. A separate monograph is also dedicated to fertilisers (24.15). Fertilisers produced in Europe are almost exclusively nitrous (N) fertilisers. Other fertilisers, either phosphates (P2O5) or potash (K2O), are imported.

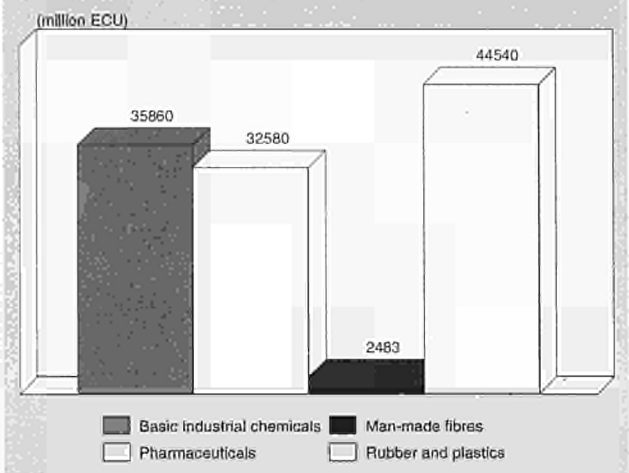
In 1994, the basic chemicals industry accounted for more than 32% of value added of the chemicals industry as a whole and for 38% of total chemical turnover. Within the basic chemicals industry organic chemicals accounted for 40% of turnover, followed by plastics and synthetic rubbers (34%), while the remaining 26% was filled up by inorganic chemicals (13%), dyes and pigments (8%) and fertilisers (5%).

The synthetic resins and plastics industry transforms petrochemicals intermediates into synthetic resins, such as polyethylene, polystyrene, or polypropylene. The synthetic rubber industry transforms petrochemical intermediates into synthetic rubber, such as polybutadiene.

The inorganic chemicals industry is based on the processing of mineral products, and includes, among others, the production of acids, such as sulphuric or nitric acids, or the production of metal oxides, such as titanium oxides.

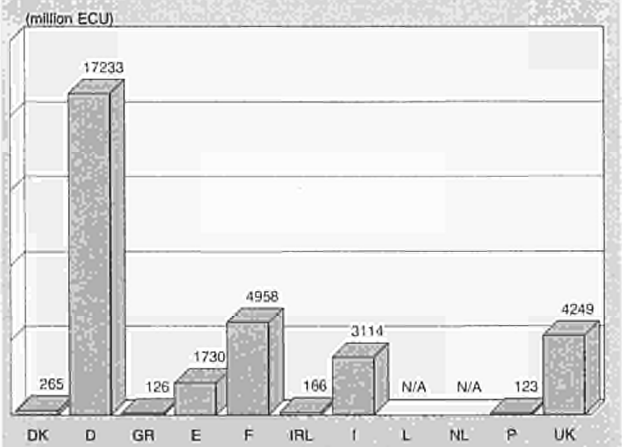
Germany is the largest contributor to this industry, accounting for almost half of the value added, followed by France (13.8%) and the United Kingdom (11.8%).

Figure 1: Basic industrial chemicals
Value added in comparison with related industries, 1994



Source: DEBA GEIE

Figure 2: Basic industrial chemicals
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Basic industrial chemicals
Main indicators in current prices (1)

(billion ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	108.6	117.3	109.9	106.3	96.3	107.2	126.9	N/A	N/A	N/A	N/A
Production	115.6	117.8	111.3	107.6	102.9	113.5	134.0	N/A	N/A	N/A	N/A
Extra-EU exports	23.0	19.9	21.0	20.9	25.5	28.1	31.2	28.3	29.3	30.2	31.4
Trade balance	7.0	0.6	1.4	1.3	6.7	6.3	7.0	4.2	-6.0	-19.4	-36.9
Employment (thousands)	645.2	619.9	594.7	571.3	541.2	514.3	495.0	N/A	N/A	N/A	N/A

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostet estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Basic industrial chemicals
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	2.2	0.3	1.3	3.4
Production	1.9	1.3	1.6	6.7
Extra-EU exports	-1.8	4.7	1.0	25.6
Extra-EU imports	-0.7	-1.2	-0.9	5.8

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Basic industrial chemicals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995(1)	1995(2)
Extra-EU exports	23 046	18 055	18 027	20 603	21 629	19 875	20 968	20 94	25 478	28 106	31 166	28 323
Extra-EU imports	16 037	13 437	13 591	15 778	19 058	19 317	19 562	19 623	18 811	21 761	24 137	24 140
Trade balance	7 008	4 618	4 436	4 824	2 571	559	1 406	1 322	6 667	6 344	7 028	4 183
Ratio exports / imports	1.4	1.3	1.3	1.3	1.1	1.0	1.1	1.1	1.4	1.3	1.3	1.2

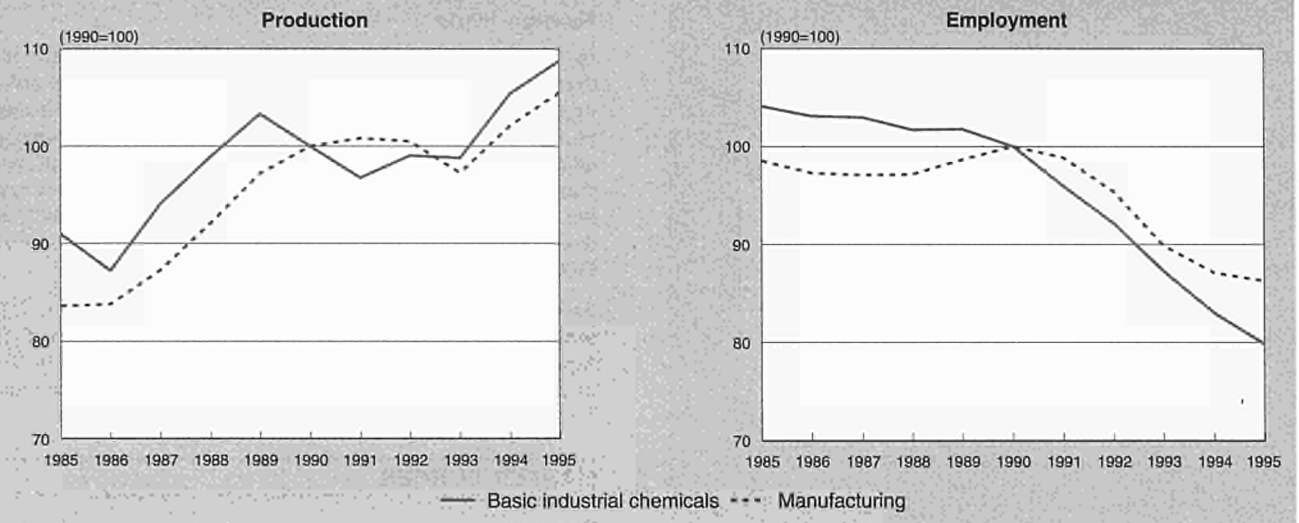
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Basic industrial chemicals
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	87.4	84.6	91.3	97.3	101.5	100.0	100.9	107.5	113.2	127.0
Unit labour costs index (3)	86.9	93.2	92.5	91.5	93.5	100.0	106.3	105.2	104.7	96.5
Total unit costs index (4)	109.2	92.6	90.6	91.8	97.9	100.0	100.7	96.3	93.2	93.5
Gross operating rate (%) (5)	9.9	12.1	13.3	16.0	14.7	10.7	8.3	7.7	7.2	9.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Basic industrial chemicals
Production and employment compared to EU total manufacturing industry



(1) Eurostat estimates.
Source: DEBA GEIE, Eurostat

Recent trends

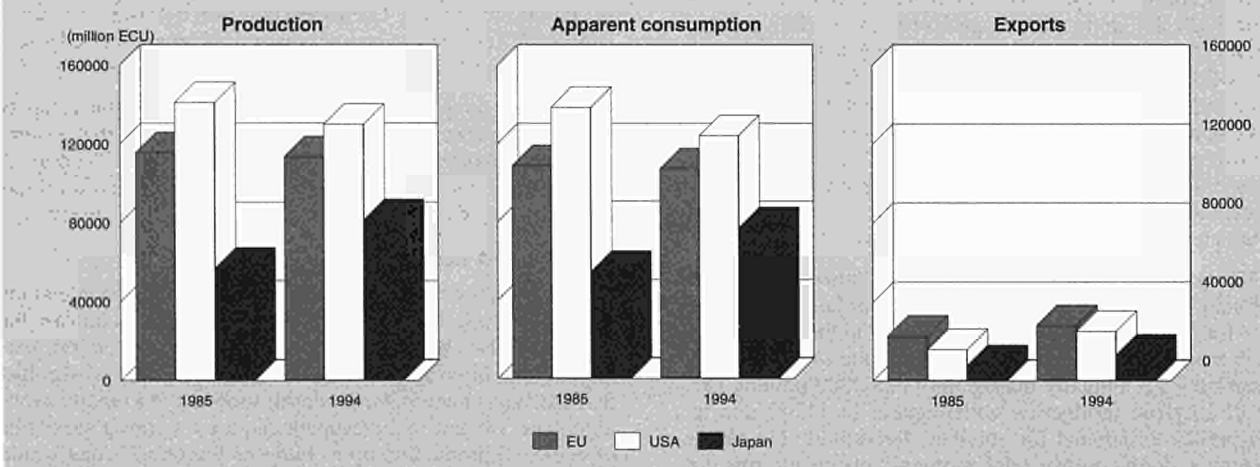
Carefulness is needed when reading the indicators concerning this industry. If the indicators are published in current prices, changes can be due variations not only in volume, but also in prices or exchange rates. From 1981 to 1994 the output growth (in volume) of the EU chemicals industry was 3.2% per annum. The basic chemicals industry grew by 2.6% during that period.

Two external events had a major influence on the fate of the basic chemicals industry in the mid-1980s: the depreciation of the dollar and the fall of the crude oil price. In 1986, the European competitiveness was directly hit by the fall of the dollar, and the EU trade balance declined by about one third, with imports and exports (in current prices) down by 9.9% and 15.9%, respectively. Consequently, European production in the basic chemicals sector fell in volume, mostly because of the fall in exports. In the following years, strong domestic demand, as the European economy flourished, and a progressive recovery of exports, allowed production to recover rapidly. The fall in the price of crude oil dramatically decreased the cost of producing basic chemicals. As selling prices remained relatively high, thanks to a fast growing demand, profitability was highest in 1988. The restructuring measures taken in the early eighties also helped to enhance profitability.

The situation changed after 1989. Growth slowed down in the European economies, with actually a recession in 1993. Between 1990 and 1994, real production of basic chemicals increased on average by 1.3% in the EU. The EU basic chemicals trade has significantly improved since the depreciation of several European currencies in 1993. In 1994 domestic demand grew which, together with good results on the trade front, helped production of basic chemicals to increase by 3.6% in volume terms in 1994.

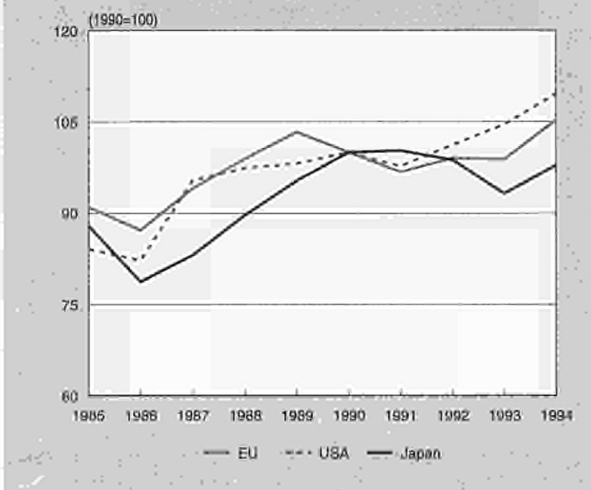
Increasing demand, high production rates, and no major new projects due on stream for a couple of years would seem to represent a scenario favouring producers. In May 1995, styrene

Figure 4: Basic industrial chemicals
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Basic industrial chemicals
International comparison of production in constant prices



Source: DEBA GEIE

prices were increasing. Producers were pushing their plants to the maximum, and buyers were being forced to face higher costs, while unable to pass all their costs onto their customers. At the end of 1995, styrene spot prices have declined strongly. As with many basic chemicals, low demand in China is causing uncertainty in the styrene market.

Prices of many bulk chemicals were stabilising in 1995 or even dropping in Western Europe as customers were lowering their inventories and demand showed signs of faltering in some key export markets. A slowdown of prices had been expected because of the drop in production during the summer. On the other hand, the price of many basic chemicals appear to have peaked throughout Western Europe.

The reduction in basic chemicals employment, which started in the early 1980s, is still going on. During the 1985-1995 period, employment in the sector decreased by about 150 200 units to 495 000 with a drop of 3.8% in 1995.

International comparison

In 1994, production (130.1 billion ECU) and apparent consumption (107.2 billion ECU) in current prices in the US were higher than in the EU and in Japan. Production amounted to 113.5 billion ECU in the EU and to 8.2 billion ECU in Japan. Nevertheless, compared to 1985, production and apparent consumption had increased only in Japan (43% and 41%, respectively). Production and apparent consumption decreased by 1.8% and 1.4% respectively in the EU and by 7.7% and 10.5% respectively in the US. Due to the depreciation of the dollar and the appreciation of the yen during the period considered, the differences between the variations of production and apparent consumption in current and in constant prices are considerable. Over the same period, from 1985 to 1994, Japan's production of basic chemicals grew the least, with a real average annual growth rate of 1.4%. Real average annual growth rate was 3.1% in the US and 1.8% in the EU.

The US organic chemicals market (in current prices) increased by 1.5% in 1995. In the same year, the US inorganic chemicals market (in current prices) grew at a slightly higher rate (2%). The US market for organic chemicals is expected to continue to grow by 1.5% annually during the 1995-2000 period. The share of ethylene production will increase to 11.3% due to higher industrial demand for ethylene derivatives. The share of ammonia production in total inorganic chemicals rose to 16% in 1995 as prices almost doubled from the 1991 level. The US market for inorganic chemicals is expected to grow by 2.5% annually for the 1995-2000 period. As increased production leads to a drop in ammonia prices, the value of ammonia production is expected to fall.

Foreign trade

In 1995, the EU was a net exporter of basic chemicals. It is expected, however, that the EU-15 will have a trade deficit in 1996. Furthermore, this trade deficit is expected to increase to almost 40 billion ECU in 1998. In 1994, extra-EU exports amounted to 28.1 billion ECU. The USA accounted for more than 18% of these exports, while the EFTA countries were the destination of almost 22% of the exports. In 1995, extra-EU12 exports were estimated to amount to 31.2 billion ECU and extra-EU15 exports only 28.3 billion ECU.

Extra-EU imports were 21.8 billion ECU in 1994. The USA took the largest share (23%), followed by Switzerland and Japan which accounted for 16% and 8.5%, respectively. Two of the new Member States, Sweden and Austria, accounted for 8% of the extra-EU imports.

MARKET FORCES

Demand

Basic chemicals require further treatment within the chemical industry itself in order to be converted into downstream chemicals. Downstream chemicals are destined either for industry and agriculture or directly for consumer markets.

Thus, the basic chemicals industry is an intermediate goods producing industry, i.e. its products are mostly used as inputs by other industries. Only 4% of basic chemicals output is sold directly to consumers and other final users. In Europe, more than 40% of basic chemicals are sold directly to other chemical industries: pigments and dyestuffs are used by paint manufacturers and petrochemicals are used to make synthetic rubber and plastics resins, etc.

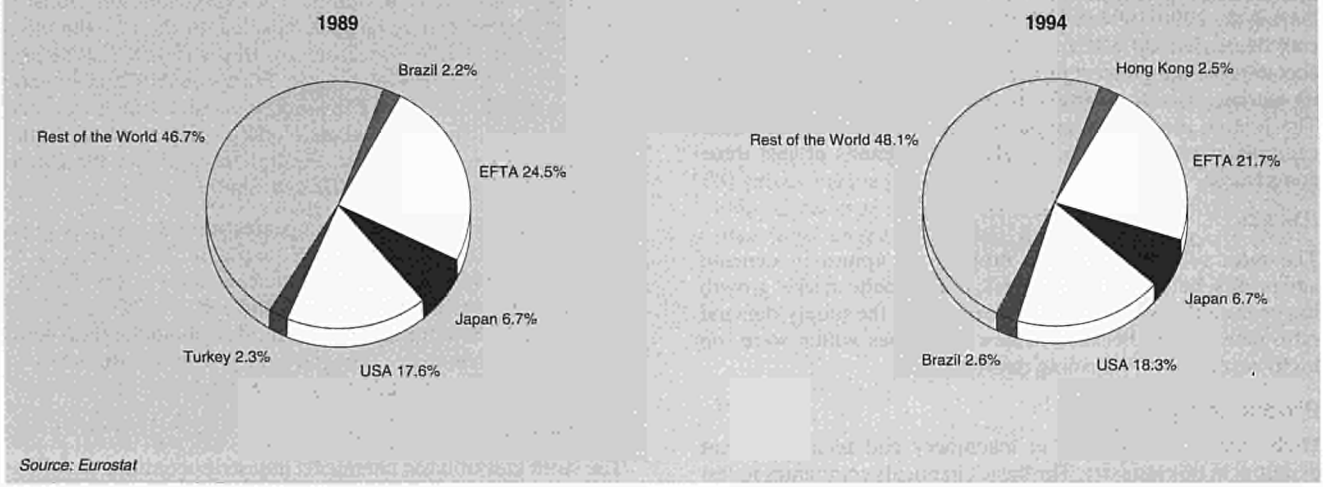
Petrochemicals are used in a wide range of industries and are therefore highly sensitive to the world economic situation. The electronics industry is the largest consumer of petrochemicals, accounting for about 40% of purchases in the sector. Another important client of the basic chemicals sector is the rubber and plastics processing sector, which processes synthetic rubber and plastic resins into finished products, such as tyres, car components, pipes, packaging houseware, equipment casing, etc. Agriculture accounts for about 7% of basic chemicals sales, in this case fertilisers. The man-made fibres industry is also a client of the basic chemicals sector in Europe. However, as textile producers are moving their production base to countries in South-East Asia, the man-made fibres industry follows. The automotive industry is one of the largest users of organic chemicals due to the importance of plastics in vehicle production. The largest end-user of inorganic chemicals is the fertiliser industry, which uses ammonia, sulphuric acid and phosphoric acid in fertiliser production.

China's booming economy and lack of production capacity for basic chemicals make obvious the need for the country needs to import large quantities of chemicals to support its manufacturing sector, and that it will need to do so for years to come. However, Chinese demand is far from steady.

Supply and competition

Chemical industries are playing a vital role in the economic revival of East European countries. In these countries the pattern of the chemical industries renewal is irregular, particularly in basic chemicals. This is mainly due to the fact that the funds needed for modernisation are not readily available. The amount of investment required to bring standards of chemical production up to those of Western Europe would be enormous.

Figure 6: Basic industrial chemicals
Destination of EU exports



Source: Eurostat

As industrial output surged in Poland, the chemical industry lifted its production by 17.2% in 1994, with the highest increases in fertilisers and fibres. Privatisation continues to be a major issue in Eastern Europe. In Poland, 85% of the detergents sector is now in private hands, as is 69% of paints and varnishes and 56% of plastics processing. Muted interest in the basic chemicals and fibres sector is reflected in privatisation levels of under 10%.

With a sizeable build-up in petrochemicals and derivatives capacity during the past decade, countries such as Taiwan and Korea have established themselves as maturing global players. Also, other countries such as Thailand, Malaysia, and Indonesia are growing their basic chemicals capacity to keep pace with growing economies or positioning themselves as major chemical export centres.

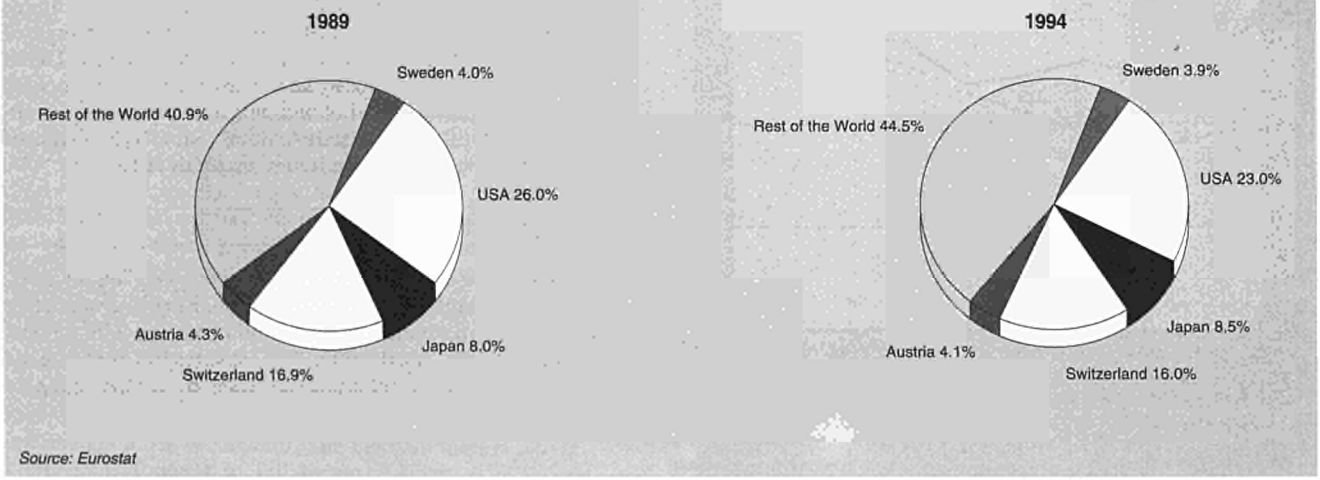
Organic Chemicals

In France, the organic chemicals market (in current prices) declined by less than 1% per annum during the 1990-1994 period. The largest market sector is that of primary petrochemicals, which represented 58% of sales value in 1994. Elf Atochem is the biggest player in the French organic chemicals market with a share of 28% in 1994. Other major players on the French organic chemicals market are Rhône-Poulenc Chimie, Exxon Chemical and Shell Chimie. German organic chemicals sales (in current prices) declined by 1% in 1995. While Bayer is the leader in this market, its turnover has declined from 1991 to 1994, due to structural problems, shrinking demand in Eastern Europe, turbulence in the European Monetary System and imports from low-wage countries. Other major players on the German organic chemicals market are Hoechst, BASF and Henkel. The British market for organic chemicals (in current prices) decreased by an average of 2.5% per annum during the 1990-1994 period. The key players in the British organic chemicals market are ICI, the largest industrial concern in the UK and by far the leading chemical manufacturer, Shell, BP and Courtaulds.

Inorganic Chemicals

In France, the inorganic chemicals market is fairly concentrated, with the four chemicals giants representing almost half of the market by value in 1994. The biggest sector in value terms is that of industrial gases, which represented 31% of sales. The German market for inorganic chemicals (in volume) has declined by less than 1% in 1995. Chloralkalies increased their market share but seem more vulnerable to environmental

Figure 7: Basic industrial chemicals
Origin of EU imports



Source: Eurostat

pressures, so that alternative bleaching materials to chlorine are sought. Half of the German market is represented by chloralkalies. The "big three" German chemical companies, BASF, Bayer and Hoechst, dominate the inorganic chemicals market, and together accounted for 93% of total sales in 1995. During the 1990-1994 period, British sales of inorganic chemicals decreased by 8% annually on average. Sulphuric acid accounts for the greatest proportion of sales, having increased its market share to overtake phosphates between 1990-1994. The British inorganic chemicals market is also heavily concentrated with over 80% of sales in the hands of just three companies.

Plastics

The most recent years have brought an upturn in demand and profits, but since its 1989 peak, although the market growth has been continuously at GDP rate or above, the supply/demand ratio deteriorated because of new capacities which were too high, resulting in vanishing profits.

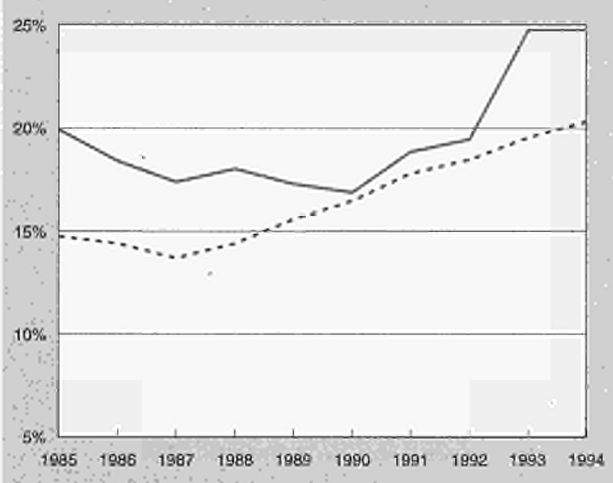
Production process

High capital investments in machinery and technology are essential in this industry. The basic chemicals companies invest considerably in new manufacturing plant and stock processing. As the production technologies for most inorganic chemicals are established, cost improvements in manufacturing tend to be incremental.

The upstream basic chemicals industry is an intensive energy user. Profitability of basic chemicals is, therefore, vulnerable to increases oil price. As the basic chemicals market is very competitive, it is difficult to pass price increases to purchasers. Other important raw materials are mineral ores, that supply the chemical substances needed by the industry.

Economies of scale are particularly important in the basic chemicals industry. It is a highly capital intensive sector that produces commodity products, thus with very few possibilities of product differentiation. The high competition, low product differentiation and heavy environmental constraints increase the difficulties of this industry.

Figure 8: Basic industrial chemicals Trade intensities



Source: DEBA GEIE, Eurostat

INDUSTRY STRUCTURE

Companies

Both the organic chemicals and the inorganic chemicals market are fairly concentrated in Europe. The basic chemicals industry is mainly composed of large companies. In the EU, the most important are: BASF, Hoechst, and Bayer (D), ICI (UK) and Rhône Poulenc (F). Other large European basic chemicals companies are the Swiss Ciba-Geigy, Sandoz and Roche, the Finnish Neste, the Norwegians Norsk Hydro and Statoil, the Finnish/Norwegian Borealis, the Italian Enichem, the Dutch Akzo-Nobel and the Dutch/British Shell.

Europe's leading chemical companies reported a slowdown in sales and profits in the third quarter of 1995 because of faltering demand and a drop in basic chemicals prices. Despite this drop in demand and prices at the end of 1995, Hoechst, Bayer and BASF are cautiously optimistic about the short-term outlook for chemicals. Demand and prices are expected to rise again in 1996 as customers stop depleting stocks.

Strategies

The strategies of basic chemicals industries continue to follow four main axes. The first strategy is rationalisation of production, in an effort to continuously improve productivity and cut costs. A steep fall in sales growth and margins has highlighted the necessity for a further rationalisation of the basic chemicals sector in Europe, e.g. Rhône-Poulenc is driven by the desire to change work processes, rather than downsizing. The most important aspect is re-engineering the work processes and refocusing the firm's efforts of serving customers.

The second strategy is restructuring of the activities portfolio. Thus, Hoechst is consolidating its basic chemicals and speciality chemicals divisions in such a way that all of the staffs are being put into a shared services organisation. Hoechst's global basic chemicals division is expanding its world-wide capacity in several ways. Between 1996 and 1999, this division will expand its world-wide capacity for vinyl acetate monomer by 225 000 metric tons. It is also raising its world-wide capacity for n-butyraldehyde, which will be converted into n-butanol, by 110 000 metric tonnes through debottlenecking at its plants in Bay City in the US (Texas), and Oberhausen in Germany.

The third strategy is extension to pharmaceuticals and speciality chemicals sectors, which generate more value added, higher profit margins, and for which demand is less sensitive to the variation in the business cycle. For example, Elf Atochem planned to make at least one major acquisition in 1995 to boost the proportion of its sales in speciality chemicals. The company has set itself a target of a 70/30 split between speciality and basic chemicals by the end of the century, compared to the current 50/50 ratio.

Finally, the fourth strategy is activity of mergers, acquisitions and joint venture, e.g. the establishment of joint ventures in the rapidly growing Asian markets. The latest joint ventures and mergers are Borealis (1994) resulting from a merge of polyolefins activities of Statoil (N) and Neste (SF). Union Carbide came back to EU by associating with Elf Atochem for PE specialities in ASPEN and with Enichem for PE commodities in POLIMERI EUROPA. Shell (NL/GB) and Himont have merged their PE/PP activities in MONTELL.

ENVIRONMENT

CEN, the European standards body, is working on an environmental management standard for auditing and reporting under the EMAS regulation, and should come up with a European standard by April 1996. This standard is likely to be ISO 14001, from the International Standard Organisation.

Table 5: Basic industrial chemicals
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	0.5	0.3
Deutschland	1.3	1.2
Ellada	0.7	0.5
España	0.8	0.8
France	0.7	0.8
Ireland	0.5	0.4
Italia	0.9	0.9
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	0.7	0.2
United Kingdom	0.9	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

REGULATIONS

The reform of the CAP, for example, the 15% set aside measure, has reduced agricultural activities, thus demand for fertilisers. Also, the Nitrate Directive will have a substantial impact on that demand.

The Packaging and Packaging Waste Directive was adopted in December 1994, requiring both recycling and recovery targets, with a minimum recycling of 15% by packaging material.

The EU regulation on eco-management and auditing (EMAS) has come into force by Spring 1995. The EMAS regulation requires the publication of an environmental statement after any environmental audit, which should be done at least every three years.

OUTLOOK

The basic chemicals industry continues to face the following structural problem: a certain excess of capacity and high production costs, which push companies to continuously press for productivity gains. In this regard, mergers and acquisitions will remain important.

In addition, demand of certain client industries is expected to continue to decline in the future. Due to certain EU regulations, fertilisers demand from agriculture will continue to decline. Also, as textile producers are moving their production base to countries in South-East Asia, the man-made fibres industry will follow. Thus, very few capacity expansions are expected in Europe in the man-made fibre industry. Demand for basic chemicals products will probably decline or remain stagnant in the coming years.

The European organic chemicals market is expected to decline slightly during the remainder of the decade. In France the structure of this market segment is planned to change, resulting from a declining share of primary petrochemicals. The German organic chemicals market (in current prices) is expected to decline by 1% annually during the 1995-2000 period. The British market for organic chemicals (in current prices) is expected to decrease by 2.5% per annum during the same period. Nevertheless, British benzene production is expected to increase by 4% (in volume) annually, during the coming five years.

The outlook for the inorganic chemicals market is different between the largest EU countries. In France all sectors (in current prices) are expected to experience steady growth of approximately 2.5% per annum. The German market (in current prices) is forecast to fall by an average of 3.5% per annum to the year 2000. The largest sector in the German inorganic chemicals market, caustic soda, is expected to remain so over the next five years to account for 43% of total annual sales in 2000. British sales (in current prices) are forecast to decline by more than 8% per annum. Sulphuric acid will continue to be the leading sector closely followed by hydrochloric acid and then by phosphates.

The outlook for plastics in Europe continues to be bleak as price declines show no sign of stopping. PVC pricing is affected by low-cost imports from Eastern Europe. Polystyrene (PS) prices vary widely. Germany is particularly affected by a drop in package industry demand. The French PS market is also weak as market leaders sell at low prices.

Written by: The Netherlands Economic Institute
The industry is represented at the EU level by: European Chemical Industry Council (CEFIC). Address: Avenue E. Nieuwenhuyse 4, bte 1, B-1160 Brussels; tel: (32 2) 676 7211; fax: (32 2) 676 7380; and Association of Plastics Manufacturers in Europe (APME). Address: Avenue E. Nieuwenhuyse 4, bte 3, B-1160 Brussels; tel: (32 2) 676 3297; fax: (32 2) 675 3935.

Fertilisers
NACE (Revision 1) 24.15

The industry in Europe is encountering growing competition in global markets from producers from Eastern Europe, from the former Soviet Union (FSU) and other regions like North Africa, the Arabian Gulf and Asia. In parallel, internal European demand should, for a while, register only relatively moderate recovery after the 20% fall at the beginning of the nineties. For the near future a stable market can be assume-However, further recession cannot be excluded in the long run, in part due to the effects of the Common Agricultural Policy (CAP) and the increased importance of environmental pressures.

INDUSTRY PROFILE

Description of the sector

In the revised NACE, the fertiliser industry corresponds to class 24.15 but previously corresponded to subgroups 253 and 256.8. The fertiliser industry manufactures and markets products which contain one or more of the three primary plant nutrients: nitrogen (N), phosphorus (P) and potassium (K). Of the total nutrient volume applied in the EU (17.3 million tonnes of nutrient in 1994/1995), nitrogen fertilisers accounted for 55% (9.6 million tonnes of N), whereas potash fertilisers (4 million tons of K_2O) and phosphate fertilisers (3.7 million tonnes of P_2O_5) accounted for 21% and 24% of the total, respectively.

All fertilisers containing more than one primary nutrient are called "multinutrient fertilisers". Single-nutrient fertilisers (which contain only one of the three primary nutrients) are called "straight fertilisers". While the majority of phosphate and potash fertilisers are applied as multinutrient fertilisers, nitrogen fertilisers are mainly supplied as straight fertilisers. Fertilisers are usually sold as solids, in prilled or granulated form. Between 5% and 10% of all fertilisers are sold in liquid form. These require special storage and handling equipment.

Recent trends

The West European market was depressed during the first half of the nineties and suffered from both the drop of consumption and low prices. Increasing imports into the European Union (EU) and competition in overseas markets, especially from producers in Central and East European countries, aggravated the financial situation of West European producers. This led to an acceleration of the restructuring process and the closing of a considerable number of plants. This process is continuing in some EU countries.

Both demand and prices have recovered since 1993/1994. The industry has regained competitiveness and is technically and financially in better shape to serve the European market with the quantities and quality of fertilisers required.

The demand for fertilisers in Europe is also linked to the Common Agricultural Policy, the CAP. Within the framework of the 1992 reform of the CAP, farm acreage and the prices for agricultural produce were reduced in order to remove surpluses. This led to a considerable decrease in fertiliser demand.

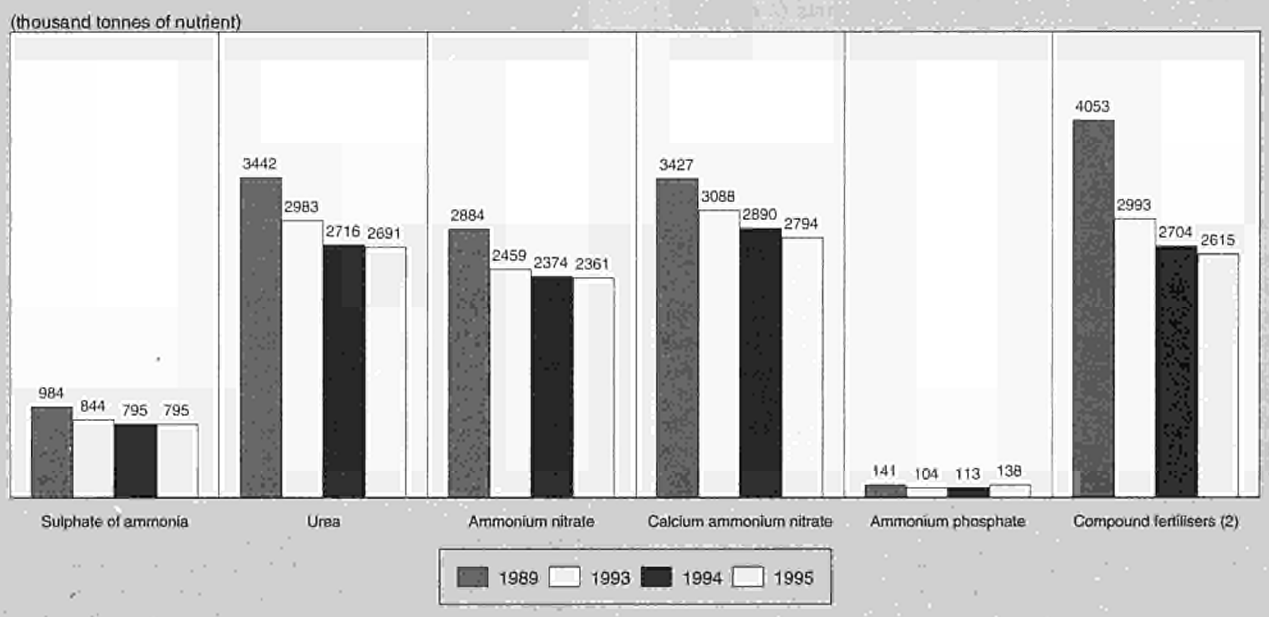
In 1995 world grain stocks fell to a record low. Prices for agricultural produce rose world-wide. In the European Union the set-aside acreage was reduced from 15% to 12%, and finally to 10%. In addition, farmers returned to more normal practices thus contributing to a recovery of European fertiliser demand.

International comparison

In 1994/1995, consumption in Western Europe represented 14% of the total world consumption of fertilisers while 54% was accounted for by China, the Former Soviet Union (FSU), the United States and India. Between 1989/90 and 1993/94 world-wide consumption of fertilisers declined by 16%. This was most significant in Western and Eastern Europe and in the FSU. At the same time, North American demand remained stable while that of developing countries grew by nearly 14%. Taken as a whole, the European Union represents about 12% of world-wide fertiliser production thus ranking fourth, behind the USA, China and the FSU.

During the past decade, a geographic shift in demand has taken place in the direction of developing countries. This shift

Figure 1: Fertilisers
Capacity in the EU (1)



(1) EUR15.
(2) NP/NPK/NK.
Source: EFMA

Table 1: Fertilisers
Consumption and production breakdown by nutrient (1)

(thousand tonnes of nutrient)	1985	1990	1991	1992	1993 (2)	1994 (3)	1995(3)
Consumption							
Total Fert. N (4)	9 802	10 166	9 876	9 051	9 197	9 594	9 521
Total Fert. P205 (5)	4 810	4 354	4 104	3 686	3 601	3 672	3 629
Production							
Total Fert. N (4)	9 044	9 494	8 932	8 400	8 450	8 650	N/A
Total Fert. P205 (5)	3 702	3 027	3 008	2 376	2 400	2 400	N/A

(1) Nutrients for technical use are not included; refers to agricultural years, for example 1988 = 1988/1989; from 1988, Europe 15.
(2) For production, refers to EU12.
(3) Estimates made by EFMA.
(4) Total Fert. N includes SA, UREA, AN, CAN, OSTRN, SOLUT., DAP-MAP-AP, NPK-NP-NK.
(5) Total Fert. P205 includes AP, NP NPK, PK, TSP, SSP, O.STRGHT PHOSPH.
Source: EFMA

is also present with respect to the location of production sites. In 1980/1981 the developing countries accounted for about one third of world nitrogen fertiliser production. By 1993/1994 their share had increased to almost half. Their share of phosphate fertiliser production increased from 23% to 38% over the same period.

The main phosphate fertiliser producing regions are the USA, the FSU, Socialist Asia, Western Europe and Africa. On the other hand, the production of potash is in regions rich in this mineral, such as Canada, part of Western Europe, Russia and Belarus, Israel and Jordan.

Foreign trade

Since the end of the 1980 s, the West European foreign trade balance for fertilisers has been negative. This trend continued in 1994/95. Even though exports increased, there was a greater increase in imports. One of the contributing factors in this development has been the relative cost disadvantage which producers suffered from, with regard to natural gas, the main raw material in nitrogen fertiliser production. However, during the past few years the relative position of EU producers has improved considerably because of price developments in North America, the CEE countries and the CIS.

With the establishments of the World Trade Organisation, trade should continue to develop as tariffs on fertiliser products are to be progressively reduced from a range of 4.8% to 10.6% in 1995, to 4.8%-6.5% in 2004. Many developing countries, and also the CEE countries can already export duty free to the European Union.

MARKET FORCES

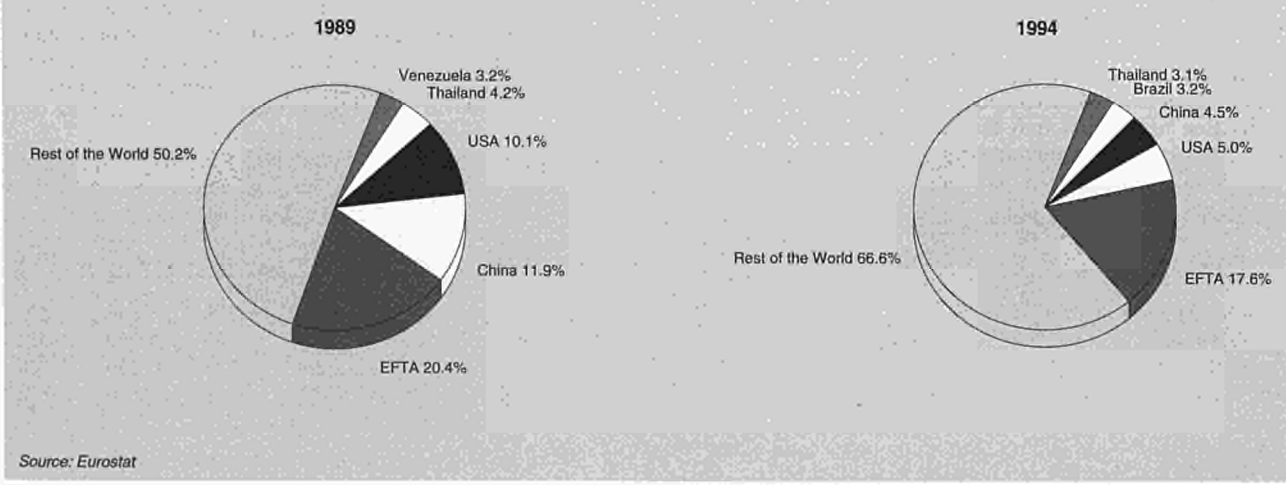
Demand

The fertiliser market is very cyclical. Despite fluctuation in the short term market place, the long term fundamentals for the fertiliser industry remain very strong. World population growth and improved diets are the basic building blocks for increasing the world's food demand, and the resulting increase in world fertiliser demand. On a global level, the demand for fertilisers is forecasted to increase in the next few years. According to the FAO study, "World Agriculture: Towards 2010", fertiliser consumption in developing countries will increase at an annual rate of 3.8% between 1988/1990 and 2010. This growth can principally be attributed to a strong increase in demand in China, North America, South Asia, and to a lesser extent in the Near East and Central Europe. In addition, it is equally probable that the consumption of fertilisers in the countries of Eastern Europe and in the FSU will have reached its low point in the period 1994/1995.

In Western Europe, the demand for fertilisers is directly linked to the implementation of the CAP reform which anticipates the set-aside of a certain percentage of arable land.

The medium term trend for the consumption of mineral fertilisers in the European Union is still towards a gradual fall, due largely to the CAP reforms, and also to the enforcement of environmental legislation such as the Nitrate Directive and the Drinking Water Directive.

Figure 2: Fertilisers
Destination of EU exports



Source: Eurostat

Figure 3: Fertilisers
Destination of EU imports

Source: Eurostat

France is the largest single mineral fertiliser market, followed by Germany, the United Kingdom, Italy and Spain. Concerning the mineral fertiliser application rates per hectare throughout the EU, the highest application rates are found in the Netherlands, Belgium, Denmark and Germany.

Supply and competition

Over the past 15 years, Europe has dramatically reduced its production capacity. Profitability has been very low for EU manufacturers for many years. Massive restructuring and downsizing have already taken place. Employment in the EU stood at 140 000 in 1983. By 1995, this had been reduced to 20 000. The EU has retained its share of the world capacity for ammonium nitrate but has seen a large decline for urea, sulphates of ammonia and compound fertilisers. The fertiliser market is a world-wide one and the fertiliser industry is therefore very sensitive to the vagaries of world supply and demand and to global competition.

Natural gas accounts for a large part of the cost of nitrogen. Producers with access to low-cost natural gas have a competitive advantage compared to their European counterparts. Similarly, phosphate fertilisers tend increasingly to be transformed near deposits in the USA, and also Africa and the Middle East.

Among the principal competitors for European producers figure manufacturers from Eastern European countries and from the FSU, especially Russia. Agricultural production and the consumption of fertilisers in these countries has declined over in the past five years. In a context of marked instability between offer and internal demand, producers in these countries have turned more towards export markets since they benefit from sizeable fertiliser production capacities. The European fertiliser industry has, consequently, lodged several complaints about dumping and unfair competitive practices. In 1995, the liberalisation of imports into the EU from the Central and East European countries was once again accelerated by the decision of the European Council to grant totally free access to imports to all East European countries with the exception of the CIS and former Yugoslavia. For exports to Eastern Europe duties of up to 17.5% are in place in Hungary, 17.4% in Slovakia, 12% in Poland, 21% in Bulgaria, 10% in Romania, 11% in Croatia.

Given the state of the market, the question of fair international trade practices is becoming increasingly important. Cases of dumping have been proven and this is still clearly an area of concern to the industry.

Production process

Fertiliser plants are often large integrated operations that process raw materials into input for other industrial sectors. This input includes ammonia, nitric acid, urea, ammonium nitrate, sulphuric acid and phosphoric acid.

The industry is highly dependent on its supplies of raw materials, notably its hydrocarbons (in particular, natural gas). Although the components of finished fertiliser products are relatively simple chemicals, the manufacturing technologies employed are highly developed and the production plants capital intensive.

For nitrogen fertilisers, the basic intermediate is ammonia, which is produced by combining atmospheric nitrogen with hydrogen extracted from hydrocarbons, mainly natural gas. Rock-phosphate and potash, furthermore, are raw materials for the production of straight phosphate and potash fertilisers, as well as for the production of complex fertilisers. Today technical progress has helped diminish the amount of natural gas needed and to improve the energy efficiency of ammonia production units. It is nevertheless the case that the fertiliser industry is one of the largest single consumers of natural gas

Table 2: Fertilisers
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	935	549	520	579	490	437	476	505	514	501
Extra-EU imports	1 034	1 037	1 032	1 029	1 212	1 225	1 263	1 193	1 053	1 451
Trade balance	-99	-488	-512	-450	-723	-787	-788	-688	-539	-950
Ratio exports / imports	0.90	0.53	0.50	0.56	0.40	0.36	0.38	0.42	0.49	0.35

Source: Eurostat

in the EU, currently accounting for approximately 4% of total EU consumption.

Continued improvements in technology and production processes have significantly reduced the amount of natural gas required to produce a tonne of ammonia, which is the basic intermediate for nitrogen fertilisers. The resulting energy friendliness of the West European fertiliser industry compares very favourably with that of ammonia producers in other regions.

Rock-phosphate is the basic raw material for the production of all types of phosphate fertilisers. It reacts with phosphoric or nitric acid to produce phosphate fertiliser. Since EU phosphate rock deposits are limited to small amounts in Finland, manufacturers are obliged to acquire the raw material from the USA, North Africa or the FSU. Difficulties encountered by manufacturers in acquiring rock phosphate and phosphoric acid imports at competitive prices, and environmental legislation, have resulted in the closing of a number of West European phosphate fertiliser production units.

INDUSTRY STRUCTURE

Companies

In the early 1990s measures linked to the CAP-reform and freezing of land in the USA brought about a decline in consumption and resulted in production over-capacities that made producers close sites in Europe.

As a result of restructuring and downsizing which began in the 1980s, the fertiliser industry has become increasingly concentrated. In the 1990s, a wave of mergers and acquisitions took place. Today, the five major players (in order of ranking) are Norsk Hydro, Kemira, BASF, Grande Paroisse and Fertiberia. However, DSM, ICI, Enichem, SKW Piesteritz, Agrolinz and Quimigal are of significant strength and are serious competitors in the market.

In 1995, Norsk Hydro procured the Canadian fertiliser firm Nutrite by acquiring the 75% of the company that it did not yet hold. In April 1995 Fertiberia was procured by the group Villar Mir. In 1996, the fertiliser division of Enichem Agricoltura, part of the Enichem group, was purchased by Norsk Hydro. In the beginning of 1996, Air Liquide ceded all of its participation in the capital of Grande Paroisse.

It seems that demand in South Asia and China should be very dynamic in the next few years, European manufacturers have initiated a number of joint-venture projects and installations in Asia. On the other hand, there are no noteworthy projects in Europe for the creation or extension of fertiliser production capacity.

Strategies

Given the increasing competition from regions that are suffering from reduced domestic demand, while at the same time enjoy competitive advantages, further restructuring of the European fertiliser industry may occur. The EU fertiliser industry has already committed itself to a huge restructuring and rationalisation process both within national borders and at EU level. Sales networks have been developed in all countries. Plants have been shut down and production concentrated at the most favourable locations in terms of supply and outlets. Investments have been made in order to improve efficiency and productivity (especially to optimise the use of energy) so as to produce the best fertilisers in an environmentally sound manner and to market them in the best way.

REGIONAL DISTRIBUTION

Production capacity for each type of fertiliser is widespread across the Community. However, this is less true now than in the past due to the rationalisation of the industry. This had the effect of concentrating production for the different types of fertiliser in a smaller number of countries. In terms of production capacity of finished nitrogen fertilisers, France, the Netherlands and Germany each account for around 16% of total EU capacity. Belgium, Italy, Spain and the United Kingdom each account for nearly 9%.

ENVIRONMENT

Since the early 1980s, there has been considerable concern about the impact of fertilisers and other chemicals used in agriculture on the environment. In particular, there has been concern about the level of nitrates in water supplies and phosphorus in water sources and the sea. A consensus on the international level has, for example, been established in the contexts of organisations like the Fourth International Conference on the Protection of the North Sea and the Oslo and Paris Commissions. In the framework of the International Conference on the Protection of the North Sea. Consensus has been reached to halve the plant nutrient inputs to the North Sea by the end of the century, at the latest. In addition, the European Commission has issued a directive on drinking water aimed at controlling the maximum concentration of nitrates. Another directive on the ecological quality of water was also proposed this year. In general, the objective is to promote well-balanced fertilisation compatible with the need to protect the environment.

For its part, the industry has committed itself to a uniform distribution in the field and thus high nutrient efficiency and minimum nutrient losses over fertilised plots into the environment. From the point of view of growers, a new approach to the management of agricultural operations is taking place. This approach aims at gaining optimal profitability from the land in light of the costs of personnel, equipment and chemical products. Considerable progress has, for example, been made in sequencing additions of fertiliser over time so as to use it optimally for each type of plant while ensuring respect for the rules of good conduct established by the profession.

REGULATIONS

Regulations exist, covering most aspects of fertiliser production and use. In addition to normal health and safety regulations, fertiliser producers are subject to emission standards and product quality specifications.

The European fertiliser industry is considerably affected by legislative measures such as the reform of the CAP. This reform necessitates abandoning support mechanisms in favour of compensation paid directly to farmers. In addition, it has had particular impact on the arable land sector. The intervention purchase prices of cereals have dropped by nearly 25%, and these reductions have been compensated for by direct aid per hectare. At the same time, aid payment is contingent on a freezing (at 10%) of the area devoted to cereals and oil- and protein-yielding crops.

OUTLOOK

As a result of current developments related to the the Common Agricultural Policy and to increasing awareness about environmental concerns, European Union production of fertilisers should stabilise in coming years. The future might see a return to growth and output attaining more than 3 million tonnes by the year 2005.

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Petrochemicals
NACE (Revision 1) 24.1

The petrochemicals industry represents more than two-thirds of the basic chemical sector and a quarter of the total chemical industry turnover. Activity improved in 1994 and in the first half of 1995, but the second half of 1995 was marked by reduced demand. Most European firms experienced a marked increase in profitability during these two years. Structural problems, involving a relatively large number of small and isolated production sites, remained largely unsolved.

INDUSTRY PROFILE

Description of the sector

The petrochemical industry is defined as the industry that uses raw materials derived from oil or natural gas to manufacture products such as primary petrochemicals, ("first generation"): olefins (ethylene, propylene, butylene, butadiene, acetylene), aromatics (benzene, toluene, xylenes, naphthalene), methanol and synthesis gases (used for further synthesis of ammonia, methanol and "oxo" alcohols), petrochemical intermediates: vinyl chloride, acrylonitrile, cyclohexane, ethyl benzene, styrene, phenol, etc. and petrochemical products: plastics, synthetic fibres, solvents, surface active agents, additives, synthetic rubber, fertilisers and agricultural chemicals.

This monograph does not deal with the last categories, which are the subject of separate monographs. The lack of common data base for petrochemical products is the main reason for the absence of complete statistical data.

The change in terminology concerning petrochemicals corresponds to a movement towards vertical integration in the chemical industry. In NACE Rev.1, petrochemicals correspond to part of subgroup 24.1, "base chemical industry". In particular, there are to be found in their entirety as subgroups 24.16 (manufacture of basic plastic materials) and 24.17 (manufacture of synthetic rubber), as well as part of subgroups 24.14 (manufacture of other basic organic chemical products) and 24.41 (manufacture of base pharmaceutical products). Thus, in NACE Rev.1, the petrochemical and carbochemical industries no longer appear as such but are integrated into a group of products within the base chemical industry. Nevertheless, the data available on petrochemicals this year still correspond almost exclusively to primary petrochemical products (ethylene, propylene, butadiene, benzene) and, to a lesser extent, to carbochemicals.

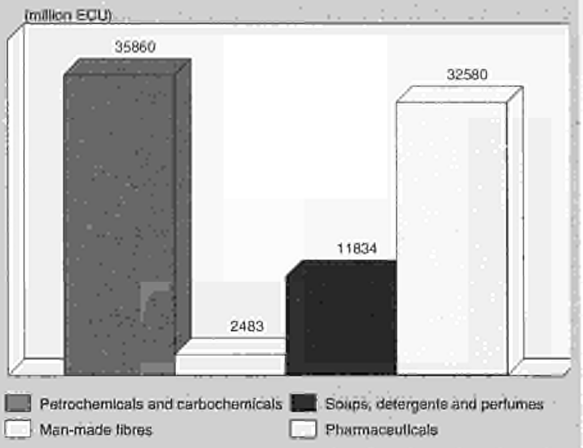
The petrochemical industry is concentrated in Germany and the Benelux countries, which hold 27% and 25% of the Community's olefin cracker capacity of ethylene production, respectively, followed by France, the United Kingdom and Italy, with 18%, 15% and 12%.

Recent trends

From 1985 to 1993, the production of primary petrochemical products increased steadily. On average, ethylene production and consumption in terms of volume has increased by about 3% per year, propylene by about 4% per year and benzene by about 1% per year. Butadiene is the exception, with a 0.1% annual decline in production, while consumption increased by an average of 2% per year.

The European industry further benefited in 1994 and 1995 by restocking within its customers, from increased exports and from increased margins. The production of ethylene, after having risen by 1.7% in 1993 rose by 12% in 1994, to the level of 16.2 million tonnes. The production of propylene rose by 12.5% in 1993, from 9.4 million tonnes in 1993 to 10.7 million tonnes in 1994.

Figure 1: Petrochemicals
Value added in comparison with related industries, 1994



Source: DEBA GEIE

While the production of benzene changed in a similar manner in 1994, the most spectacular change in production was that of butadiene which rose by more than 20%. On the other hand, the change in consumption of butadiene was less radical, with a rise of nearly 4%, while the consumption of other primary petrochemical products rose between 10% and 12.5%.

Eurostat figures show that the value added for the petrochemical sector represented, in 1994, nearly 36 billion (thousand million) ECU as against 32.6 billion ECU for the pharmaceutical industry and 12 billion ECU for the soap, detergent and perfume sector. A combination of destocking and falling demand in the second half of 1995 led to a reduction in price levels, with in consequence a squeezing of margins.

International comparison

The EU is a major player in the world market for primary petrochemicals, being the largest producer of butadiene and benzene and the runner-up to the USA, for the production of ethylene and propylene. EU production is about twice that of Japan. Recently, new producers have emerged on the world scene, particularly in south-east Asia, Brazil and the Middle-East. In most product areas, the highly organised US petrochemicals industry poses the greatest competitive threat to the European Industry.

Foreign trade

The trade balance for the EU in 1994 and 1995 not only remained positive, but also improve. This was largely the result of European producers taking advantage of tight capacity globally by exporting larger volumes, and substituting some imports into the EU. With significant investment in new production capacity in the US, the Middle East and the Pacific Rim in the period 1996 to 2000, it is likely that there will be some deterioration in the EU trade balance.

A breakdown by Member States shows the predominance of Germany, which is both the major exporter and importer in the EU, accounting for 41% of extra-EU exports and 22% of extra-EU imports. Next comes the United Kingdom (11% of exports and 14% of imports), France (11% of exports and 13% of imports), the Netherlands (10% of exports and 14% of imports), Italy (9% of exports and 15% of imports) and Belgium (8% of exports and 15% of imports). The other countries, Spain, Portugal, Denmark, Greece and Ireland each represent less than 5% of exports and imports.

Table 1: Petrochemicals
EU supply of and demand for the primary petrochemical products

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
ETHYLENE										
Actual capacity	13 074	12 878	13 230	13 830	13 925	14 350	15 895	16 659	17 384	17 675
Production	11 161	11 636	12 375	13 338	13 050	12 820	13 507	14 225	14 468	16 214
Consumption	11 393	11 813	12 572	13 377	13 122	13 022	13 527	14 296	14 632	16 154
PROPYLENE (1)										
Actual capacity	7 400	7 536	7 885	8 363	8 838	7 255	7 963	8 453	8 761	9 106
Production	6 243	6 632	7 097	7 755	7 734	8 005	8 518	9 143	9 492	10 680
Consumption	6 801	7 151	7 374	7 993	8 057	8 320	8 574	9 390	9 505	10 586
BUTADIENE										
Actual capacity	2 083	1 905	1 983	2 015	2 129	2 159	2 189	2 222	2 110	2 183
Production	1 623	1 552	1 679	1 819	1 815	1 847	1 753	1 786	1 693	2 033
Consumption	1 238	1 208	1 286	1 411	1 405	1 455	1 440	1 488	1 458	1 520
BENZENE										
Actual capacity	6 381	6 611	6 750	6 481	6 861	6 885	6 949	7 108	7 184	7 318
Production	4 796	4 740	5 150	5 475	5 446	5 400	5 439	5 356	5 383	5 992
Consumption	5 077	5 083	5 356	5 956	5 769	5 840	5 636	5 629	5 629	6 333

(1) Capacity from 1990 onwards is based on non-refinery production (i.e. steam cracking), whereas production figures cover the whole industry.
Source: CEFIC, Eurostat

Before the recent enlargement of the EU, the EFTA countries and the USA were the main end markets for extra-EU exports as well as the primary source of EU imports. Nevertheless, in 1994, the share of exports represented by the EFTA countries, by the USA and by Japan fell slightly with respect to the "rest of the world" and to that of particular countries (Turkey, Hong Kong). Similarly, the share of imports outside the EU from the "rest of the world" and from Japan rose in 1994, to the detriment of the share from the USA and the EFTA countries.

MARKET FORCES

Demand

The products of the petrochemical industry are used mainly by other branches of the chemical sector, in particular speciality chemicals, synthetic resins, plastics and synthetic rubber, used in virtually all segments of our industrialised economies (such as packaging, construction, electronics or transports), pharmaceuticals, paints, varnishes and inks, and man-made fibres.

The profitability of the European industry is traditionally very cyclical. The two most recent low points of the cycle occurred in 1986/87 and 1990/92, and, despite a difficult economic environment, the years 1993 and 1994 were marked by strong demand for the industry's products, and an accompanying significant increase in profitability. The reason for the sharp fluctuations in the fortunes of the industry relate very largely to the difficulty in managing forward production and stock levels to balance changes in demand for downstream petrochemical products.

Supply and competition

The European petrochemical industry generally lacks competitiveness and continues to suffer from problems related to the historical development and structure of the industry. From 1986 to 1991, the petrochemical industry invested massively in order to increase its production capacity.

However, new capacity only arrived in and after 1991, when the demand growth rate started slowing. Thus, from 1990 to 1993, the production capacity for ethylene in the EU rose by 21%, which was the result of the induction of the service of new crackers. When world-wide demand shrank, the European petrochemical industry found itself with large over-capacity. In 1993, capacity utilisation fell to 83%.

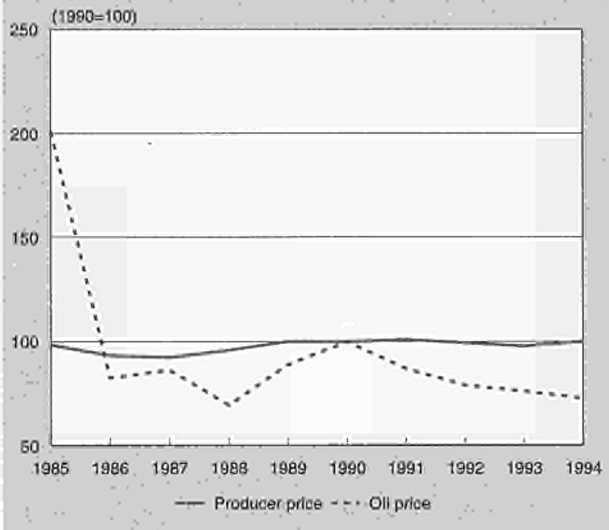
At the same time, world-wide production capacities continued to grow faster than the demand. European producers, less competitive, were more affected by global over-capacity. A tonne of ethylene produced in Europe can cost up to twice as much as a tonne produced in the Middle-East. This is essentially due to manufacturing procedures in Europe, which use naphtha, where the Middle-East uses ethane. New producers in the Middle-East will increasingly have to use naphtha or liquefied petroleum gases, where they might lose their raw material cost advantage. Between 1993 and 1994, production capacity grew by only 1.5% but a revival in demand led to a 92% use of production capacities.

Table 2: Petrochemicals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	15 771	13 580	13 648	15 749	14 870	15 378	16 063	16 114	19 352	21 670
Extra-EU imports	9 974	9 028	9 179	10 939	13 357	13 859	14 058	13 911	13 321	15 383
Trade balance	5 797	4 552	4 469	4 811	3 286	1 520	2 005	2 203	6 031	6 288
Ratio exports/imports	1.58	1.50	1.49	1.44	1.25	1.11	1.14	1.16	1.45	1.41
Terms of trade index	89.4	95.1	97.0	95.8	97.5	100.0	102.2	103.1	105.9	N/A

Source: Eurostat

Figure 2: Petrochemicals
Crude oil supply and European chemical industry producer price



Source: ESCIMO & CEFIC - Ecostat analysis, Eurostat

Petrol and oil producing countries are betting more and more on petrochemicals. For example, the APICORP (Arab Petroleum Investment Corporation), founded in 1975 by the governments of 10 Arab petrol producing nations, participated in 1994 in petrochemical projects totalling USD 180 million.

Already, the increasing market share and competitiveness of foreign investors has had long-term consequences for European petrochemical producers. Thus, while an increase in the trade surplus was experienced in 1993 (due mostly to exchange rate fluctuations), a gradual longer term decline of the level of trade surplus may be expected.

Market prices for petrochemical products were low 1991-93, as the situation of excess capacity forced producers to lower prices to keep their market share and to keep their factories running at as high a utilisation rate as possible, in order to lower the influence of important fixed costs. As a result, margins and profit were under serious pressure, and the petrochemical operations of many European companies lost money in 1993.

The situation improved in part in 1994, due to shutdown both for maintenance and because of accidents, which reduced supply on a world-wide basis, and due to a surge in demand caused by a certain amount of stock building activity and a rebound in economic activity in Europe. Most European petrochemical producers were profitable in 1994: the quoted price for ethylene sold in forward contracts increased by 23% with even greater increases down the line.

Prices continued to progress until the second semester of 1995 and then declined anew. Internal and external European market demand shrank. In this situation, prices tended downwards partly because of problems in disposing of increased stocks, complicating matters since there already existed a stock surplus (in particular, that of primary products).

Production process

Most of the petrochemical crackers being built around the world today are based on naphtha, or mixed streams.

In recent years, there has been considerable investment in Europe to allow cracker operators to select the feed most appropriate for their particular circumstances. For instance, major European petrochemical companies have sought to take advantage of the availability of alternative feedstocks such as liquid petroleum gases by setting up pipelines to feed petrochemical sites. A case in point is the BP cracker at Grangemouth in Scotland. Furthermore, in 1995 a new cracker was put into service in Antwerp by BASF. It represented a substantial investment and reinforced the objective of downstream integration for the site. The flexible raw material position of this cracker clearly gives it advantage.

The fact that the European Industry is reliant on naphtha as its principle feedstock is not of itself a competitive disadvantage, since most of the new crackers being built in other regions of the world are also based on naphtha.

INDUSTRY STRUCTURE

Companies

In the early 1980's, over 30 uneconomic crackers in Europe were closeFrom 1986 to 1991, the European petrochemicals industry invested heavily to improve production, its flexibility, and economics, and to provide increased capacity. The latter was achieved by expanding production at many existing locations, and by the construction of new world-scale plants. This combination of plant closures and new investment significantly improved the competitiveness of the European industry in its global context. In 1994 and 1995, crackers in Europe were operating at over 90% of available capacity. The industry is seen as having further scope to expand the production capability of existing plants to meet the growth in demand for petrochemicals in Europe up to 2000.

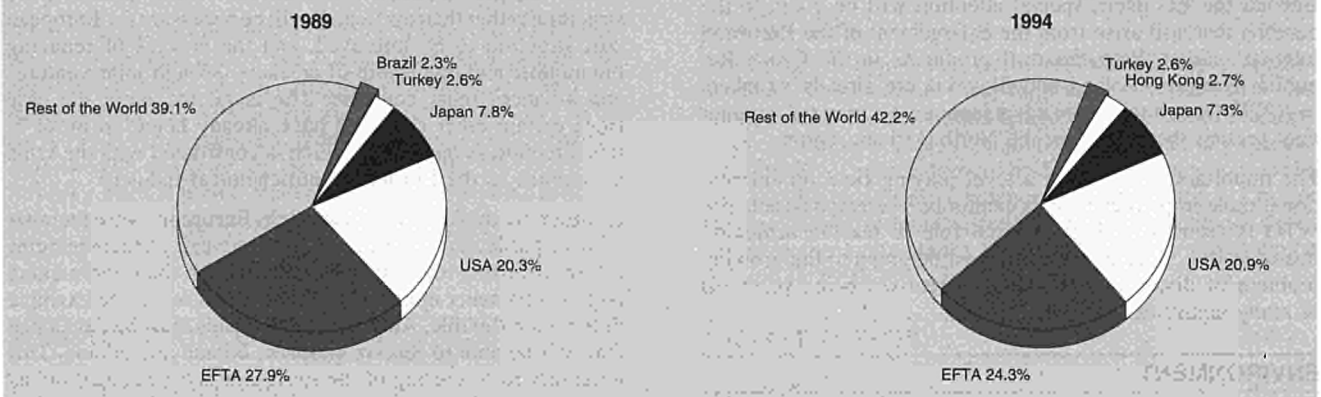
Despite these favourable developments, the European industry continues to operate at a competitive disadvantage against its rivals in the United States and the Middle East. Europe is reliant on naphtha as its primary raw material, which is substantially more expensive than the ethane base of the US and Middle East producers. In consequence, the cash cost of ethylene production in Europe is relatively high. However, in a period such as 1995 when margins earned in Europe were relatively high, the integrated structure of the European industry and the margins earned on co-products such as propylene and butadiene and their derivatives resulted in the European industry having a competitive profile similar to that of the United States.

A growing problem affecting the global competitiveness of the European industry is the increasing trend in some nations, notably in the Middle East and the Pacific Rim, to grant substantial discounts on raw materials such as naphtha in order to attract investment to these regions.

Other factors also contribute to a lack of global competitiveness in the European petrochemicals industry. Labour costs in Europe, both on a unit bases and in total, are higher than elsewhere. Energy costs such as electricity are significantly higher. Europe lacks a pipeline network in support of its crackers; the integrated network in the United States confers great advantage to their producers. Transport costs within Europe are uncompetitive against the United States. European producers are also seen as suffering costs from its legislative burden which are higher than in rival regions. Importantly, GDP growth rates are lower in Europe than in the United States and the Pacific Rim - a major factor attracting investment to these regions.

Whilst the European petrochemicals industry undeniably suffers from competitive disadvantage in a global context, it equally benefits from the integration which the industry has from its basic crackers operations through to derivative industries and a wide range of speciality and performance chemicals. These strengths constitute the main reason behind the industry continuing to provide a net trade surplus in petrochemicals to the European Economy.

Figure 3: Petrochemicals
Destination of EU exports



Source: Eurostat

In 1994, there were 52 olefin crackers operating in Western Europe, owned by 27 companies, representing a production capacity of 18 million tonnes of ethylene. Among the five leading EU chemical firms, BASF (D), Bayer (D), Hoechst (D), ICI (UK) and Rhône-Poulenc (F), there are involved in the production of primary and intermediate petrochemicals, representing varying portions of their turnover. Among the non-EU leaders, Dow (USA) and Exxon (USA) are firmly installed in the European petrochemical sector. Furthermore, Exxon Chemical is pursuing an offensive strategy in poly-olefins and intends to consolidate its petrochemical supply base by buying the 25% held by Borealis in the Fina-Borealis cracking complex at Antwerp (the remaining parts are held by Petrofina).

The petrochemical sector is relatively close to the oil refining industry for its supply of raw materials, though some producers are independent of the refining industry. It is worthwhile to note that among the top 15 chemical groups at the world level, four of them are petrochemical subsidiaries of larger oil companies: Shell Chemical (NL/UK), Enichem (I), Elf Atochem (F) and Exxon Chemical (USA). On-site downstream integration is more and more the case.

Strategies

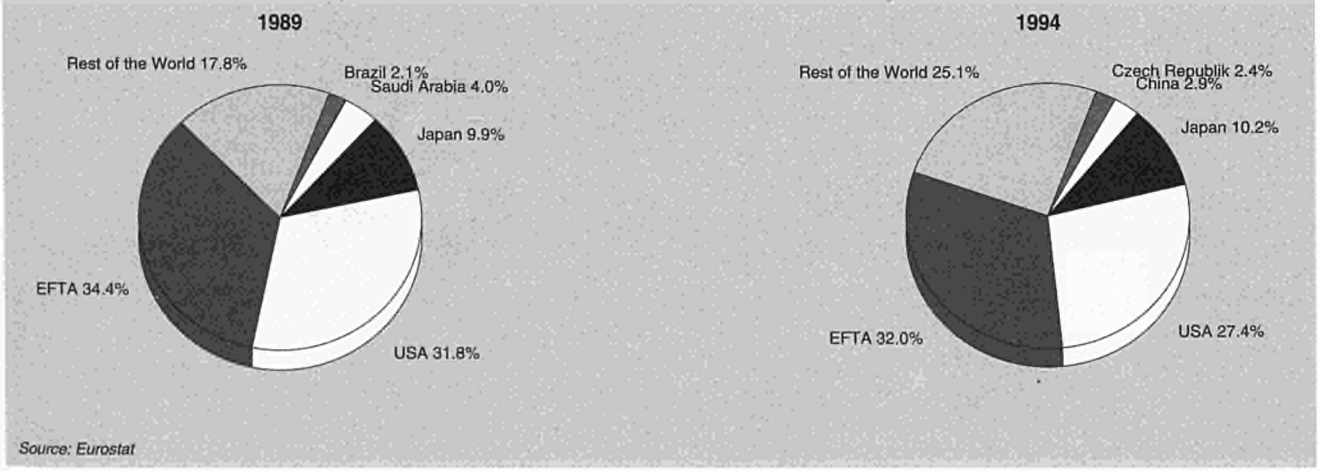
"APPE and its 37 members companies have a clearly stated objective - to create and to sustain global competitiveness in the European petrochemicals industry. The association and its members will continue to pursue objectives to this end. This position is equally shared by the European Commission in its Communication: An Industrial Competitiveness Policy for the European Chemical Industry: An Example" - COM(96)187.

The need for further restructuring of the European industry is well recognised. The industry has an inheritance of a relatively large number of isolated, old, established and uneconomic production sites many of which will require closure or significant new investment to improve their viability and competitiveness. Further investment in new plant or through expanding existing units is necessary in order to increase the average size of the plants operating in Europe, and to meet the growing demand for petrochemicals in Europe.

Further rationalisation of company operations through joint ventures, mergers and acquisitions will be beneficial to the competitiveness of the industry.

The industry, with the support of regulatory authorities where appropriate, will continue to address other issues which contribute towards a lack of competitiveness in Europe - for

Figure 4: Petrochemicals
Origin of EU imports



Source: Eurostat

example a lack of a common monetary system; labour costs; access to energy and energy costs; inefficient and costly transport systems; the inadequate pipeline infrastructure; and the inappropriate use of state aid.

Beyond the EU itself, special attention will be given to the benefits that will arise from the enlargement of the European internal market. Petrochemical producers in the Czech Republic, Hungary, Poland and Slovakia are already members of APPE. Opportunities for advantageous raw material supplier may present themselves in the North African region.

The importance of seeking a level playing field for international trade in petrochemicals cannot be overemphasised. The WTO is seen as having a crucial role to play in achieving this objective. Special attention must be given to the growing problem of distorting investment incentives being practised in many countries.

ENVIRONMENT

Four main factors have helped to greatly diminish the level of pollution produced by the petrochemical industry over the past two decades. These include the closure of plants whose environmental performance was not satisfactory and their replacement with units using clean technologies, modifications to the production processes (to make them less contaminating), the set-up of effluent processing plants downstream from the polluting units, and the Responsible Care programme (launched by the chemical industry to improve its environmental performance).

REGULATIONS

The industry's trade association (APPE) fully supported the proposal made by the European chemicals industry at the Uruguay round of the GATT negotiations to lower tariffs on chemical goods to 5.5% on 6.5%. Other trade agreements include the Community's Generalised System of Preference as well as the Association Agreements with East and Central European states. The association agreements concluded with most East European neighbours aim to create a free trade area within ten years.

OUTLOOK

The factor that will influence the European petrochemical industry most in the future is the lack of competitiveness within the global market. The causes of this situation are structural rather than cyclical. It will be necessary for European cost structure to be improved, and the process of reducing the number and ownership of crackers through joint-ventures and alliances must continue. The is all the more the case since certain other countries have already begun to move in this direction as has Japan, which is confronted with the same difficulties as the European petrochemical industry.

In order to avoid new difficulties, European petrochemists will, in particular, have to use the recovery of their margins for modernising their installations, rather than for making large investments in capacity. Finally, following the example of the more flexible, Antwerp cracker, sites must be developed that will be able to receive propane, butane and ethane. This necessary restructuring of the European petrochemical industry may well, however, not be operational before the end of the century.

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Agrochemicals
NACE (Revision 1) 24.20

Interior European demand for chemical products in agriculture was strongly affected by the Interior European demand for chemical products putting into place of the Common Agricultural Policy (CAP). It underwent a strong decline in the early 1990s. However, 1994 signalled a change in this tendency that should continue in the coming years. Furthermore, Europe's very positive trade balance in chemical products for agriculture is a sign of the competitivity of its enterprises in this sector.

INDUSTRY PROFILE

Description of the sector

In compliance with the NACE subgroup, Revision 1 24.20, the agrochemical sector covers the manufacture of products such as insecticides, rodent killers, fungicides, herbicides, plant growth control products, as well as biological products designed to protect plants against diseases and parasites. Formerly, these products were part of subgroups 25.67 and 25.68 and, in particular, fertilisers and nitrates, both currently in subgroup 24.15. World-wide, cereals accounted for almost 20% of agrochemical use, whereas fruit and wines, maize, and cotton accounted each for nearly 10%.

International comparison

Representing close to 40% of the world's production, the European Union represents the largest zone for agrochemical product production, ahead of Asia, Eastern Europe and North America. In the 1980s, Western Europe ranked highest in the crop protection markets. Nevertheless, since 1990, with the implementation of the CAP, demand in Europe has markedly dwindled and the portion of the world market held by Europe has considerably declined.

France, Germany, Italy, Great Britain, Spain, the Netherlands and Denmark make up the principal EU markets. The EU's number one crop in terms of pesticides sales is cereals, followed by wines, fruits, maizes and vegetables. The pattern of consumption according to product type varies significantly from one European country to another, depending on crops climatic conditions and on the nature of agricultural production. For example, insecticides are used more frequently in southern member states of the EU, such as Spain and Greece, than in the northern countries. In contrast, fungicides used to fight fungal diseases, particularly for high-value crops, are increasingly used in northern European countries, where there is a more humid climate.

Foreign trade

The European Union is a major exporter of crop protection products. The countries with highest export levels are Germany, France and the United Kingdom. These three countries account for nearly 80% of the total export values of pesticides from the EU. Overall, foreign trade in crop protection chemicals has shown a positive balance, reaching nearly 1.4 billion ECU in 1994. Herbicides, fungicides and insecticides represented respectively 38%, 32%, 26% of total agrochemical imports in 1993.

MARKET FORCES

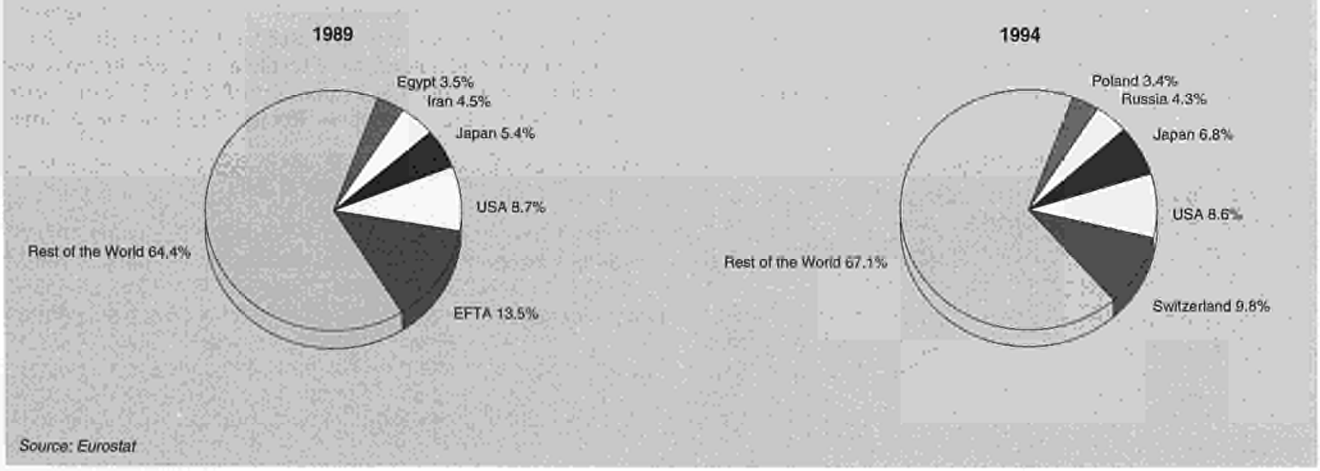
Demand

Demand for agrochemicals is closely linked to shifting dynamics within the agricultural sector, as well as to the search for technologies which are likely to increase profitability per hectare. Statutory, economic or even environmental constraints also exert a noticeable influence on developments in demand for agrochemicals in Europe. Furthermore, climatic conditions favour, to a varying degree, the proliferation of parasites and insects and, therefore, also exercise an influence on the demand for chemical products in agriculture. Lastly, certain economically-related factors, such as labour costs, which vary from one country to another, can generate demands that differ among countries. For example, herbicides are used more in countries where labour is more expensive.

Following a period of steady development during the 1970s and 1980s, the European agrochemical market shrank in the early 1990s. Implementing the CAP brought about a drop of nearly 20% in demand. Indeed, the surface area devoted to cereal cultivation decreased by almost 11% in the EU, producing a reduction in total surface area for potential treatment. In certain respects, mediocre earnings in the agricultural sector also contributed to weak demand. This led some companies to cut back and in some cases even shut down their production facilities.

It seems that the low point was reached in 1993. Demand for agrochemical products started rising again in 1994. The effects of the CAP and of the renegotiation of the GATT agreements stabilised and European farmers resumed external

Figure 1: Agrochemicals for crop protection
Destination of EU exports



Source: Eurostat

Table 1: Agrochemicals for crop protection
Sales by area and product, 1994

(million ECU)	Herbicides	Insecticides	Fungicides	Others	Total
North America	5 460	1 825	610	405	8 300
Western Europe	3 020	1 175	1 935	590	6 720
Japan	1 475	1 600	1 535	90	4 700
Far East	850	1 315	490	60	2 715
Latin America	1 450	825	540	115	2 930
Eastern Europe	365	380	180	30	955
Others	375	990	130	10	1 505
Total	12 995	8 110	5 420	1 300	27 825

Source: Wood Mackenzie

purchases of agrochemical products and machines. Total demand progressed in value by more than 3%. It must, however, be noted that the volumes of active ingredients sold decreased. Modern crop protection products are active at very low concentrations. Consequently, to obtain the same result, farmers do not need to use as much as was previously the case.

In addition, in 1995, prices of agricultural raw materials rose (in particular that of wheat). Farmers income benefited from this rise, although the situation varies greatly according to the type of crop. On the world-wide level, it is likely that demand will shift in future years towards Asian countries with its concomitant impact on the strategy of enterprises in the sector.

Supply and competition

Since the early 1990s, more intense competition has been observed in a context of reduced demand within Europe. Taking into account slack demand, companies in the agrochemical sector have seen a setback in revenues. Although European manufacturers are in the lead in the field of research and development, they will, nevertheless, be driven to form alliances in order to reach the critical mass needed to compete on the international market. Difficult market conditions led to a reduction in work force in the sector (34 000 jobs in 1994 against more than 35 000 in 1993).

It must also be pointed out that American and Japanese groups are trying to strengthen their position in Europe, and are attracted by the potential prospects that East European markets represent. DowElanco (USA) has launched an investment program in France and Germany, while Dupont de Nemours is opening a research centre in the field of plant protection products in Europe. Lastly, competition between brand-name and lower cost generic products is intensifying.

Production process

Research and development is crucial in the competition among companies in the sector. Indeed, research and development in the field of agrochemicals is responding to changes in agricultural practices and to increasing environmental pressures. Research and development costs, in the top 20 companies world-wide, represent nearly 10% of their turnover in the sector.

Among the main lines of research in the area of agrochemical products figures the development of products that discriminate more carefully and that endanger the environment less. In addition, several alternatives to the use of agrochemical products are coming to light. Among these that may be noted are the increasing share of biological and biotechnical products and the development and use of pest-resistant varieties that resort to biological techniques.

Lastly, progress in biotechnology may produce a major shakeup in the market in the medium future. All major groups are currently represented in this area. Biological techniques are used, for instance in developing plants that are more pest resistant. What is more, industrialists are currently working on producing plants that withstand specific herbicides. This will allow farmers to spread a herbicide without the risk of damaging a crop. Moreover, putting on the market of plant/herbicide pairs, an activity not yet very widespread, could have an effect on the structure of the sector since it will facilitate the rapprochement of seed producers and agrochemical producers.

Transgenic crops could radically reshape the agrochemical market, shifting demand in favour of selected herbicides and slashing the use of chemical insecticides and fungicides. Nevertheless, agrochemical producers remain cautious over the promises of biotechnology Such crops can also clear the way for the increased use of herbicides. A series of new herbicide-tolerant crops has been developed that opens up potentially large new applications for herbicides.

It should be noted that keys to gaining a competitive edge are the reduction in time required to market a product and reduction of costs. Consequently, companies in the sector have undertaken an effort to streamline and increase productivity.

INDUSTRY STRUCTURE

Companies

Weak demand, intensification of competition among agrochemical producers and increased costs of research, development and registration have resulted in concentrations and in the formation of alliances among producers within the sector. A number of groups such as Roche, Shell, or the Austrian

Table 2: Agrochemicals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	1 732.9	1 599.9	1 380.0	1 342.9	1 403.8	1 423.0	1 478.7	1 392.0	1 529.6	1 921.8
Extra-EU imports	426.3	378.5	392.0	461.2	571.8	593.8	636.4	507.9	448.5	482.1
Trade balance	1 306.6	1 221.5	988.1	881.6	832.0	829.7	842.3	883.8	1 081.1	1 439.7
Ratio exports / imports	4.07	4.23	3.52	2.91	2.46	2.40	2.32	2.74	3.41	3.99

Source: Eurostat

Table 3: Agrochemicals for crop protection
Breakdown of external trade by product

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports										
Insecticides	761.6	629.2	541.3	529.0	543.9	500.7	541.6	445.2	472.8	514.5
Herbicides	433.3	383.3	355.6	350.5	351.3	384.9	427.3	388.5	438.0	629.2
Fungicides	396.9	448.5	328.3	328.0	385.7	395.7	374.2	407.7	441.7	507.8
Plant growth regulators	141.2	139.0	154.8	135.5	122.9	142.0	135.7	150.6	177.0	90.3
Extra-EU imports										
Insecticides	96.4	89.9	76.4	96.1	120.6	134.2	128.3	114.3	104.4	122.0
Herbicides	152.4	132.5	168.2	191.2	247.2	252.3	286.0	222.9	178.8	180.5
Fungicides	151.9	120.0	106.9	137.2	180.0	177.7	197.3	145.2	137.4	151.1
Plant growth regulators	25.5	36.0	40.5	36.7	24.0	29.6	24.8	25.5	28.4	16.4

Source: Eurostat

OMV have recently left the sector which is now relatively concentrated at the international level, since the top 12 companies control more than 80% of the market. They are based mainly in the United States, Western Europe and Japan.

The five leading European companies in the sector, BASF (D), Ciba-Geigy (CH), AgrEvo (D), Zeneca (UK) and Bayer (D) are also among the six leading manufacturers world-wide. Bayer is the principal world-wide producer of insecticides but is only in 10th place for the production of fungicides. Zeneca has resulted from the splitting of ICI, while AgrEvo is a joint venture in the field of plant protection products created by the Hoechst (D) and Schering (D) groups in the beginning of 1994.

Strategies

In this context, the current shrinking of the European market, combined with the appearance of new statutory requirements and the development of genetic products is contributing to the increase in critical mass of companies in the sector. This will cause further restructuring within the sector in the form of alliances between various players or buyouts from outside. Thus, in the next few years, the movement toward sector concentration at the European and world-wide levels should continue.

AgrEvo has decided to concentrate its activities at the Saint Marcel site near Marseilles. This will considerably augment its competitivity. Bayer has announced its intention to develop new plant health products by the year 2005 and will increase its co-operation with other industrialists so as to reduce development costs. Lastly, BASF has associated with two Japanese groups, Nippon Soda and Mitsui, creating a joint venture for the manufacture of a herbicide that the group is currently developing.

At the same time, favourable market prospects in Asia, especially in China, and in Eastern Europe are inciting European industrialists to prepare the ground in these countries. In 1994, AgrEvo, already established in China, announced the formation of AgrEvo China to expand its business activities in the country and, in the same year, bought out the South Korean firm, Misung. Meanwhile, Zeneca (UK) has several joint venture projects in China for the construction of agrochemical product production units.

Furthermore, while enterprises are obliged to sustain considerable research and development costs in developing new products, the market for generic products is undergoing rapid growth. Many groups are already present on this market. In 1995, Rhône Poulenc acquired the firm Interphyto which specialised in the sale of generic products for the protection of plants. This acquisition has allowed the group, already represented by the Sedagri offering, to reinforce its presence in the generic market.

REGIONAL DISTRIBUTION

Differences vary greatly among regions and countries in their use of pesticides to protect arable crops. They range from less than 3 kg of active ingredients per hectare for Germany, to 10 kg for the Netherlands. The use of pesticides is highest in areas with intensive horticulture (northern Italy, the south coast of France, the south-east coast of Spain, and the Netherlands). The use of pesticides to grow vegetables and fruit is high along the south-east coast of Spain and northern Italy. The use of fungicides to protect grapes is likely to be highest in regions with relatively high precipitation levels.

ENVIRONMENT

The use of agrochemicals can be critical from an environmental point of view insofar as these substances can accumulate in the ground and in living organisms and their residues can affect water resources. European directives on the quality of ground and drinking water fix maximum limits on the concentration of some crop protection products in water. The revision of these directives may weigh heavily on the use of agrochemicals. The World Health Organisation has developed its own health-based risk assessment standards for individual active substances in drinking water.

A plan for significant reduction in the use of pesticides in the European Union between now and the year 2000 is currently under discussion. Already, the Netherlands, Denmark and Sweden have set up such programs. For example, Sweden had a target of a 50% reduction in the volume of agrochemicals used by 1990 (based on the average total volume of active ingredients applied from 1981-1985). The goal was missed by only 5%, whereas the total arable area treated with agrochemicals was just 2% less than in 1985.

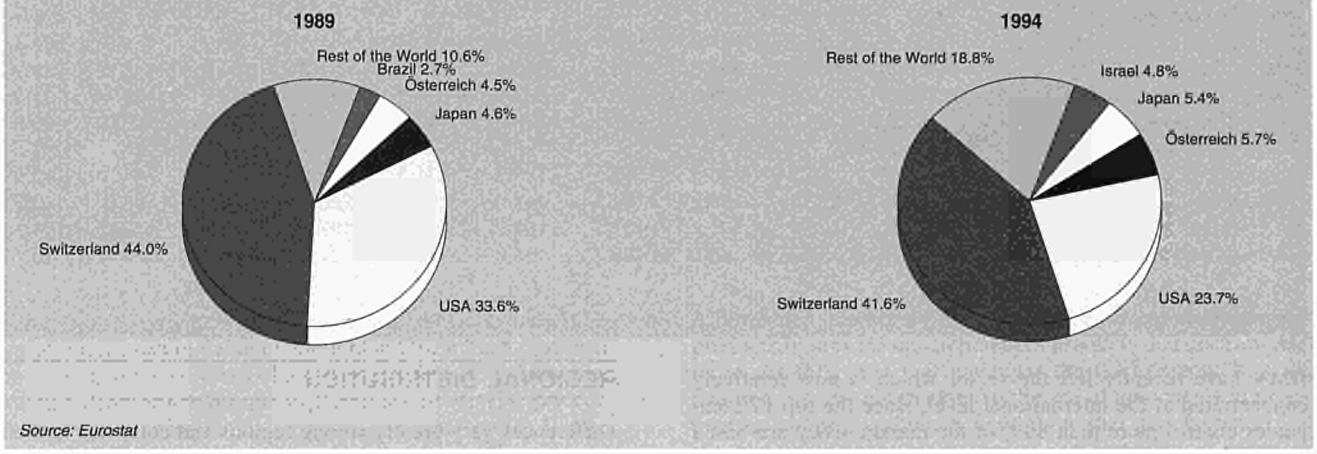
The Danish government has successfully passed a legal proposal for levies on agrochemicals. The law is in effect as of 1 January 1996. Insecticides for use in both crop and livestock production will be levied at 27% of the retail value while fungicides, herbicides and crop growth regulating chemicals will be subject to a 13% retail price levy.

Lastly, the OECD, since 1991, has been implementing a project intended to harmonise test guidelines for crop protection products. Farmers have as well become sensitive these past years to optimum use of agrochemical products and to the adoption of a good conduct code of agricultural practice.

REGULATIONS

The reform of the CAP has strongly affected the agrochemical market in Europe. This reform, implemented on 1 July 1993, necessitates abandoning support mechanisms in favour of com-

Figure 2: Agrochemicals for crop protection
Origin of EU imports



Source: Eurostat

pensation paid directly to farmers. This reform has had a particular impact on the arable land sector. Intervention in the purchase prices of cereals has dropped by nearly 25%, this reduction being compensated for by direct aid per hectare. At the same time, aid payment is contingent on a percentage freeze in the surface area devoted to cereals and oil- and protein-yielding crops (originally 15% but changed to 10% in 1995). In addition, the Registration Directive (91/414/EEC), adopted in July 1993, will progressively establish the criteria by which all Member states will evaluate crop protection products (the so-called uniform principles) and a positive list for all authorised substances. Moreover, in the framework, all the existing substances should assessed again during the coming years. After the adoption of the Biocide Directive, currently in discussion with the Council, all types of agrochemicals and uses of agrochemicals will be covered by community regulations.

OUTLOOK

After the shock of the establishment of the CAP reform and the conclusion of the GATT agreements, it is expected that the general demand for productivity raising inputs, for example pesticides, will recover. In the following years, farmers will have considerably improved their level and pattern of use of crop chemicals and, as a result, consumption should stabilise.

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Paints, varnishes and printing inks
NACE (Revision 1) 24.3

The market prospects for the European paints and varnishes industry is positive, as the EU economy recovers from the 1992-1993 recession. Furthermore, the industry continues to expand successfully into Eastern Europe and Asia-Pacific. However, the stagnating trend of the European printing ink market will probably continue. Like most other industries, the industry of paints, varnishes and similar coatings, printing inks and mastics, is governed by the growing concern for environmental issues. Although EU legislation is sparse, country-specific regulations have forced the industry to search for environmentally friendly materials to replace hazardous substances, to reduce damaging emissions, and to minimise the use of raw materials. More efficient use of raw materials has also been stimulated by increasing prices for these materials in 1994. In order to meet these requirements and attain a competitive advantage, companies are spending more on R&D. As a result new technological developments are expected in the coming years.

INDUSTRY PROFILE

Description of the sector

NACE (Revision 1) Group 24.3 includes the production of paints, varnishes and similar coatings, printing ink and mastics. In the former NACE 1970 classification these products were covered by NACE 255.

Within this range of products with various applications, four categories can be distinguished:

- decorative (architectural) coatings, including exterior and interior house paint, primers, finishing coats, pore fillers and varnishes;
- coatings used for a whole series of industrial products and consumer products (e.g. wood or metal furnishing, automotive OEM industry, aircraft industry, machinery and equipment, household appliances, electrical insulation, film, paper and foil, toys and sporting goods);
- special coatings designed for specific applications or for use in special conditions, including products for the repainting of cars and machines, high-performance maintenance, road markings, powder coatings, bridge maintenance and metallic coatings; and,
- printing inks used for a series of printing processes (e.g. offset printing, flexo/rotogravure, publication gravure, newsprint, screen inks, etc.).

In 1994, the paints, varnishes and printing inks industry accounted for 6% of total Western European chemical industry turnover. In the same year, production reached a level of more than 15.6 billion ECU. Paints and varnishes account for around 88% of production measured in volume and 82% of production measured in value, of the sector.

Germany is the largest producer commanding around 27% of total EU-production (in value), followed by the United Kingdom, France and Italy.

Recent trends

From 1990 to 1994 the EU production increased by an average rate of 5% per annum. In some countries, however, production dropped due to the economic recession. In 1992, Spain and the UK recorded production declines, while Portugal and Italy saw production decreases in 1993. Between 1994 and 1995 overall EU production increased by 4%. In France, Portugal, and the UK, however, production levels dropped during this period. After a constant increase in employment over the 1985-1992 period, it has decreased since 1992.

International comparison

With an estimated production of 15.6 billion ECU, the EU is the largest producer in this industry if compared with the USA and Japan. In 1994, production levels of the latter countries were 12.9 billion and 11.1 billion ECU respectively. While the production (in constant prices) of the EU has been increasing during the 1985-1994 period, this was not the case for the USA and Japan. US production has decreased since 1989, except for 1992. In 1994, US production rose by nearly 5% and reached almost the 1990 level. Japan experienced a decrease in production level in 1993. After 1993 Japanese production (in constant prices) grew by 3%.

Foreign trade

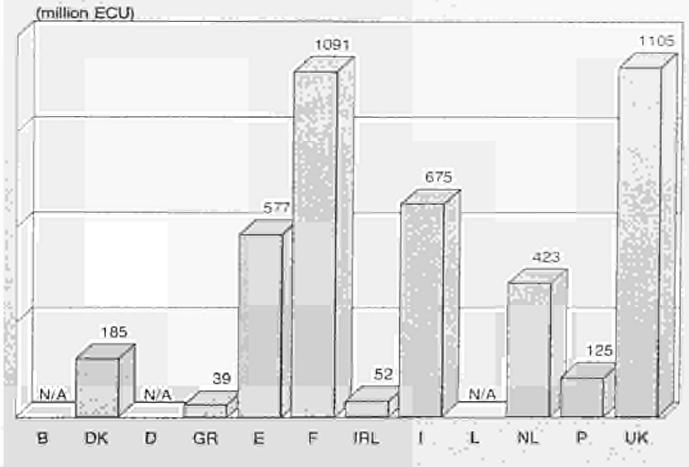
The EU is a net exporter of paint, varnish and printing ink. The extra-EU imports recorded a growth of 17.5% in 1994, while extra-EU exports recorded a growth of 13.6% in the same year. Despite this development, the EU trade surplus increased by almost 12%, an amount of 1 744 million ECU. Germany had the largest trade surplus (753 million ECU). Ireland was the only EU country which recorded for a trade deficit (3 million ECU).

Exports as a percentage of production declined during the 1985-1991 period, except for 1989. Since 1991 this ratio has increased from 13.7% to 16% in 1994. The import/consumption ratio was significantly smaller than the export/production ratio. It amounted to an average of 4.5% during the 1985-1993 period. In 1994, this ratio was 5.6%.

Intra-EU trade increased during the last decade. The share of intra-EU imports in total EU imports has decreased from 84% to 80% during the last decade. The share of intra-EU exports in total EU exports has increased from 52% in 1985 to 60% in 1990, and since then has decreased to 56% in 1994.

As in former years, Austria, Sweden, Finland and Switzerland were major trade partners of the EU-12 in 1994. Together their share of total extra-EU imports was almost 24% (0.18

Figure 1: Paints, varnishes and inks
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Paints, varnishes and inks
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	6 852	11 388	12 128	12 369	13 044	13 871	14 026	N/A	N/A	N/A	N/A
Production	7 979	12 647	13 378	13 741	14 601	15 615	15 940	N/A	N/A	N/A	N/A
Extra-EU exports	1 443	1 756	1 824	2 035	2 195	2 494	2 711	2 469	2 600	2 740	2 910
Trade balance	1 127	1 259	1 250	1 372	1 557	1 744	1 914	1 779	1 840	1 910	1 980
Employment (thousands)	88.8	96.8	98.6	110.3	109.0	108.3	107.0	N/A	N/A	N/A	N/A

(1) Some country data for apparent consumption, production and employment have been estimated. Excluding Greece, Ireland and Luxembourg.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: CEPE, DEBA GEIE

Table 2: Paints, varnishes and inks
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	8.2	5.1	8.2	6.3
Production	9.6	0.5	7.7	6.9
Extra-EU exports	0.7	6.1	3.1	13.3
Extra-EU imports	5.2	6.0	5.5	11.9

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat, CEPE

billion ECU), while their share of total extra-EU exports amounted to almost 21% (0.43 billion ECU) in 1994.

Since Austria, Sweden and Finland joined the EU, the intra- and extra-EU-15 trade figures - given for 1995 onwards - differ significantly from the intra- and extra-EU-12 trade data - given for years up to 1995.

In 1994, 8.3% of EU production (in value) was exported to Switzerland. Exports to the USA totalled 154.2 million ECU or 6.2% of extra-EU exports. The growing export markets in Eastern Europe are remarkable. Together, Poland, the Czech Republic, Russia and Hungary accounted for almost 12% of total extra-EU exports in 1994. Almost 32% of extra-EU imports (238.1 million ECU) originated from Switzerland. The USA and Japan made up 22% and 14% of imports respectively.

The EU is specialising in R&D intensive chemicals, and in the Central and Eastern European Countries (CEEC) for labour and energy intensive chemicals. Pharmaceuticals and speciality chemicals are the most notable cases, but also perfumes & cosmetics, paints & inks, and soaps & detergents are product groups to be highlighted when talking about the EU trade surplus with the CEEC. All these product groups face hardly any competition from the CEEC, so that their trade surpluses almost match their exports with those countries.

MARKET FORCES

Demand

Clear trends in consumer preference have appeared in recent years. Wood care products have become increasingly important in the decorative market, at the expense of paints. Sales in wood coatings have increased in almost all EU countries, e.g. the Netherlands (by 13.0%), Sweden (12.5%), Italy (12.4%) and Denmark (11.4%). Powder coating is estimated to be the fastest growing paint market in the world; as powders contain no solvents and therefore tend to be less toxic. Finally, demand for high-solid paints has grown at the expense of non-water-based solvents. The percentage of water-based architectural coatings for the EU was 72% in 1993 and grew to 76% in 1994. Marine paints have also increased substantially. However, they command a small share of total paints. Therefore, the impact of this increase on total market sales in this industry is minimal.

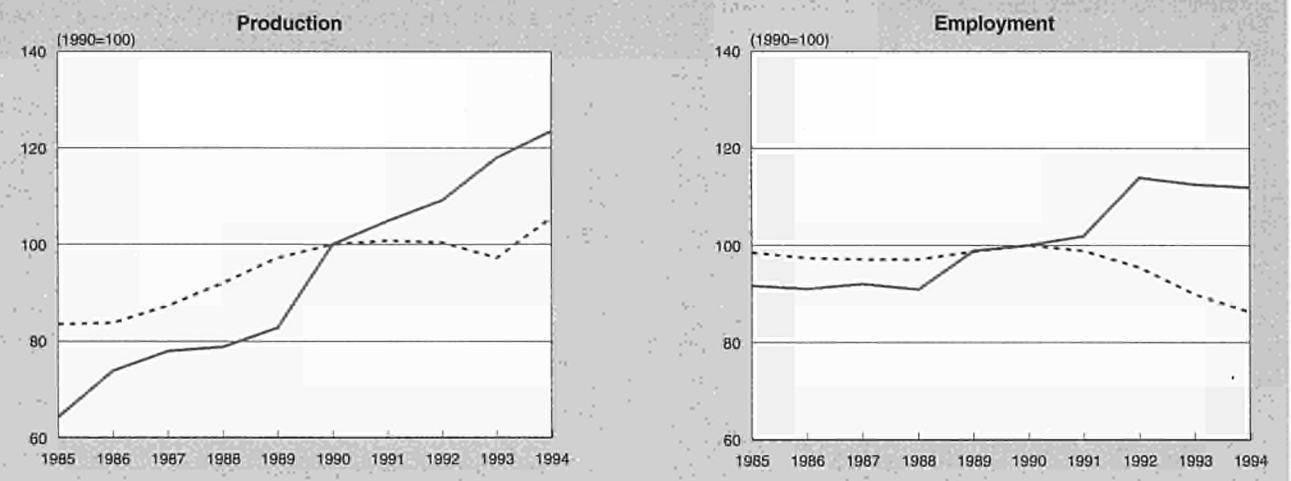
Sales continue to grow strongly in the Asia-Pacific region. Consumers, particularly in North America and Europe, remained extremely price-conscious, so higher costs had to be absorbed by improvements in efficiency and productivity.

Table 3: Paints, varnishes and inks
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	1 443	1 339	1 392	1 475	1 670	1 756	1 824	2 035	2 195	2 494	2 711	2 469
Extra-EU imports	316	308	329	394	484	497	574	664	639	750	797	690
Trade balance	1 127	1 031	1 063	1 081	1 186	1 259	1 250	1 372	1 557	1 744	1 914	1 779
Ratio exports / imports	4.6	4.3	4.2	4	3	3	3.2	3.1	3.4	3.3	3.4	3.6
Terms of trade index	104.2	110.7	108.1	110.5	104.6	100.0	98.9	99.4	97.9	93.5	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 2: Paints, varnishes and inks
Production and employment compared to EU total manufacturing industry



Source: CEPE, Eurostat, DEBA GEIE

Overall, in 1994 the domestic market sales have increased by 6.2% in France, by 5.0% in Sweden, and by 4.0% in Spain, the Netherlands and Germany. In France, Sweden and Spain the rate of growth for total architectural coatings was lower than the rate of growth for total industrial coatings. In Germany and the Netherlands it is the opposite.

The European graphic industry has not yet fully recovered from the recession, resulting in a stagnating market in the printing ink industry. This and other downward pressures on the EU demand for printing ink, such as environmental laws for packaging, were partially compensated by rising exports.

In the market as a whole, tailor-made solutions are increasingly needed. In this context, manufacturers are continuously searching for product improvements.

Supply and competition

In France the market for paints and coatings is fairly fragmented, with the largest manufacturer, Total, holding only 15% of the market in 1994. Total is in a stable long-term position, but is let-down slightly by a relatively low growth rate. The German market for paints and coatings is led by several large chemical companies, of which BASF Lacke & Farben and Herberts are the major suppliers. The German paints and coatings industry remains moderately fragmented, yet fiercely competitive. In the UK, ICI, with strong brands such as Dulux and ICI Autocolor, led the market in 1994 with 35% of sales. However, due to competition from private labels and lower retail prices, ICI and Crown Berger both experienced a slower growth of turnover.

The European paint manufacturers operate on a broad country base, which is demonstrated by market shares of these companies in other parts of the world. The world-wide activities of motor vehicle manufacturers and other client industries and the growing similarity of market requirements will further promote the internationalisation of competition.

The strong international competition in the printing ink industry has resulted in a downward pressure on sales prices.

The European labour productivity increased from 1984 to 1994 by an average of 4% per year, although it declined slightly in 1986, 1989 and 1992.

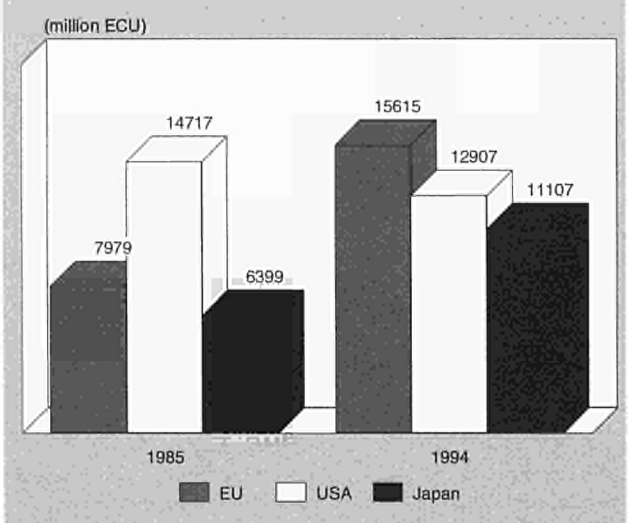
Production process

In this difficult market, a combination of outstanding service and high-quality, innovative products are constantly being developed. In 1994, the industry faced competition, generally sluggish markets and increases in the price of raw materials and packaging. As stated earlier, consumers remained extremely price-conscious, so higher costs had to be absorbed by improvements in efficiency and productivity.

Users are constantly looking for better performance, easier application and greater value for money. The industry has responded by developing new products and adopting new applications driven by this rationalisation in its clients industries.

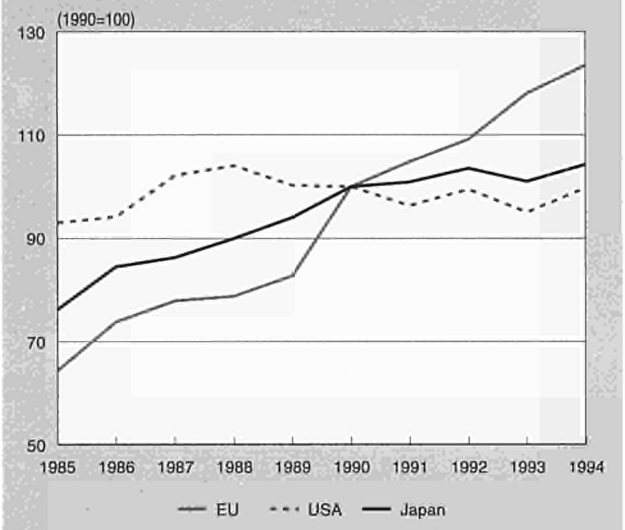
The industry is devoting a considerable share of its R&D expenditure to solve environmental problems. High-solids, water-based products and powder coatings are all innovations which offer solutions for these problems.

Figure 3: Paints, varnishes and inks
International comparison of production in current prices



Source: CEPE, DEBA GEIE

Figure 4: Paints, varnishes and inks
International comparison of production in constant prices



Source: CEPE, Eurostat, DEBA GEIE

INDUSTRY STRUCTURE

Companies

The paint industry has undergone considerable change from the largely national structure of small to medium size companies to one which also includes many large international businesses. The industry's changing structure reflects trends among some customers. For example, the automotive, can coating and some other industries are becoming increasingly international and expect service from multinational paint suppliers who specialise in certain sectors world-wide. The globalisation process is expected to continue.

With the merger at the end of 1993, AKZO Nobel (NL/SF) became the largest manufacturer of coatings world-wide, followed by ICI (UK).In 1996, however, due to merger & acquisition activities (Bunge Paints), ICI has returned as the world's leading producer. The Herberts Group (D) achieved sales of approximately 1.2 billion ECU in 1994 and was the fourth major supplier in the EU in 1994.

A key player in the French paints and coatings market is Total (market share 15%). Other large companies are Azko Nobel, Lafarge (F), ICI (UK) and PPG (US).As much as 24% of the market is accounted for by own label products of which Novodec is the leading supplier. Key players in the German market are BASF Lacke und Farbe and the Herberts Group, with approximately equal market shares, followed distantly by ICI and Sigma (Histor)(B). The major suppliers in the UK are ICI, Azko Nobel and Courtaulds (UK).

Manufacturers of printing inks consist primarily of companies which specialise in this market. Their product range is geared to printing inks and related products for virtually all graphic processes.

Strategies

The large multinationals follow three general strategies:

- developing new markets for existing products (the exploration of the East European and Asia-Pacific markets for instance),
- developing new products or product varieties for existing or new markets,
- performing mergers and take-overs.

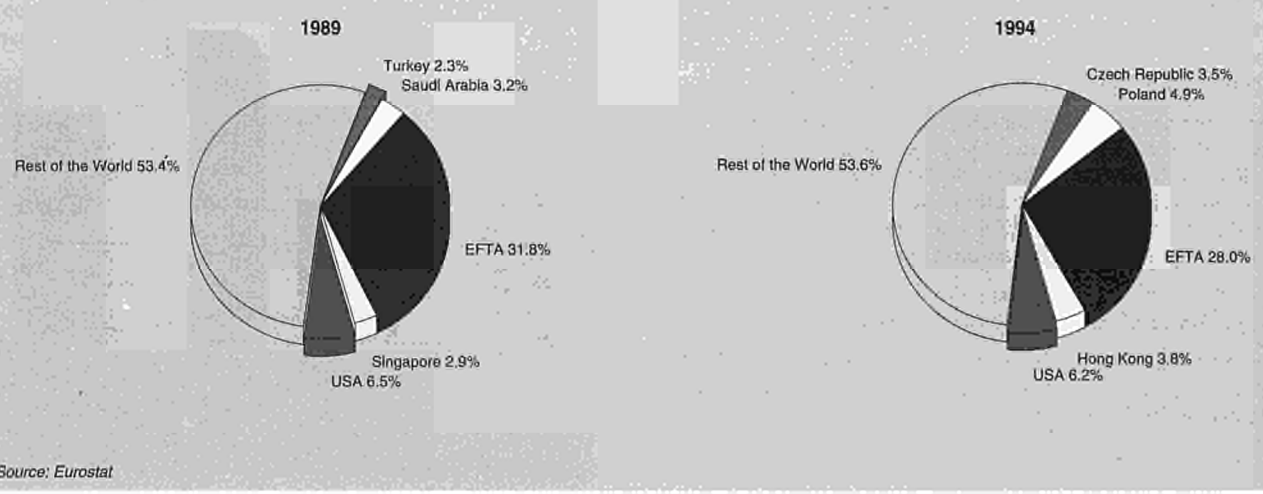
ICI, for example, completed two acquisitions in 1994 - Decatrend, a California-based chain of stores for the professional painter; and Cabots, a supplier of wood-care products in Australia. By opening a plant in China, apart from extending the existing factories in Thailand, Taiwan and Australia, ICI Paints seeks to sustain its growing sales in Asia Pacific. China offers great potential for sales and ICI Paints is rapidly expanding its distribution network there. In 1995 Akzo Nobel acquired Deckel Lack AB of Sweden, which name was changed into Akzo Nobel Car Refinishes AB. In 1996, ICI acquired the South-American company Bunge Paints.

As in previous years, in 1994 companies focused on the development of their products and services, such as environment-friendly paint systems, the substitution of hazardous substances and direct technical support for the client industries.

REGIONAL DISTRIBUTION

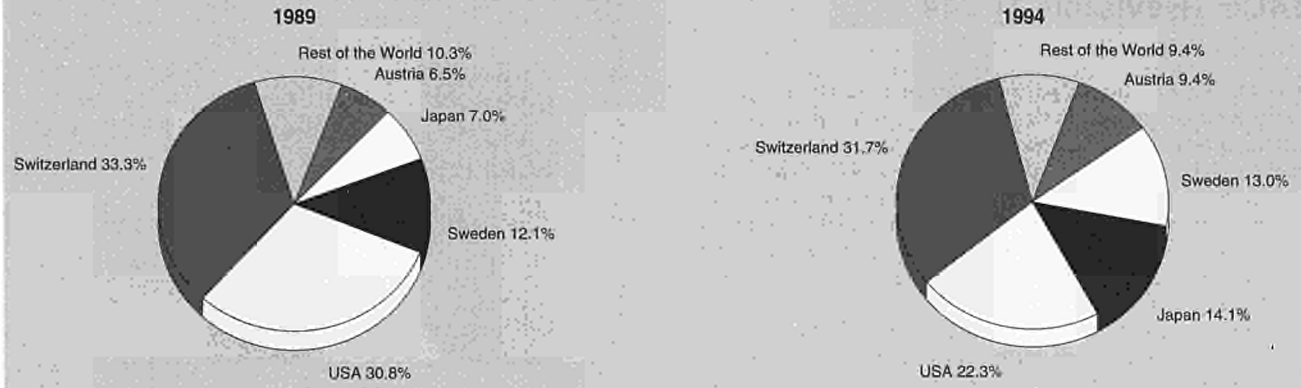
Retail distribution of paints and coatings, i.e. do-it-yourself (DIY) products, takes place through DIY superstores, hypermarkets & supermarkets, traditional stores, department stores and speciality retailers. It depends on the country which form of retail distribution is performing best. In France, traditionally almost two thirds of consumer sales are distributed through DIY superstores. In Germany, however, more than half of the sales are distributed by specialist retailers.

Figure 5: Paints, varnishes and inks
Destination of EU exports



Source: Eurostat

Figure 6: Paints, varnishes and inks
Origin of EU imports



Source: Eurostat

ENVIRONMENT

The paints manufacture process consumes mainly raw materials, energy and water. Paints also affect the environment when used, for example by the emission of volatile organic compounds (VOCs) to the air.

In this respect there are three main types of action:

- reducing VOC emissions. The overall level of these emissions is decreasing as more water-borne paints are being produced and the use of organic solvents is being reduced;
- protecting the sites, i.e. preventing spillage, improve working practices;
- product stewardship, i.e. encourage the use of water-borne products by informing customers and the market, and by working with governments and other organisations to promote recycling, reuse and reduction in the post-consumer waste area, etc.

The industry is taking serious efforts to reduce solvent-borne products, the results of which can be seen in the growth of the water-borne products market. The overall development of low-pollution paints, such as water-thinnable or high-solids, is geared to the environmental legislation. Powder coatings are entirely free of solvents and can be recycled to a high degree. Herberts (D) has developed a special recycling system for powder coating waste. Reducing the emission of volatile organic solvents (VOCs) during paint application is one of the foremost goals to improve the environmental compatibility of paints.

REGULATIONS

The EU Commission has put forward several directives on environmental pollution which concerns the paint and varnish industry, for example food contact coatings. Also, EU legislation on packaging such as printing inks for food packaging exists. The European Commission has recently published environmental criteria for awarding the European environmental hallmark in housing paint and varnishes (Ecolabel). These criteria are applicable for a period of three years, from December 15, 1995.

Directive 88/379/EEC on classification, packaging and labelling of dangerous preparations shall be applied in cases where the preparation is classified as dangerous and it contains at least one dangerous substance. A warning label shall be attached on a package of a dangerous preparation according to the rules defined by the Directive. In certain cases packages of preparations must carry child resistant fastenings and tactile danger warnings. Where a dangerous preparation is supplied to professional users a Safety Data Sheet must be compiled and submitted when the preparation is supplied for the first time to a customer.

Similar laws, such as the environmental legislation in California, which went into force on January 1, 1995, and the VOC ceilings for individual paint firms, are anticipated in the UK from April, 1995, and thereafter (by 1998) throughout the EU (unless earlier on a national level).

In 1994, activities of the association which represents the European industry (CEPE) were focused on the EU draft rules on VOC emission reduction, for production, but in particular for contained and non-contained application. Also, CEPE was participating in the drafting of the biocides directive (anti-fouling paints).

In the future, the environmentally-relevant operating conditions of industrial installations will be determined by the proposed air and water quality directives, the draft VOC directive and an amendment of the Discharges to Water directive (76/464).

OUTLOOK

Under growing pressure from environmental legislation, users will switch to more environmentally friendly products. The internationalisation of competition in this industry will be promoted further by the continuing world-wide activities of motor vehicle manufacturers and other client industries. This globalisation and the ongoing rationalisation process will lead to a further continuation of merger and acquisition activity by European companies, in all parts of the world. The Extra EU exports are expected to grow by more than 5% per year during the 1995-1998 period, while the trade balance is estimated to grow by more than 3% in the same period. Production in this industry is expected to grow moderately during the 1995-2000 period. Average growth rates will approximate 4 to 5% per year.

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The industry is represented at the EU level by: European Confederation of Paint, Printing Ink and Artists' Colours Manufacturers' Associations (CEPE). Address: Avenue Van Nieuwenhuyse 4, B-1160 Brussels; tel: (32 2) 676 7480; fax: (32 2) 676 7490.

Pharmaceuticals for human use

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In 1994, the EU human pharmaceutical industry enjoyed a strong rebound from 1993's lacklustre results. Real growth in both production and apparent consumption were strong, reaching levels of 7.1% and 7.6% over 1993's figures, respectively. EU's share of Triad production and apparent consumption grew steadily between 1985 and 1994. Although the EU's export/import ratio has remained constant in recent years at about 2.0, the EU's positive trade balance with the world has grown by 75% since 1990.
Still, there are areas of concern. While the EU enjoys a high R&D/turnover expenditure ratio relative to the Americans and the Japanese, it has fallen compared to the other Triad members in terms of pharmaceutical development, particularly in the area of biotechnology. Also, a divergence of national pharmaceutical pricing and reimbursement systems has made the EU market for pharmaceutical products far more fragmented than the American and Japanese markets. Such a divergence has served to create market distortions which have prevented manufacturers from enjoying the full benefits of a unified EU market. In order to contain public spending on pharmaceuticals, all governments have adopted cost-containment measures including restrictions on the categories of products reimbursed which have increased demand for self-medication products.

INDUSTRY PROFILE

Description of the sector

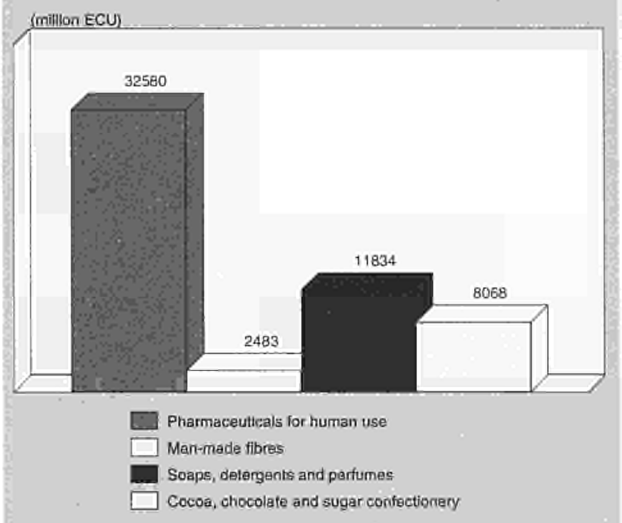
Within the EU, pharmaceutical products are defined according to Article 1 of Council Directive 65/65/EEC (see Official Journal L 22 of 9.2.65 for more details):

- Proprietary medicinal products: any ready prepared medicinal product placed on the market under a special name and in a special pack;
- Medicinal product: any substance or combinations of substances presented for treating or preventing disease in human beings or animals;
- Substance: any matter irrespective or origin (i.e. human, animal, vegetable, chemical).

Traditionally, a single monograph has included pharmaceuticals both for human consumption and for veterinary use. From a scientific and technical perspective this would make sense as there are strong similarities between the two categories. Still, there are significant differences in the social and economic frameworks within which each category operates. Accordingly, each sector will be treated in its own monograph. This monograph is dedicated exclusively to pharmaceuticals for human use, referred to as pharmaceuticals.

The market for pharmaceuticals is customarily divided into two categories whose boundaries are determined on the basis of the way in which the products are purchased. The first category of pharmaceuticals is that of prescription drugs, i.e., those products that can only be sold on the basis of a medical prescription. The second category is non-prescription pharmaceuticals which can be both prescribed by a physician or purchased directly by the patient without a prescription. Non-prescription pharmaceuticals which are purchased directly by the patient without a prescription are commonly defined as over-the-counter (OTC), or self-medication products.

Figure 1: Pharmaceuticals for human use
Value added in comparison with related industries, 1994



Source: DEBA GEIE

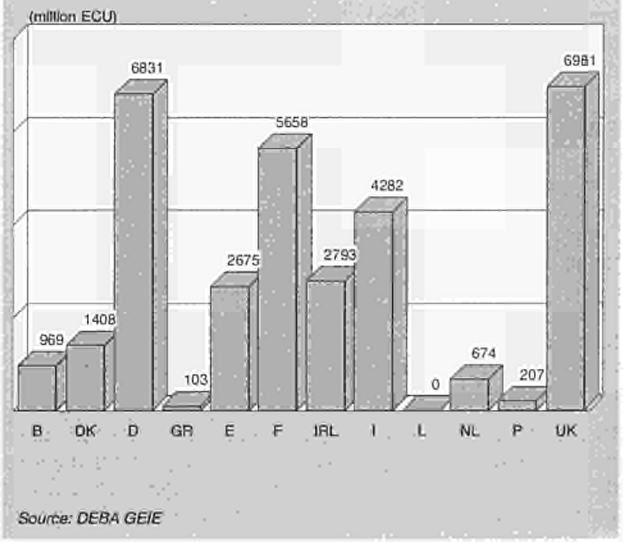
Human pharmaceutical products are also divided in terms of brand and generic manufacturing. During the life of a product's patent protection, only the original brand manufacturer may market a pharmaceutical product. After a product loses patent protection, competitor manufacturers may market what is an essentially identical product under a generic name. Such generic pharmaceuticals are generally less expensive than their brand name analogues.

Although chemical processes still represent the overwhelming majority of pharmaceutical manufacturing, biotechnological processes have grown in significance. In recent years, biopharmaceuticals have been estimated to command more than 4% of world pharmaceutical products' sales.

Recent trends

As Table 2 shows, this sector has enjoyed strong and largely constant real growth in production since 1985. Real production

Figure 2: Pharmaceuticals for human use
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Pharmaceuticals for human use
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	34 923	55 643	61 747	66 804	66 409	70 778	75 087	79 163	86 012	93 687	102 185
Production	38 766	59 675	66 127	71 693	72 716	78 028	83 324	88 163	95 754	104 229	113 620
Extra-EU exports	6 192	7 975	9 124	10 559	12 579	14 313	15 354	15 031	16 520	18 037	19 725
Trade balance	3 843	4 032	4 381	4 889	6 307	7 250	8 237	9 000	9 742	10 542	11 435
Employment (thousands)	366	412	422	429	422	409	397	417	421	424	428

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Pharmaceuticals for human use
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	8.4	6.6	7.6	6.8
Production	7.2	6.9	7.1	7.1
Extra-EU exports	-0.1	7.7	3.3	9.7
Extra-EU imports	4.9	4.9	4.9	8.0

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Pharmaceuticals for human use
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	6 192	6 246	6 302	6 816	7 621	7 975	9 124	10 559	12 578	14 313	15 353	15 031
Extra-EU imports	2 349	2 461	2 509	2 848	3 478	3 943	4 743	5 669	6 272	7 062	7 117	6 030
Trade balance	3 843	3 785.0	3 793	3 968	4 142	4 032	4 380	4 889	6 307	7 250	8 237	9 000
Ratio exports / imports	2.6	2.5	2.5	2.4	2.2	2.0	1.9	1.9	2.0	2.0	2.2	2.5
Terms of trade index	102.1	103.7	104.6	104.9	103.7	100.0	92.6	91.4	90.6	90.1	N/A	N/A

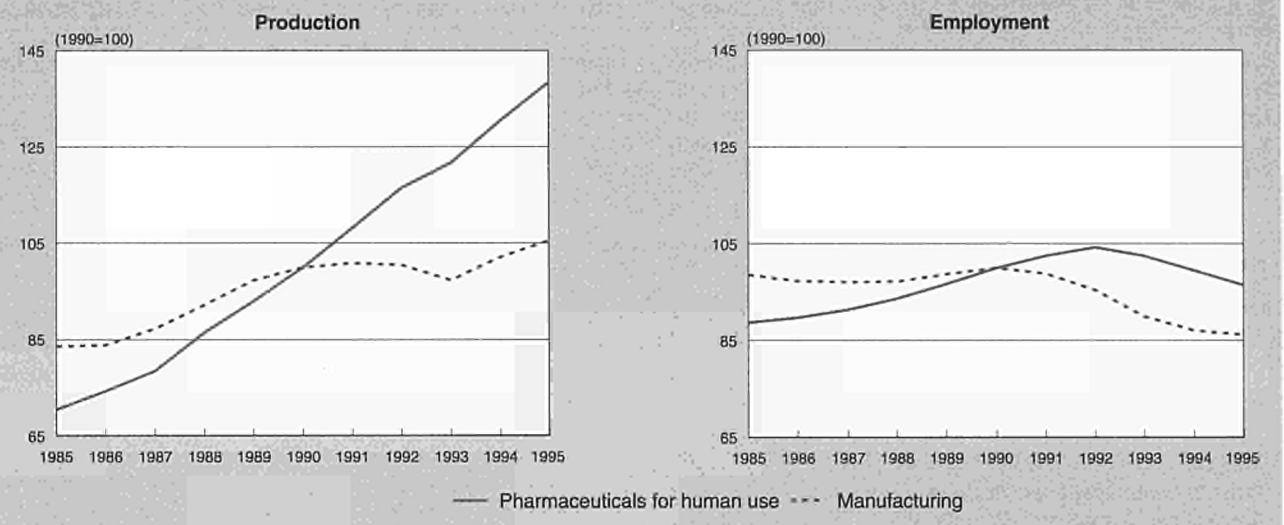
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Pharmaceuticals for human use
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	79.5	82.8	85.8	92.4	96.2	100.0	105.6	111.7	118.7	131.2
Unit labour costs index (3)	91.9	92.5	95.1	94.5	97.3	100.0	101.4	100.9	95.9	88.5
Total unit costs index (4)	92.2	91.3	91.9	94.4	98.4	100.0	102.3	102.4	98.5	95.9
Gross operating rate (%) (5)	16.5	16.2	16.4	17.8	17.0	16.1	16.4	16.6	17.4	19.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Pharmaceuticals for human use
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

in 1994 grew by 7.1% over 1993. However, there is a moderate contrast in real pharmaceutical production relative to the previous year. Real apparent consumption has also been strong, averaging 7.6% over the 1985-94 period. The growth occurred at a much faster rate in the first half of that period than in the latter half as Table 2 illustrates. Real apparent consumption in 1994 grew by 6.8% over the 1993 figure. Also, 1993 represents a rebound in growth relative to 1992.

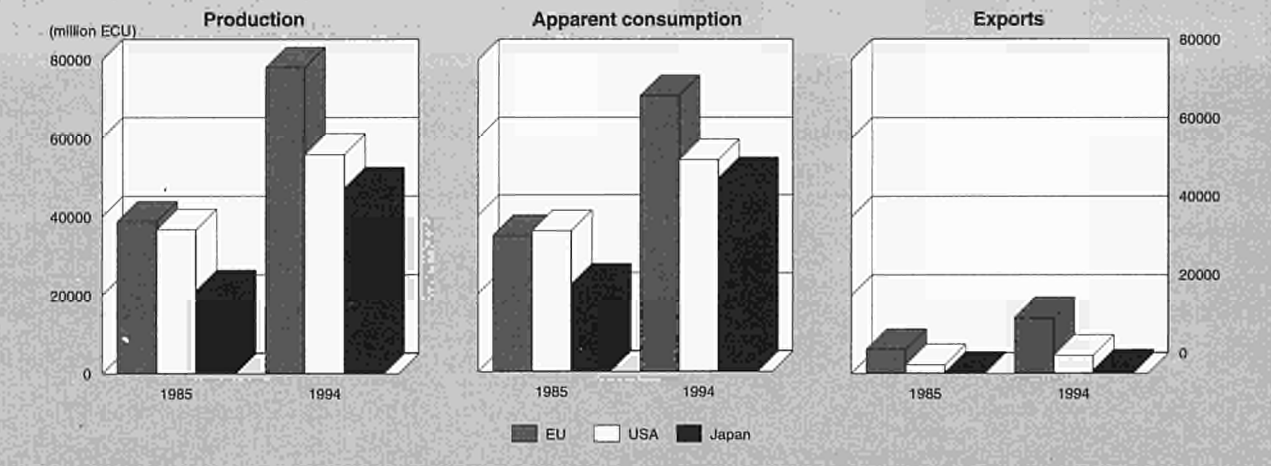
Employment within the human pharmaceutical sector continued a decline that began in 1993. Between 1992 and 1994, this sector lost approximately 20 000 jobs, or about 4.8% of total employment. This compares markedly with the growth that this sector enjoyed between 1985 and 1992 with the addition of over 60 000 jobs, a one-sixth enlargement of the work force. The decline in employment in 1994, unsurprisingly, caused a significant jump in the labour productivity by 10.6% and a corresponding decline in unit labour costs and total unit costs of 7.8% and 2.6%, respectively, as Table 4 shows. Recent declines in employment are owed, in part, rationalisation efforts by EU pharmaceutical companies.

International comparison

Figure 3 illustrates the dominance in nominal human pharmaceutical production, apparent consumption, and exports that the EU has relative to the other Triad members, the United States and Japan. Between 1985 and 1994, the EU's share of Triad nominal production of pharmaceuticals increased from 40% to 43%. Over the same period, the American share declined from 38% to 31%, despite the fact that American nominal production increased by well over 50% in absolute terms. Some of the American market share was lost to Japan whose nominal production more than doubled.

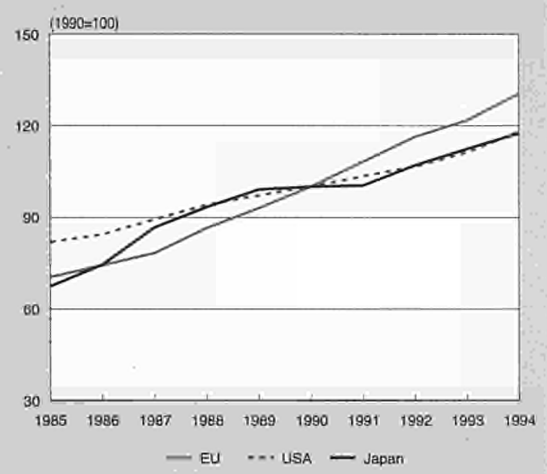
A similar story can be told with respect to nominal apparent consumption. There, EU market share increased from 37% to 40% between 1985 and 1994. At the same time, American and Japanese nominal apparent consumption achieved near-parity, American share declining from 39% to 31% and Japanese share increasing from 24% to 29%. Overall, Triad nominal apparent consumption nearly doubled.

Figure 4: Pharmaceuticals for human use
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Pharmaceuticals for human use
International comparison of production in constant prices



Source: DEBA GEIE

Meanwhile, Triad nominal exports of pharmaceuticals more than doubled between 1985 and 1994. As Figure 3 suggests, the relative member share was essentially static. Still, Japanese exports nearly tripled in absolute terms, a rate of growth that exceeds those of the EU and the United States. It is in this latter regard that the Japanese pharmaceutical industry has altered its traditional self-centred focus. Until recently, the Japanese pharmaceutical industry primarily targeted its domestic market, in large measure the result of the government's generous provision of health care services and, specifically, reimbursement for purchases of medicinal products to the Japanese public. Such an official policy created huge indigenous demand. Governmental budgetary cutbacks in this area have compelled the Japanese pharmaceutical industry to find alternative sources of revenue from abroad. To this end, the Japanese have been particularly active in the United States and Europe, expanding their presence through acquisitions. The Japanese have also established production units in Asia.

Table 5: Pharmaceuticals for human use
Top 15 Pharmaceutical Companies World-wide for prescription sales, 1994

(million ECU)

	Country	Total Pharmaceutical Sales
Glaxo Wellcome	UK	10 276
Merck	USA	7 916
Hoechst Marion Roussel	D	7 862
American Home	USA	6 242
Bristol-Myers Squibb	USA	5 860
Roche	CH	5 247
Pfizer	US	4 885
Smithkline Beecham	UK	4 651
Pharmacia & Upjohn	S & USA	4 459
Lilly	USA	4 412
Johnson & Johnson	USA	4 336
Takeda (1)	J	4 924
Sandoz	CH	4 070
Ciba	CH	3 753
Rhone-Poulenc Rorer	F	3 736

(1) Includes Over The Counter sales.
Source: Scrip Magazine, January 1996

Foreign trade

As Table 3 indicates, the EU is a net exporter of pharmaceuticals. In recent years, all EU countries but Italy have maintained a positive trade balance within this sector. Indeed, when measured in current prices, the EU trade balance rose by over 75% between 1990 and 1994. Still, the export/import ratio has remained essentially constant between 1990 and 1994 in the range of 1.9 to 2.0 as seen in Table 3. Between 1985 and 1990, imports grew at a much faster pace than exports as the export/import ratio declined from 2.6 to 2.0. Notwithstanding, the EU's relatively stable export/import ratio of recent years, the trade position is thought to be somewhat vulnerable. In this regard, pharmaceutical manufacturers experience a competitive disadvantage in production of active substances, which tend to generate more added value and which are more closely related to research than to finished or semi-finished products.

As Figure 6 shows, EU pharmaceutical imports overwhelmingly come from Switzerland and the United States, a reality that has remained unchanged since at least 1989. The export markets of pharmaceutical manufacturers are far more dispersed. As Figure 5 illustrates, the largest single country market is the United States with a 13.5% share in 1994. Also, the combined 1994 share of EU exports associated with the United States and the EFTA countries was 35.8% which compares to 1989's share of 32.7%.Such increase in relative share is owed to the fact that the EU is expanding its manufacturing facilities in developing countries. Consumers in these countries are now purchasing locally produced products to the detriment of EU exports, this in turn, has enhanced the relative importance of the American and EFTA markets to EU exporters.

MARKET FORCES

Demand

As Table 1 provides, apparent consumption of pharmaceuticals in 1994 rebounded from its decline in 1993. Nominal apparent consumption increased by 6.6% over 1993 compared to 1993's decline of 0.6% relative to the year earlier. Within the EU, the are different rules governing the sale and reimbursement of individual medicinal products. Within the EU, the rules governing the sale and reimbursement of individual medicinal products differ widely from one Member State to another. The lack of convergence of cost containment measures does not allow a proper functioning of the Internal market and prevents the pharmaceutical industry from taking full advantage of it. The overwhelming majority of turnover for pharmaceuticals came in the form of prescription pharmaceuticals. However, the turnover for non-prescription pharmaceuticals grew faster in 1994 than their prescription counterparts. This can be discerned by noting that the combined 1994 growth rates for the four largest non-prescription EU markets - Germany, France, Italy, and the United Kingdom - significantly exceeded the 1994 growth rate for the pharmaceutical sector overall, 8.7% vs. 6.6%.

The laggard growth of prescription pharmaceuticals is not surprising given efforts by EU governments to contain spending on health-care, particularly by reducing the reimbursement rates of prescription medicines. This, in turn, has seriously limited the growth in sales of prescription pharmaceuticals. The German and Italian markets have experienced notable declines in this regard. Generic pharmaceuticals have become an important alternative to branded pharmaceuticals. In Denmark, for example, generics represent approximately 20% of the total pharmaceutical market. In Germany, generics' share is approximately 15%; in the United Kingdom and the Netherlands, the share is about 10%. The growing public acceptance of generic pharmaceuticals is due in part to the cost advantage that they enjoy relative to their branded counterparts which explains that the use of generics has enjoyed official encouragement by certain EU governments.

Figure 6: Pharmaceuticals for human use
Destination of EU exports

Source: Eurostat

The majority of non-prescription pharmaceutical turnover in the EU assumes the form of self-medication products. In Germany, Spain, and Italy, the 1994 growth rate of self-medication pharmaceuticals (10%-11%) exceeds the EU overall growth rate in pharmaceuticals by a significant margin. Among the four largest self-medication product markets, the 1994 growth rate was somewhat less - about 8.1% - yet still comfortably more than the 6.6% overall growth rate.

For certain markets, cough and cold remedies and analgesics are the most popular forms of self-medication product.

Supply and competition

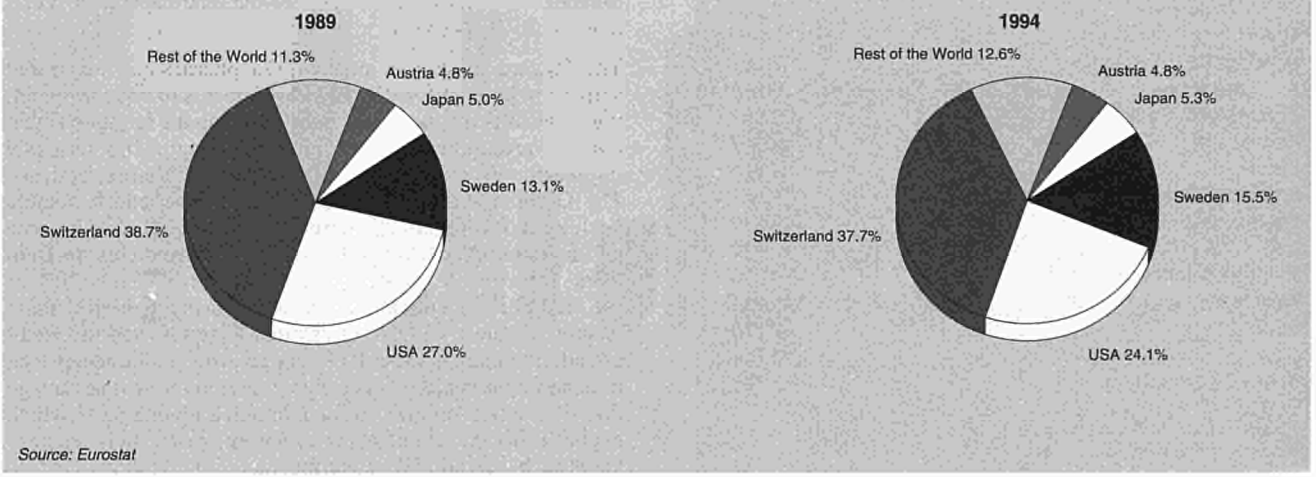
Growth in the production of pharmaceuticals far outpaced corresponding growth in other industrial sectors between 1990 and 1994. Real growth in American and Japanese human pharmaceutical production. Unsurprisingly, the EU share of Triad human pharmaceutical production increased from 40% to 43% between 1985 and 1994.

Still, as EU production of human pharmaceutical products has grown unabated in recent years, manufacturers have sold an increasing percentage of it in extra-EU markets. Indeed the export/production ratio rose significantly between 1990 and 1994, from 13.4% to 18.3%. Much of this relative increase was sold in the American and EFTA markets as Figure 5 suggests. Indeed, it is thought that EU human pharmaceutical manufacturers hold about one-third of the American market.

At the same time, however, EU consumers have increasingly relied on foreign manufacturers of pharmaceuticals to satisfy indigenous demand. In this regard, the import/consumption ratio has risen steadily since 1988 as Figure 7 points out. Much of the foreign competition that vies for the EU market emanates, of course, from the United States, Sweden, and Switzerland, as seen in Figure 6. Still, the Japanese pharmaceutical industry is expected to increase its penetration of the EU market with new medicinal products researched and developed in Japan and purchased under license by extra-EU companies from the United States and Europe. In a broader sense, the rising trend lines of Figure 7 underscore the internationalisation of the human pharmaceutical industry.

Beyond international competition, another form of competition within the sector is that which occurs between companies to secure a share of the EU human pharmaceutical market. In most Member States, prices for prescription, i.e., reimbursable, medicines are largely regulated. Prices for self-medication products are generally not regulated. It is in this latter category of pharmaceuticals that there is fierce price competition. In

Figure 7: Pharmaceuticals for human use
Origin of EU imports



Source: Eurostat

Table 6: Pharmaceuticals for human use
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.9	0.8
Danmark	1.5	1.7
Deutschland	0.8	0.7
Ellada	0.8	1.0
España	0.9	1.2
France	1.2	1.2
Ireland	3.6	4.5
Italia	1.3	1.1
Luxembourg	0.0	0.0
Nederland	0.7	0.8
Portugal	0.6	0.5
United Kingdom	0.9	1.1

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

the area of reimbursed medicinal products, where prices are mostly regulated, companies expend competitive efforts in improving existing products as well as therapeutic innovation. Companies here endeavour to reduce costs rather than compete strictly on a price basis.

Production process

When a product comes off-patent, i.e., when its patent protection expires, its generation of revenue quickly declines as generic imitation products are launched. It is therefore critical for branded manufacturers to sustain an uninterrupted flow of innovation. To this end, the pharmaceutical sectors survival depends on a continuous stream of innovation. In turn, this requires that there be copious financial resources to underwrite research and development and a regulatory climate that facilitates the innovative process.

Within the EU and nearly every other industrialised country, pharmaceutical research represents a long and costly process. A lead time of 10 to 12 years is required before a substance can be finally approved and marketed as a medicinal product. In recent years, the average total cost of launching a new pharmaceutical product from scratch has far exceeded 250 million ECU. Accordingly, pharmaceutical companies endeavour to market the new products on as wide a geographic basis as possible during the life of the patent in order to recoup their investments. Still, because the cost of pharmaceutical development is so great, innovation is left mostly to the province of the bigger firms.

To compound matters, pharmaceutical research and development within the EU is almost entirely financed by the industry itself. Because most EU pharmaceutical companies are smaller than those in the United States, they are unable to compete on an equal footing with their American counterparts in the area of product development. Indeed, the proportion of active substances developed by companies has declined significantly. Whereas between 1975-1979, the EU developed 61% of the world's new medicines, this proportion has declined to 48% between 1990-1994. Over the same period the United States increased their share from 26% to 31% and Japan from 11% to 22%.

In biotechnology, one of the fastest growing segments of the pharmaceutical industry, the picture is even darker. Analysis based on data relating to pharmaceutical research projects show that American companies account for 58% of compounds in clinical development and 48% of companies in post clinical development, while European companies account for 26% and 16% respectively. Although EU pharmaceutical companies' interest in the biotechnology sector is growing, as witnessed by the number of European acquisition of small American biotechnology firms, R&D expertise in this area still lies primarily within the United States.

Notwithstanding the disadvantages that affect EU pharmaceutical research, not all signs are bleak. In 1990, the R&D/turnover ratio for the 500 largest West European pharmaceutical companies was 10.8% compared to Japan's ratio of 10.1% and the United States' ratio of 9.5%. By 1992, even with a slowdown in production growth and domestic sales in Europe, the R&D/turnover ratio had risen to 11.8%, significantly higher than America's 1992 share of 10.5%. Still, when measured in absolute terms, EU R&D pharmaceutical expenditure is considerably less than analogous American figures.

INDUSTRY STRUCTURE

Companies

The pharmaceutical industry assumes a pyramidal structure. At the top of the pyramid there are about two dozen large companies which boast relatively large R&D operations. In the middle of the pyramid are several hundred medium-sized firms which exploit both the products of their own research and other companies' products under licence. At the base of the pyramid rest thousands of small companies mostly working in specialised fields or involved in biotechnology.

The pharmaceutical industry is marked by strong inter-firm competition. No single company has a dominant position. (In this regard, it should be noted that the results for Hoechst,

Table 7: Non-prescription pharmaceuticals
Turnover by country at public price level

(million ECU)	1989	1990	1991	1992 (1)	1993 (1)	1994 (1)	1995 (1)
Belgique/België	460	490	492	577	504	516	555
Deutschland	5 480	5 800	6 015	7 556	7 537	8 054	8 753
España	798	877	980	1 021	822	866	905
France	4 220	4 700	5 031	5 266	5 699	5 898	6 136
Ireland	N/A	N/A	N/A	50	52	57	62
Italia	990	1 196	1 261	1 348	1 243	1 641	1 684
Nederland	182	217	251	327	345	352	407
Österreich	N/A	N/A	N/A	245	204	223	240
Portugal	N/A	N/A	45	63	67	115	163
Suomi/Finland	N/A	N/A	N/A	208	185	205	244
Sverige	N/A	N/A	N/A	232	245	225	235
United Kingdom	1 090	1 311	1 455	1 883	1 995	2 051	2 001

(1) These figures only include products registered as medicinal products.
Source: AESGP

Table 8: Self-medication products
Turnover of the principal products at public price level, 1995 (1)

(million ECU)	Cough and cold	Analgesics	Digestives	Skin treatment	Vitamins & minerals
Deutschland	706	497	487	429	421
España	172	187	170	80	86
France	588	488	459	348	274
Ireland	12	14	7	9	9
Italia	281	264	290	203	170
Nederland	69	66	36	53	56
Österreich	46	35	34	39	28
Suomi/Finland	30	51	31	30	61
Sverige	4	29	6	16	20
United Kingdom	303	248	158	186	241

(1) These figures only include products registered as medicinal products.
Source: AESGP

Bayer and Rhone-Poulenc-Rorer are consolidated and, thus, not representative of pharmaceutical turnover.) Together, the top ten pharmaceutical producers represent somewhat over 20% of the world pharmaceutical market. In recent years, 7 of the top 10 pharmaceutical companies have come from Europe, although not necessarily the EU. Still, in considering the size of European pharmaceutical companies, it is important to remember that there have been restructurings and acquisitions which have served to bolster the size of certain firms. A most important change in 1995 was Glaxo's acquisition of Welecome of the UK.

In the biopharmaceuticals market, the top companies are mainly from the United States. Still, several of the top European pharmaceutical producers have increased their stake in this market, mostly through acquisition. Rhone-Poulenc Rorer is one such company through the creation of its new division RPR Gencell, which will concentrate on the treatment of genetic diseases. RPR has established a network involving cooperation with 14 companies and research laboratories, and already has a number of products in clinical trials. Another EU firm that has expanded its investment in biopharmaceuticals is Glaxo of the UK which has recently acquired the American-based biotechnology company Affymax.

Strategies

The four main challenges confronting the pharmaceutical industry include:

- heightened competition at world level due to the emergence of new technology;
- downward pressure on prices and profits from governments trying to reduce the growth in health spending;
- rising R&D costs;
- increased market harmonisation.

The world's largest pharmaceutical companies, including those within the EU, employ one of two strategies in response to these challenges. One strategy involves the outright acquisition of other drug companies as a way to achieve market share in complementary sectors, Glaxo's purchase of Welecome and Roche's acquisition of American rival Syntex are two examples of this strategy. The second strategy is more an American phenomenon: the purchase of drug distributorships. Merck, SmithKline Beecham, Eli Lilly, among other companies, have employed this strategy.

Both European and American companies have placed greater emphasis on the development of products for the self-medication segment of the industry. Such a shift in emphasis is in response to the perception that this is a fast-growing segment of the larger pharmaceutical industry. Some EU companies are also producing generic versions of their own branded products in an effort to retard the decrease in revenue that accompanies the loss of patent protection.

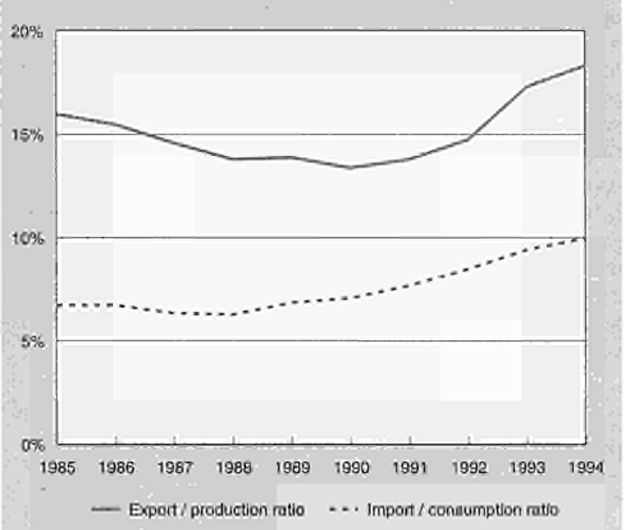
The growing role of price controls by a number of governments, in combination with fundamental changes in national reimbursement systems, has caused a shift in strategy of pharmaceutical research. Companies are placing increasing emphasis on the research and development of those substances that have practical therapy-oriented value, particularly those

Table 9: Self-medication products
Turnover of the total pharmaceutical market at public price level

(million ECU)	1989	1990	1991	1992	1993 (1)	1994 (1)	1995 (1)
Belgique/België	280	311	333	388	416	433	442
Deutschland	2 430	2 650	2 903	3 447	3 701	4 080	4 537
España	518	598	686	722	642	711	722
France	2 420	2 500	2 692	2 829	2 983	3 220	3 282
Ireland	N/A	N/A	N/A	32	35	36	44
Italia	890	1 063	1 051	1 215	1 321	1 469	1 403
Nederland	148	184	222	290	295	317	365
Österreich	N/A	N/A	N/A	176	184	214	171
Portugal	N/A	N/A	45	62	71	80	163
Suomi/Finland	N/A	N/A	N/A	125	129	114	244
Sverige	N/A	N/A	N/A	142	174	152	199
United Kingdom	690	850	956	1 401	1 615	1 626	1 497

(1) These figures only include products registered as medicinal products.
Source: AESGP

Figure 8: Pharmaceuticals for human use
Trade intensities



Source: DEBA GEIE, Eurostat

substances which are thought to have the greatest market potential.

In recent years, pharmaceutical companies have engaged in joint efforts. Certain of these efforts have been straightforward Co-marketing ventures between two similarly situated firms. Certain companies form research consortia which invest in research institutions. This type of investment improves the competitive position of certain geographic locations through the formation of pharmaceutical research "clusters" - amalgams of corporate and educational resources within the pharmaceutical sector. Also, with more emphasis on corporate efficiency than ever, it is likely that there will be a burgeoning trend toward outright mergers, particularly where the strengths of the respective parties complement one another.

Impact of the Single Market

Prior to the implementation of the Internal Market programme, pharmaceutical markets within the European Union were very fragmented by an array of non-tariff barriers to trade such as differences in marketing authorisation rules and different classification systems across Member States. With the new marketing authorisation system, it would appear that many of these barriers have evaporated.

Moreover, a truly unified EU market requires a continued harmonisation of national health systems. Differing reimbursement policies, among other factors, have caused certain market distortions between Member States that make real inter-border transparency a still somewhat elusive concept.

While the long-term effects of harmonisation within the EU pharmaceutical industry are far from known, certain observations can already be made. First, there appears to be a concentration of production activity within member states with relatively low production costs, such as Portugal and Ireland. The number of production facilities within the EU has also declined as companies are concentrating production in fewer sites to reduce costs. Also, there has been a pickup in the number of mergers in the pharmaceutical sector. Those mergers involved both medium sized pharmaceutical companies and giants, both within the EU and outside it.

REGULATIONS

As mentioned, the EU pharmaceutical market was, until recently, very segmented, marked by numerous and varied national regulations which often presented important barriers to intra-EU trade. With the adoption and implementation of a set of Directives related to technical harmonisation, market access and increased transparency, the situation is changing quite rapidly. However, the creation of a truly integrated market for pharmaceuticals in Europe is dependent on a further approximation of national health care systems.

Relevant regulations cover all industrially-manufactured medicines, including vaccines, blood products, radiopharmaceuticals and homeopathic medicines. These regulations are designed to achieve two key objectives. The first objective is to harmonise the essential health protection rules across Member States. The second is to remove barriers to trade within the EU by defining the conditions for market access. By 1993, all regulatory measures relating to technical harmonisation of products, product approval, and marketing authorisations had been adopted and are now being implemented. Progress has been slower in terms of convergence of national measures on price and reimbursement.

Technical regulations and marketing authorisations

On January 1st, 1995, a new system for marketing authorisation and supervision of medicines came into force, and a European Agency for the Evaluation of Medicinal Products was established (Regulation (EEC) 2309/93 and Directives 93/39/EEC, 93/40/EEC and 93/41/EEC). The new marketing authorisation systems affords the entire EU market a quicker and simpler access to medicines. The new marketing authorisation procedures address both the specific needs of the companies as well as the public health requirements within the EU.

Since January of 1995, two procedures have been available for pharmaceutical companies that provide improved access to the entire EU market. The first is a centralised procedure that leads to a single authorisation for the whole of the EU. Such a procedure is designed for certain new medicinal products and mandatory for those products that are derived from biotechnology. The second is a decentralised procedure that is designed for most medicinal products. This procedure is based on mutual recognition of national marketing authorisations; disputes are to be settled by binding Community arbitration.

The European Agency for the Evaluation of Medicinal Products serves as an administrative and technical secretariat which has been established to operate the new marketing authorisation system. The Agency enjoys substantial scientific support that is provided by the appropriate authorities within the Member States. The Commission relies on the Agency as its scientific adviser on those issues.

It is thought that the new marketing authorisation system will provide the EU pharmaceutical industry with several benefits including:

- Access to the large internal market that they need to recoup their research and development costs;
- Reduction in the time it takes to authorise a product from several years to less than a single year;
- A stop to runaway increases in registration fees.

Given the investment in time and money that is needed for the development of new products, the pharmaceutical industry is rightly concerned with the quality of intellectual property protection that is afforded by industrial property rights. In theory, patents that are granted under the Munich Convention, to which all EC Member States are party, provide 20 yeas' protection, which runs from the date the patent application is filed. In practice, unfortunately, once a medicinal product

has been developed and a marketing authorisation obtained, only 8 to 10 years of protection remain.

To improve this situation, the Council adopted Regulation (EEC) 1768/92, creating a supplementary protection certificate that provides medicinal products with up to 5 years additional protection. This gives the pharmaceutical industry a degree of protection that is similar to that obtained in the United States and Japan during the 1980s.

Price controls and reimbursement regulations<

Member States are responsible for the organisation of financing their social protection system and progress in harmonising national legislation in pricing and reimbursement of medicines has been slow. This divergence of national pharmaceutical pricing and reimbursement systems has made the EU market for pharmaceutical products far more fragmented than the American and Japanese markets.

In this regard, there are differing reimbursement rules for products among the Member States, along with different approaches to controlling prices or volumes sold, and different lists of products qualifying for reimbursement. The reimbursement rates for pharmaceuticals vary across countries and according to individual medicine, but can be up to 100%. Total spending on pharmaceuticals is thought to represent about 14% of total health care costs within the EU. The proportion of the price of a medicine which is not covered by social protection is borne either by private insurance, or by the patients themselves. The reimbursement rate is typically higher (about 60%) for products which are only available on medical prescription, and for innovative products.

In recent years, national authorities both within and without the EU have dramatically increased cost containment efforts. Such efforts have included price cuts (in Germany, Ireland, Italy, Portugal, Spain, the UK, and Japan), price freezes (in Belgium, Denmark, Germany, Ireland, Portugal, and Switzerland), reductions in the rate of reimbursement (France and Belgium), limits on the value of doctors' prescriptions (Germany), restrictions on the categories of products reimbursed (Italy), tightened controls on the industry's advertising practices (France), and measures to encourage rational prescribing and use of medicines. All of these efforts have caused a decreased in demand for prescription pharmaceuticals within a number of Member States, itself triggering a new round of restructuring in the industry.

While it is well-accepted that price controls and reimbursement systems fall within the purview of the Member States' authority, they tend to create distortions in the market, inhibiting manufacturers from enjoying the full advantages of a unified EU market. To mitigate these distortions as much as possible, the Council adopted Directive 89/105/EEC known as the "Price Transparency Directive" which lays down the transparency rules to which Member States must conform. This directive requires that national measures be based on objective and verifiable criteria, and that all individual decisions be duly motivated. A committee has been established which constitutes an important forum for discussion and exchange of information in this field, and which should help improve the current situation in this regard.

OUTLOOK

Demand for pharmaceutical products is little affected by cyclical changes in the larger economy. Rather, demand for these products is dominated by structural developments. The predominant factors which influence structural developments within the pharmaceutical industry include the general ageing of the population as well as technological progress in medical science. These two factors have altered the structural composition and increased the level of demand for pharmaceutical products within the EU. This trend is likely to continue for the remainder of the decade.

EU manufacturers are also likely to benefit from the continuing opening of Eastern European markets. Already, the need for a ready and quick supply of advanced medicinal products has resulted in a growing trade surplus with this region. The probability of increased EU exports to other developing world regions will remain quite favourable, provided, of course, that producers can secure access to these markets.

As discussed earlier, EU governments have largely attempted to contain health care costs in particular in recommending prevention and self-medication. However, while certain segments of the pharmaceutical industry will grow faster than others in the years ahead, the industry, as a whole, will enjoy steady growth, buoyed by an ageing population and pharmaceutical innovation.

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Animal Health Care Products

NACE (Revision 1) 24.4

In 1994 the world market for animal health care products (at the ex-manufacturer's sales level) was ECU 9 923 million (including ECU 2 377 million for nutritional feed additives). In 1994 animal health care products represented a share of 6% of the total pharmaceuticals market.
The major markets for animal health care products by value are North America and Western Europe. The United States is the biggest market, as it is the only big unified market. In Europe, France is the biggest market, followed by Germany, the United Kingdom and Spain.
The leading companies in the sector are seen to have good products which are marketed well. But clearly in the long term the continued success of the company is determined by its research and development pipeline. For generics and niche players, cost control is critical and research and development is less of a concern.
The current average research and development expenses are 10.1% of sales, which remained more or less stable between 1989 and 1994. Moreover, large European companies spend more than large American companies on research and development as a percentage of sales (14% compared to 11.3%).
The future of the sector in the EU looks pessimistic. The declining number of animals in the livestock sector is expected to decrease demand for the animal health care products. Moreover, stringent EU regulations aimed at ensuring safe residue levels in food and in the environment are resulting in considerable reduction in the number of products

INDUSTRY PROFILE

Description of the sector

Under the old NACE classification, pharmaceuticals for human use and pharmaceuticals for veterinary use were included in the unique sector called "pharmaceuticals" (NACE 257). With the new NACE classification, this sector was divided into two groups: pharmaceuticals for human use and pharmaceuticals for veterinary use (NACE Revision 1) 24.4.

Veterinary products are composed of three main categories: feed additives, biologicals and pharmaceuticals.

Feed additives contains two main groups:

- nutritional additives, or in other terms, vitamins;
- medicinal additives, which mainly includes antibacterials, anticoccidials and growth promoters.

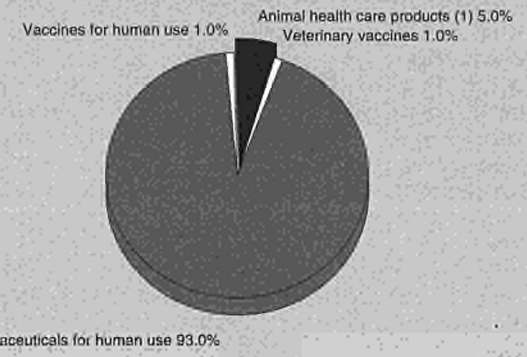
Biologicals comprise vaccines, antisera, and colostra.

Pharmaceuticals cover antibiotics, parasiticides and other pharmaceuticals.

The main product category is nutritional feed additives (vitamins), with a share of around 25% in 1994, while medicinal feed additives, biologicals, antibiotics, parasiticides and other pharmaceuticals each represent a market share of around 15%.

A market segment for these animal health care products is confined by the country in which the product is sold, the product group, the species, and whether the specie is food producing or not. This means that segments can be very small. A drug used for one segment, or specie for that matter, cannot necessarily be used for another segment (or specie) because of regulatory issues.

Figure 1: Pharmaceuticals
Distribution of the world pharmaceuticals market by product, 1994



(1) Excluding vaccines.
Source: Wood MacKenzie Animal Health Service and International Pharmaceutical Service

Livestock animals dominate the animal health markets with a total percentage of above 80%. This is owed to its dominance in nutritional and medicinal feed additives. Within the segment of livestock animals, cattle and swine account for more than 50% of all sales, followed by products directed towards poultry. Sheep and goats only play a minor role.

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In 1994, animal health care products represented a share of 6% of the total pharmaceuticals market.

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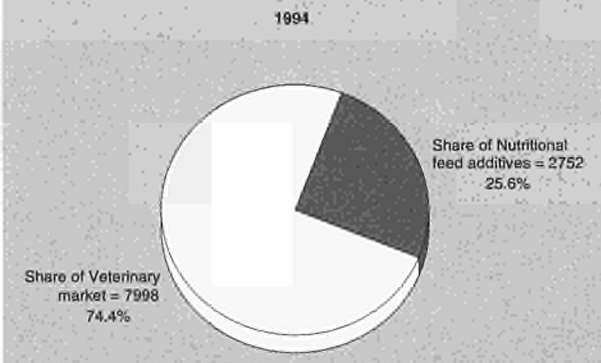
Recent trends

Looking at the evolution of growth in market size in dollars, it shows that the world market for veterinary products followed a period of strong growth between 1986 and 1992, with an

Figure 2: Animal Health Care Products
World market



Source: Wood MacKenzie Animal Health Service

Table 1: Animal health care products
Animal health care products by species, 1994

(million ECU)	Cattle	Pigs	Sheep	Poultry	Pets/Other	Total
Nutritional feed additives	742	825	92	733	358	2 750
Antibiotics	156	358	33	154	23	725
Antibacterials	13	125	8	50	4	200
Anticoccidials	15	0	23	417	21	475
Growth-promoters	103	32	7	17	0	158
Others	25	63	0	17	0	104
Medicinal feed additives	312	578	71	654	48	1 663
Biologicals	517	258	125	379	358	1 638
Antimicrobials	671	542	100	96	250	1 658
Parasiticides	629	171	229	17	746	1 792
Performance enhancers	250	0	0	0	0	250
Other	308	167	67	67	392	1 000
Pharmaceuticals	1 858	879	396	179	1 388	4 700
Total	3 428	2 540	683	1 946	2 153	10 750

Source: Wood MacKenzie Animal Health Service

Table 2: Animal health care products
1994 sales and real growth rates

(million ECU)	Sales	1989/94 Average annual growth(%)
Belgique/België	65	-1.9
Danmark	72	3.7
Deutschland	591	6.1
Ellada	22	-1.1
España	349	-1.5
France	645	2.8
Ireland	83	3.4
Italia	337	7.0
Nederland	193	4.9
Portugal	47	-1.8
Suomi/Finland	25	10.0
Sverige	34	0.1
United Kingdom	403	3.9

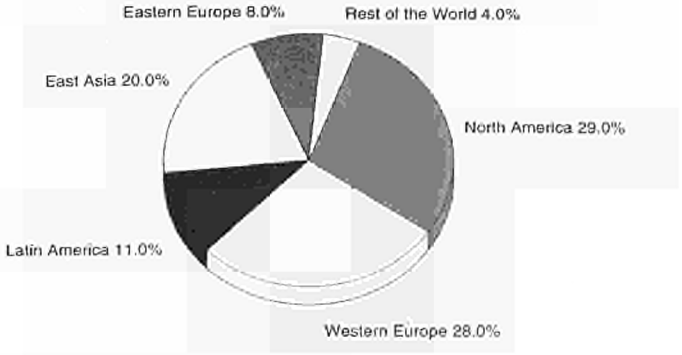
Source: Wood MacKenzie Animal Health Service

Table 3: Animal Health Care Products
Evolution of the national markets (1)

(million ECU)	1990	1991	1992	1993	1994
Belgique/België, Luxembourg	46	52	60	72	72
Danmark	43	45	50	46	53
Deutschland	226	253	302	338	361
España	174	175	178	172	161
France	398	414	456	483	534
Ellada	N/A	N/A	N/A	N/A	N/A
Ireland	48	53	56	56	62
Italia	160	160	129	142	153
Nederland	94	100	111	115	121
Portugal	19	20	22	22	22
United Kingdom	233	245	234	273	319
EUR12	1441	1517	1598	1720	1858

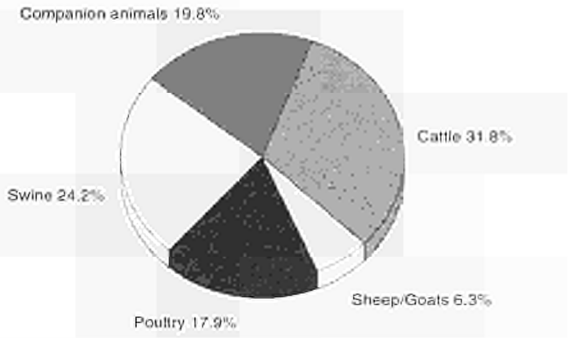
(1) Excluding additives; company prices.
Source: FEDESA

Figure 3: Animal Health Care Products
European market shares per species, 1994



Source: Wood MacKenzie Animal Health Service

Figure 4: Animal Health Care Products
West European market structure by product category, 1994



Source: Wood MacKenzie Animal Health Service

average annual growth rate of 8.6%. Since 1993, however, this growth has decelerated, with 4% in 1993 and 3.25% in 1994.

In Western Europe, the market for veterinary products (in American dollars) grew very strongly between 1986 and 1992, by an annual rate of 10% on average. However, between 1993 and 1994, the growth of this market decelerated in Europe, with no progress in 1993 and a small growth rate in 1994 (3.2%).

It is in this context that Western Europe has outperformed North America. However, this mainly reflects the dollar depreciation against many European currencies. Moreover, the European market has grown less than other regions of the world and is very fragmented, both in terms of number of species and markets.

Looking at the sales of veterinary products (in million ECU) in the EU, it shows that they grew at an annual rate of 7% between 1989 and 1994. It is interesting to note an acceleration of this growth in 1994 (8%), compared to 1992 and 1993 (6%).

In the three new EU member countries, sales of veterinary products grew even more in 1994, by 10.85% on average. However, this was owed to the growth in Finland (24.52%) and Sweden (12.86%), as opposed to the growth in Austria (2.14%).

Among the different types of veterinary products, biologicals experienced the most significant growth in market size in American dollars since 1984. Thus, between 1991 and 1994, this product group grew by an annual rate of 5.6% on average, compared to 4.1% for pharmaceuticals and 2.7% for feed additives. This is owed to the growing emphasis on preventative medicine. To this end, the use of vaccines is growing largely because of the growing industrialisation of the agricultural production, which means diseases are less easy to control and can have a far greater effect, as well as the growing concern of residues in the meat.

The slow growth for feed additives is owed to a higher share of generics. Such is also a result of the general agricultural overproduction in the EU.

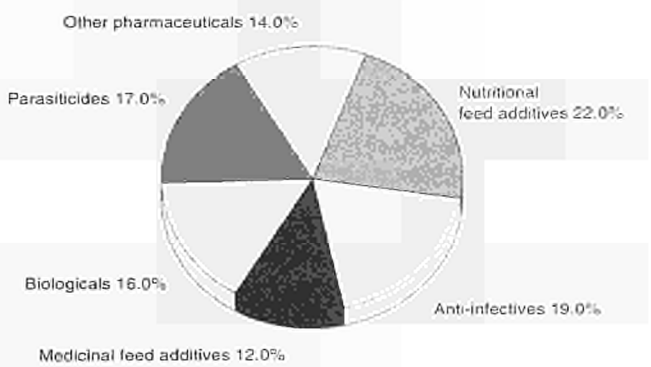
Employment levels have increased in the past five years as companies expand in capturing market share, particularly in the animal health care sector.

International comparison

The biggest markets are North America, with a world market share of 29% (in 1994), followed by Western Europe (28%) and East Asia (20%). Six out of the ten biggest markets are European countries. The leading four Western European Countries and their share of the world market are: France (7%), Germany (5%), the UK (3.2%) and Spain (3.2%).

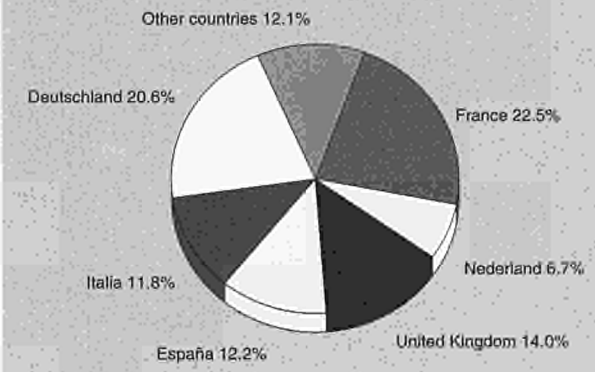
The European market has grown less than other regions of the world and is very fragmented, both in terms of number of species and markets. Most European markets do not represent more than 2% of the world market and are different in many features. One reason for this fragmentation is a change in consumer behaviour. Europeans are increasing their consumption of white meat at the expense of red meat which should benefit the avian segment. Another factor increasing the segmentation of the market is the variety of distribution systems in Europe. This increases the cost for multinational companies but offers the possibility to develop niches for smaller distribution and generics oriented companies. The problem for smaller companies is that even if minor species and special client groups could offer a viable niche which is not targeted by the multinationals, the segment may be too small. Registration and entry barriers are often too high to

Figure 5: Animal Health Care Products
Structure of European sales by country, 1994 (1)



(1) EUR12, Finland and Sweden.
Source: Wood MacKenzie Animal Health Service

Figure 6: Animal Health Care Products
Share of the global market, 1994



Source: Wood MacKenzie Animal Health Service

offer reasonable returns on investment. Most companies will therefore target their activities on the big segments of cattle, swine and, possibly, avian. A third factor which limits the size of a market segment is the competition between original products and generics. As the generics market is likely to grow, more and more original drug manufacturers will try to prolong the exploitation of their product by buying into this market. Cost advantages for those operating outside the EU can be found in the purchase of drugs, the labour cost, and in the reduction of over-demanding safety standards.

Moreover, the locus of power in the sector is shifting towards the USA mainly due to the US comparative advantage in biotechnology, R&D and risk capital development.

Foreign trade

In terms of sales by geographical area, most of the sales are directed towards other member states of the EU. This illustrates the need for harmonisation of regulations in regard to cross border trading in order to facilitate the easy circulation of goods. The rest of the sales is divided between the United States and other geographical regions like the Middle East, Latin America, Eastern Europe and South-eastern Asia.

MARKET FORCES

Demand

Sales of Animal Health Drugs per Species

Livestock animals dominate the animal health markets with a total percentage of above 80%. This is owed to its dominance in nutritional and medicinal feed additives. An analysis of the different product groups illustrates this fact clearly, since pets and other animals have an estimated share of 39% of the world pharmaceuticals market.

There is a high share of poultry in the medicinal feed additives sector which can be explained by the high degree of industrialisation in this sector; this causes a high density of animals. In order to prevent diseases which can destroy a whole flock within several days, medicine is used in the feed.

Companion animals are the second major market, mainly cats and dogs with 13%, while sheep and goats constitute the third segment with 7% of sales. Equine is only 1.5% of sales and the remaining species, 2.5%. Among these other species is rabbits which are quite important in Spain and France owing to the popularity of their meat.

Future change in this product mix will be influenced by:

- Changes in the macroeconomic environment. The CAP had affected negatively the number of dairy herds in the EU.
- Changes in eating habits. More white meat is going to be consumed in the future.
- The growth in the companion animals' segment. A lot of the companies are becoming interested in the sector in the near future because of its growth.

Distribution of livestock in the EU for the main categories: cattle, pigs, sheep and goats

Livestock numbers in the EU have been relatively stable, although with a declining trend, from 1991 to 1994. The exception rests in the number of pigs, which rose by 2.5%, while the number of bovine livestock in total declined by 3.3%. This is a result of the Common Agricultural Policy and general EU policy which is coming to terms with EU overproduction.

There are marked differences within the categories as to the development of specific species in different countries. While the number of bovine livestock in countries such as Portugal decreased by 8.6%, and in Italy by 9.7%, it rose by 4.1% in Ireland.

The adhesion of Austria, Finland and Sweden to the EU increases the number of bovine livestock and pigs considerably by 6.8%, and 6.7%, respectively. The number of sheep and goats is only slightly affected with an increase of 0.9% and 0.5%.

Companion Animals

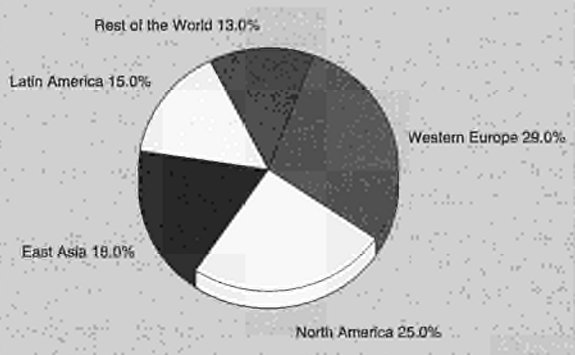
Generally the development of the number of dogs is expected to remain flat, while cats will be growing as households become smaller and pet owners pursue a higher variety of work and leisure activities. Additionally, dog owners now tend to prefer smaller breeds. The number of cats benefits from this, because cats are more independent animals.

In general, pets are most likely to be kept by families with children and households with more than three members. Cat ownership is common in all income groups, while dog ownership is slightly skewed towards layers of the society with a lower income.

Meat consumption

Meat plays an important part of the nutrition in Western Europe and the region has the third highest per capita consumption of meat which is also a reflection of the comparable wealth

Figure 7: Immunological Veterinary Medicinal Products
Distribution of the world veterinary vaccine market, 1994



Source: Wood MacKenzie Animal Health Service

of the region. Europeans tend to eat more meat, having consumed 27.4m tons of meat in 1992 as opposed to 25.8m tons in 1987. It is interesting to note that there is a shift away from beef towards pigmeat and poultry, as white meat is perceived as being more healthful. There is also a general change in consumer behaviour. Consumers tend to buy less red meat in preference to white meat such as poultry.

Supply and competition

Distribution systems

Distribution systems vary substantially among EU member states. First, they tend to vary in the degree of market regulations. The markets can be regulated by:

classifying the drugs and restricting their sale to the public through veterinarians;

restricting their sale through certain distribution channels, such as pharmacies.

The way in which a drug travels from the manufacturer to the customer is not the only important consideration. Severe differences in the EU concern regulations that determine which drugs need a prescription and which do not.

Moreover, the difference in distribution channels leads to an array of consequences including:

- Price differences among some EU countries;
- Heterogeneity of distribution systems, creating difficulties in market entry and additional cost for multinational companies, which have to adapt their sales efforts to the distribution system in each country;
- Emergence of a black, or grey, market, owing to strict regulations of the distribution system;
- Difference in the cost of the different distribution system to the manufacturer.

Indeed, the harmonisation of the distribution system has been the single most effective measure to narrow the gap between the higher cost of selling veterinary drugs and the lower costs in the United States.

Multinational and small national companies do have distinctively different viewpoints. While companies distributing their products internationally advocate further harmonisation, smaller companies tend to prefer the status-quo. Smaller companies do not have the same marketing power as multinationals, and therefore must rely more on the veterinarian to advocate their product. Moreover, since smaller companies only have a limited amount of R&D, they very much have to rely on their marketing expertise and special client relationships. This is the reason that they are regularly given access to the multinationals' active ingredients before the end of the patent's life.

INDUSTRY STRUCTURE

Companies

Several of the larger companies producing pharmaceuticals for human consumption are also involved in the production of therapeutic products for veterinary use or feed additives. In 1993, the five major animal health and nutrition companies were Hoffmann-La Roche, followed by Rhone-Poulenc, MSD, SmithKline Beecham and Mallinckrodt Veterinary. Together, they accounted for 33% of the sales of the animal health industry's thirty largest producers, but only 3% of the total sales of Europe's five largest pharmaceutical producers. Amongst the top 30 animal health and nutrition producers, 10 also rank in the world's top 15 pharmaceutical companies.

The largest firms tend to develop innovative products and the use of patents allows them to recoup their investment in R&D. Smaller companies mainly produce generics and invest significantly less in R&D.

Moreover, their differences in profitability and cost structure lead to the existence of different points of view about the current and future status of the sector of animal health care products in the EU.

Sales by product

The EU based companies have a large product rangThe products are mainly focused on the pharmaceuticals' sector. This sector comprises 72% of sales and a company has, on average, 112 products in this sector. However, a large number of these sales are attributed to the production of generics. Another 25% of revenues, an average of 14 products, is generated from the production of biologicals, the growing market at the moment. A mere 3% stems from medicinal feed additives. It is, however, difficult to make the distinction between medicinal feed additives and nutritionals.

Most of the products generate low sales levels. Only 1% of the products generated sales of more than 10 million ECU, while 75% had sales of less than 100,000 ECU. It is expected that because of the change in the EU regulations, the number of products will decrease sharply. One estimate is that 25% of the existing products will be eliminated. Although this might create some problems for some rare diseases and minor species, it is not generally considered as a serious problem.

Profitability

In the past five years, 45% of the EU companies have seen their profits increase, while these profits have actually decreased for 27%, and have stabilised for the remaining 27%.

After dividing companies with respect to their size, one could note that in the past five years, profits have risen for 80% of big companies and only 17% of small companies. During the same period, profits of 50% of small firms have decreased, while no large firms under consideration have seen their profits follow the same evolution. Finally, 20% of big companies and 33% of small companies have seen a stabilisation of their profits.

Overall, the assessment for the profitability in the EU industry of animal health care products is rather pessimistiThe profit margins in the EU are expected to drop which might also happen in the United States but to a lesser extent. American companies are, in any case, more profitable than European companies because of advanced technology and lower costs.

Strategies

There has been a significant amount of consolidation occurring in the global industry of Animal Health Care products within the last year. Some of these activities were the result of consolidation in the industry of Human Health Care (HHC) products, while others were confined to the industry of Animal Health Care (AHC) products.

There has been both horizontal and vertical integration occurring in the HHC industry which has affected the AHC industry. The vertical integration has occurred within pharmacy benefit (PBM) companies, an example being SmithKline Beechams $2.3 billion acquisition of Diversified Pharmaceutical Services in 1994. In light of these large corporate activities and the need for cash to finance them, many companies are focusing on their core human pharmaceuticals business. Thus, those small peripheral businesses with lower profitability such as AHC have been discarded.

Consolidation has stemmed from declining profitability in the AHC industry resulting from an increasing threat from generics and the expiration of many patents. In addition, the link between HHC research and AHC research has declined in recent years. However, in certain sectors, such as agrochemicals which have lower profit margins, the margins available

Table 4: Immunological Veterinary Medicinal Products
Size of the national markets by species, 1992

(million ECU)	Cattle	Swine	Poultry	Sheep/ Goat	Horses	Pets	Others/ Rabbits	Total
Belgique/België, Luxembourg	4.5	5.6	1.5	N/A	0.0	2.8	0.4	14.9
Danmark	0.3	8.9	0.5	N/A	0.7	1.5	0.8	12.7
Deutschland	16.3	17.1	5.3	2.0	4.7	20.0	1.3	66.7
Ellada	N/A	1.8	1.8	1.2	0.0	1.1	0.0	5.8
España	5.1	11.2	7.2	4.7	0.7	5.4	2.4	36.8
France	14.3	14.0	21.5	3.3	1.6	23.0	1.6	79.2
Ireland	2.8	0.8	0.3	2.5	0.4	0.6	N/A	7.3
Italia	6.2	6.2	12.0	1.4	1.3	6.8	0.3	34.3
Nederland	3.4	10.5	2.6	0.2	0.7	3.9	0.1	21.4
Portugal	0.7	1.2	1.3	0.8	0.0	0.5	0.0	4.6
United Kingdom	7.9	3.3	13.5	13.5	2.9	22.3	0.9	64.3
EUR12	61.4	80.4	67.4	29.5	13.1	88.1	8.0	347.9

Source: FEDESA

in the AHC business are attractive. Sales of successful products in the AHC industry can provide profit margins exceeding 25%. Thus, what looks unappealing to the HHC companies, looks attractive to companies in lower margin industries such as agrochemicals. For agrochemical companies, there are links with the AHC industry, an example of which exists between plant protection and ectoparasitics.

The other reasons for the increased consolidation is the fact that the AHC market is mature. While there are segments of the market which are growing, such as companion animals, the overall market suffers from slow growth and a lack of new customers. With a relatively stable market with limited organic growth opportunities, the only way to grow is through outright acquisition of competitors.

Research and development is very important to provide new products and, with the rising costs and uncertainty of success, buying a company may serve as an effective way to increase the products "in the pipeline", and to spread risk and reduce costs. With escalating regulatory costs and global marketing needs, increasing the size of operations allows the firm to benefit from economies of scale.

Moreover, due to rationalisation, at least nine EU factories have closed down over the last five years. Under the new regulations, the companies have to update the safety and production standards of their facilities which is forcing them to invest a lot of funds on equipment. However, this is also helping them increase productivity.

Marketing Expenditure and Advertising

Marketing is considered particularly important, especially now that patents are expiring and generics are posing a strong pressure on profit margins. Generics have been reported t have market share of around 20% of total sales in the EU.

However, according to survey research carried out by th Manchester Business School, marketing costs in this secto have either tended to decrease for the last five years or remai stablThis is likely the result of consolidation, cost containmen efforts, or the recent changes in organisation structure.

According to the same study, advertising is also becomin very important as 80% of the 15 interviewees who answere claimed. However, this is only meaningful in countries wit substantial OTC sales and considerable presence of farmer and wholesalers. Advertising takes place mainly in the forr of ads on specialist magazines and is estimated at around 3% of sales, while 6% of sales is spent on annual promotion. A further 178% of sales is spent at the launch of a product. I should be noted that even those who did not regard advertisin as important are investing in it in order to defend their marke position.

Other key marketing areas identified were logistics, custome service, and branding. Interestingly branding plays an impor tant role in the animal health care market, and is one wa to differentiate a product and guard against the threat fro generic products.

Meanwhile, for generic manufacturers, the key element is co control. As the generic market is similar to a commodity ma ket, the basis of competition is price. Thus, the low cost pr ducer has the competitive advantage in the industry. Oth considerations for generic manufacturers are access to distr bution/specific client base, strong marketing, multiple sou cing, and speed in the registration process.

Table 5: Animal health care products
Product groups sales by region, 1994

(million ECU)	North America	Latin America	West Europe	East Europe	Far East	Rest of the World	Tota
Nutritional feed additives	788	175	667	329	683	108	2 75(
Medicinal feed additives	575	142	354	150	375	67	1 66
Biologicals	417	250	475	113	292	92	1 63
Pharmaceuticals	1 383	625	1 550	267	725	150	4 70(
Total	3 163	1 192	3 046	858	2 075	417	10 75(

Source: Wood MacKenzie Animal Health Service

Table 6: Animal Health Care Products
Breakdown of the 10 largest markets in the world, 1994

(%)

Deutschland	5.0
España	3.2
France	7.0
Italia	2.5
Nederland	2.3
United Kingdom	3.2
USA	27.7
Japan	7.6
Brazil	3.5
Mexico	1.8
Other	36.2

Source: Hoechst Veterinar GmbH

Research and development

According to companies' surveys, research and development (R&D) is seen as the most important factor for future company success, but effective marketing is important for today's revenues. Generics manufacturers quote cost control, marketing and fast registration process as the most important success factors.

The current average R&D expenses are 10.1% of sales. It remained more or less stable between 1989 and 1994. Moreover, large European companies spend more than large American companies on R&D as a percentage of sales (14% compared to 11.3%). Smaller EU companies stated that their R&D spending as a percentage of sales fluctuates yearly as some larger projects vastly change the figure.

In a broader perspective, of all the money spent on R&D in the pharmaceutical industry, 7% was allocated to animal health in the United States in 1989, 13% in Japan and 8% in Europe. A further look at these numbers estimates that the amount spent in the United States on animal health R&D in 1989 was ECU 451, ECU 355m in Japan, and ECU 624m in Europe.

Many companies feel that R&D has a positive impact on long-term profitability. This confirms the reasons that they would state that R&D spending will increase in the future. However, some worry about the negative short-term effects of R&D on profitability.

Reasons for the increase in R&D expenditure are the fact that new chemical entities are more and more difficult to find, increased toxicological and environmental tests.

Moreover, companies are increasing research and development done in companion animal and biologicals area. Vaccines are the current focus in research and development with 30.2% of all R&D being spent in this area (animal focus in cattle, pigs and companion animals), 22.2% of R&D on anti-infectives and 17% on anthelmintics, the rest on other areas. The species, which capture most of the R&D are bovine (22.7%), porcine (21.6%) followed by companion animals (18.2%) and avian (14.8%).

In terms of R&D expenditures financing, in-house R&D is most profitable, while 20% opted for buying existing firms and the rest for out-sourcing.

Finally, the most important factors for locating R&D are closeness to market (25%), historical reasons/closeness to parent company (25%), the legislation (20.8%), and the costs (14%). The most important factor for re-locating outside of the EU is cost and efficiency (55%), followed by more flexible legislation (25%).

Impact of the Single Market

Common Agricultural Policy (CAP) and the General Agreement on Trade and Tariffs (GATT) significantly influence the animal health care industry in the EU.

The CAP regulates the agricultural sector. One of the prominent tools of the CAP is the formulation of milk quotas for each country. Thus, given the current over-production, a decrease of the livestock population in the EU has resulted. This development has decreased the number of potential "customers" for the animal health industry.

At the same time the GATT will allow more non-EU agricultural products into the EU. The effect of this is that should EU farmers lose market share, the market for Animal Health Care products will decline and they will need to increase productivity which will be difficult without the same access to product as farmers in other countries.

REGULATIONS

The New System for Marketing Authorisations

The legislative environment in the EU is in a period of transition, shifting from a national licensing process to an EU-wide licensing process. This is manifested in the European Medicines Evaluation Agency (EMEA), established by Council Regulation (EEC) No 2309/93 in July 22, 1993, located in London which started operations on January 1, 1995.

There are two procedures for obtaining a license for all Member States: the "centralised" approach and the "decentralised" approach. No veterinary medicinal product may be placed on the market of a member state unless a marketing authorisation has been issued by the competent authorities.

Cases in which the Dossier Requirements are Reduced

There are specific categories, as specified in Directive 81/851, where data requirements may be reduced and the results of

Table 7: Immunological Veterinary Medicinal Products
Worldwide distribution by region and by species, 1994

(million ECU)	Western Europe	North America	Other areas	Total
Cattle	84	155	286	525
Sheep	47	30	48	125
Swine	45	30	183	258
Poultry	126	63	191	380
Small animals/Horses/Others	173	137	40	350
Total	475	415	748	1 638

Source: Wood MacKenzie, FEDESA

toxicology and pharmacological tests and field trials omitted. The first such category is when a copycat application is made, a second authorisation for an existing product. The next category is a simplified authorisation procedure, when an applicant can demonstrate that the constituents of the product have a well-established medicinal use with recognised efficacy and an acceptable level of safety. The final category is the generic category; where, in the EU legislation, the product must have been on the market for no fewer than 6 years for normal products and 10 years for high technology products, although member states can extend the six year period to 10 years at their discretion.

Cases in which there are no Authorised Veterinary Products

When there is no authorised veterinary medicinal product for a certain condition in a particular species and to avoid suffering, a veterinarian can exercise his or her clinical judgement and can prescribe for one or a small number of animals under their care in accordance with the following sequence: a veterinary medicine authorised for use in another species for a different purpose ("off label use"); a medicine authorised for human use; a medicine to be made up at the time on a one-off basis by a veterinary surgeon or a properly authorised person.

There are restrictions to this "cascade system", notably in food producing animals. Only medicines whose pharmacological active ingredients are contained in a product already licensed for use in food-producing animals can be used.

Maximum Residue Limits (MRL) Legislation

The EU MRL legislation arising from Council Regulation (EEC) No 2377/90 dated June 26, laid down the Community procedure for the establishment of maximum residue limits for veterinary medicinal products in foodstuffs of animal origin. The goal of the MRL legislation is to put increased emphasis on consumer safety and to protect public safety. This legislation has resulted in a workload increase as well as increases in costs in order to compile the information necessary for the MRL dossier for AHC companies. Companies have until January 1, 1997 to comply with the legislation, i.e., have established MRL's for all products on the market. The concern with this legislation is that many products may be withdrawn from the market if their sales do not merit the costs associated with the MRL dossier.

OUTLOOK

Animal Health Care products are non-durable goods for which the demand is only moderately influenced by the business cycle. Thus, the demand for these products is dominated by structural developments.

There are two factors influencing structural trends in demand for animal health care products when it comes to the future development of the market. One is the declining number of animals in the livestock sector, which is only partially cushioned by the growing number of pets (especially cats). Secondly, the sectors are highly segmented, which is a result of the high number of species and certain regional preferences. Both are expected to decrease the demand for these products.

Moreover, the EU market for these products is currently undergoing major shifts and rationalisation as a result of two factors: the creation of the Single Market and stringent regulations aimed at ensuring safe residue levels in food and in the environment. These have resulted in a considerable reduction in the number of products.

Finally, in recent years, a number of major pharmaceutical producers have divested from the animal health and nutritional sector to generate cash to finance their restructuring or new acquisitions in the human health sector. Given the enormous difference in market size and turnover value between the human drugs businesses and animal health products, the animal health divisions are indeed not perceived to be a strategic enough asset for the larger pharmaceutical firms to want to keep them in their group. This represents a new threat to an industry which is already faced with relatively slow growth in demand.

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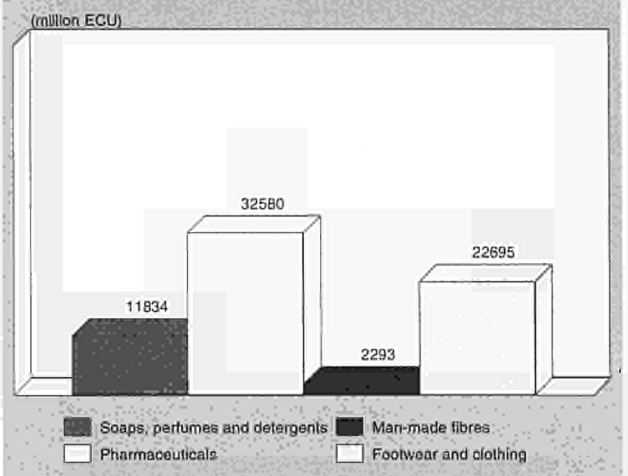
Soaps, detergents, perfumes and toiletries

NACE (Revision 1) 24.5

With a total estimated turnover of 45 billion ECU, the industries covered in this chapter only command 15% of the total chemical industry turnover. While the soaps and detergents industry should be viewed separately from the industry covering perfumes and toilet preparations, both industries are becoming increasingly integrated. This is caused by the introduction of brands by large suppliers, which cover market segments of both industries with one product line, ranging from toilet soaps to bath and shower products and skin care products. The growth of the market for soaps and detergents and personal care products is expected to continue at a modest but constant rate. The outlook for different markets, however, varies. Despite growing markets, the rationalisation process in the industry is expected to continue which will lead to a further reduction in employment. Besides cost reducing measures, R&D expenditure will maintain a relatively high level not only with the aim of developing new products or product varieties, but also with the environmental goal of reducing waste and increasing environmental and human safety.

Figure 1: Soaps, perfumes and detergents
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

The manufacture of soaps and detergents is closely related to the manufacture of maintenance products. In the NACE 1970 classification, however, sanitary cleaners, bleaches and air fresheners were categorised under maintenance products (NACE 259.2), whilst sanitary water fresheners used to be categorised under soaps and detergents (NACE 258). In the former NACE classification, NACE 258 also covered perfume and toilet preparations.

In the new NACE (Rev.1) classification the aforementioned products categories have been combined. Group 24.5 can be divided into the following product categories:

- the manufacture of soaps and detergents (Class 24.51) covers toilet, household and industrial soaps and washing products; and household cleaning agents and maintenance products including scourers and surface cleaning products, polish products and waxes, bleaches and sanitary cleaners and air fresheners.
- the manufacture of perfumes and toilet preparations (Class 24.52) covers hair products, beauty products (skin care, sun care, cosmetics, etc.), bath and shower products, hair care products, perfumes and fragrances, deodorants, etc.

With total ex-factory sales estimated at 20.5 billion ECU in 1994, the EU-market for perfumes and toilet preparations is larger than the market for soaps, detergents and cleaning preparations. Sales of the latter class amounted to an estimated 19 billion ECU in 1994. It should be noted that the figures in the tables refer to the former NACE 1970 classification. Cleaning preparations are not included.

Soaps, detergents and cleaning preparations

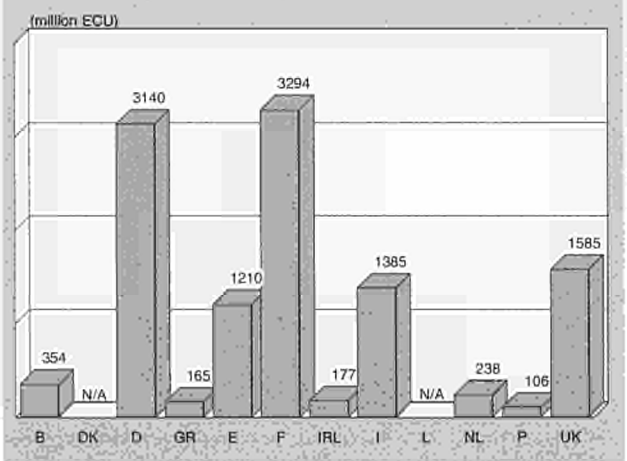
Within class 24.51 a further subdivision can be made between soaps and detergents on the one hand and cleaning and polishing preparations on the other. Soaps and detergents account for roughly 75% of total sales in this class, with cleaning and polishing preparations making up the remaining 25%.

Cleaning and polishing products are defined as preparations designed to meet the cleaning, preserving and protective requirements encountered in a wide range of domestic, institutional and industrial applications. Scourer and surface cleaning products include all-purpose cleaners, scouring powders and preparations for specific applications, such as car, oven and window cleaning products. Their market size is estimated at nearly 2 billion ECU. Polishing products and waxes include polishes for wood, shoes, leather etc. For these products sales are estimated at more than 800 million ECU. Bleaches and lavatory cleaners cover both powder and liquid products. They are especially used for the cleaning and disinfecting of sanitary ware. Their market size is estimated at nearly 1.5 billion ECU. The market for air fresheners is estimated at 400-500 million ECU. Air fresheners appear in an aerosol or solid form.

Perfumes and toilet preparations

Class 24.52 covers hair products, beauty products (skin care, sun care, cosmetics, etc.), bath and shower products, hair care products, perfumes and fragrances, deodorants, etc. Toiletries, hair products and skin care products are the largest sectors with estimated ex-factory sales reaching 5.3, 5.2 and 4.1 billion ECU respectively. Perfumes and fragrances both

Figure 2: Soaps, perfumes and detergents
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Soaps, perfumes and detergents
Main indicators In current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	21 666	29 002	30 528	32 764	33 733	33 695	34 605	34 425	36 373	38 720	41 500	44 500
Production	23 686	31 624	33 368	35 658	37 053	37 421	38 923	38 936	40 296	42 900	45 980	49 300
Extra-EU exports	2 348	3 157	3 425	3 633	4 133	4 656	5 358	5 647	5 032	5 430	5 850	6 340
Trade balance	2 020	2 622	2 841	2 894	3 320	3 726	4 318	4 511	3 923	4 180	4 480	4 800
Employment (thousands)	191	204	205	203	198	193	189	183	190	190	190	190

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Soaps, perfumes and detergents
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.9	1.1	2.7	1.9
Production	3.9	1.8	2.9	3.3
Extra-EU exports	4.2	8.2	5.9	15.0
Extra-EU imports	8.5	8.6	8.5	7.6

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Soaps, perfumes and detergents
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 348.1	2 249.5	2 341.6	2 589.4	3 156.6	3 425.2	3 632.6	4 132.6	4 655.7	5 357.6	5 646.6	5 032.1
Extra-EU imports	327.9	297.8	360.5	456.9	534.8	584.5	738.5	812.7	929.8	1 039.1	1 136.0	1 109.1
Trade balance	2 020.1	1 951.7	1 981.0	2 132.5	2 621.8	2 840.7	2 894.1	3 319.9	3 725.9	4 318.5	4 510.6	3 923.0
Ratio exports / imports	7.2	7.6	6.5	5.7	5.9	5.9	4.9	5.1	5.0	5.2	5.0	4.5
Terms of trade index	99.9	104.3	106.5	100.3	100.8	100.0	100.4	101.0	92.8	89.5	N/A	N/A

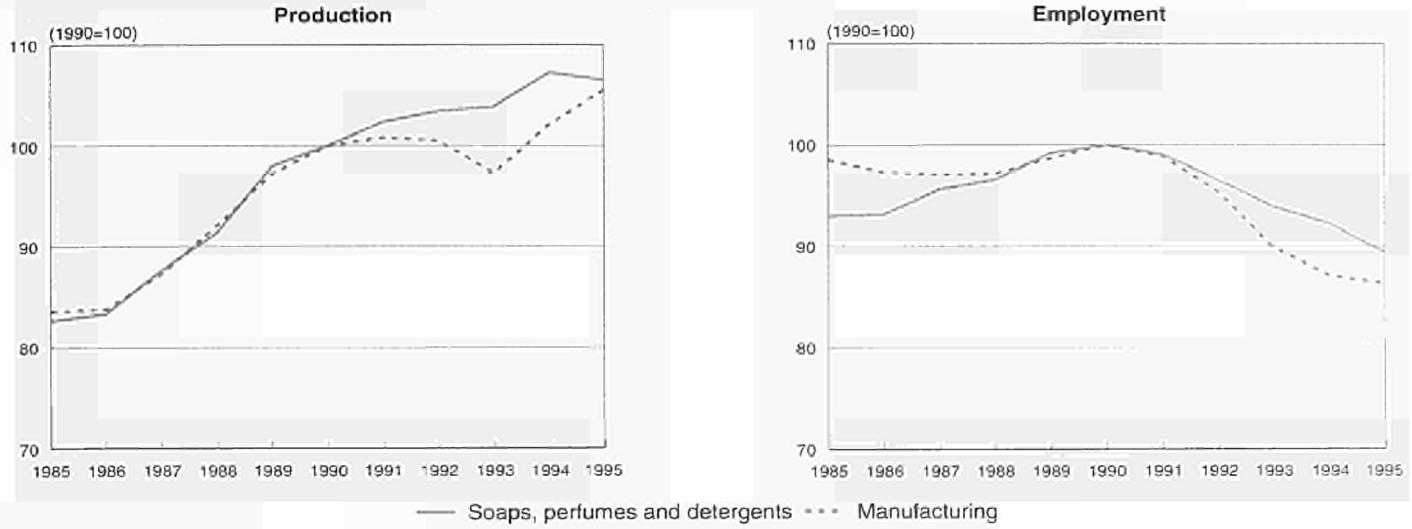
(1) Eurostat estimates.(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Soaps, perfumes and detergents
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	88.9	89.4	91.7	94.7	98.8	100.0	103.3	107.1	110.6	116.3
Unit labour costs index (3)	88.4	92.0	92.9	94.7	96.2	100.0	103.9	107.1	106.9	104.8
Total unit costs index (4)	86.1	87.0	88.1	91.8	97.1	100.0	103.8	107.7	107.7	108.0
Gross operating rate (%) (5)	10.9	11.8	12.1	11.8	11.0	11.2	11.3	10.8	11.5	12.0

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Soaps, perfumes and detergents
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

have a market size of 3.2 billion ECU, followed by cosmetics (2.3 billion ECU).

Recent trends

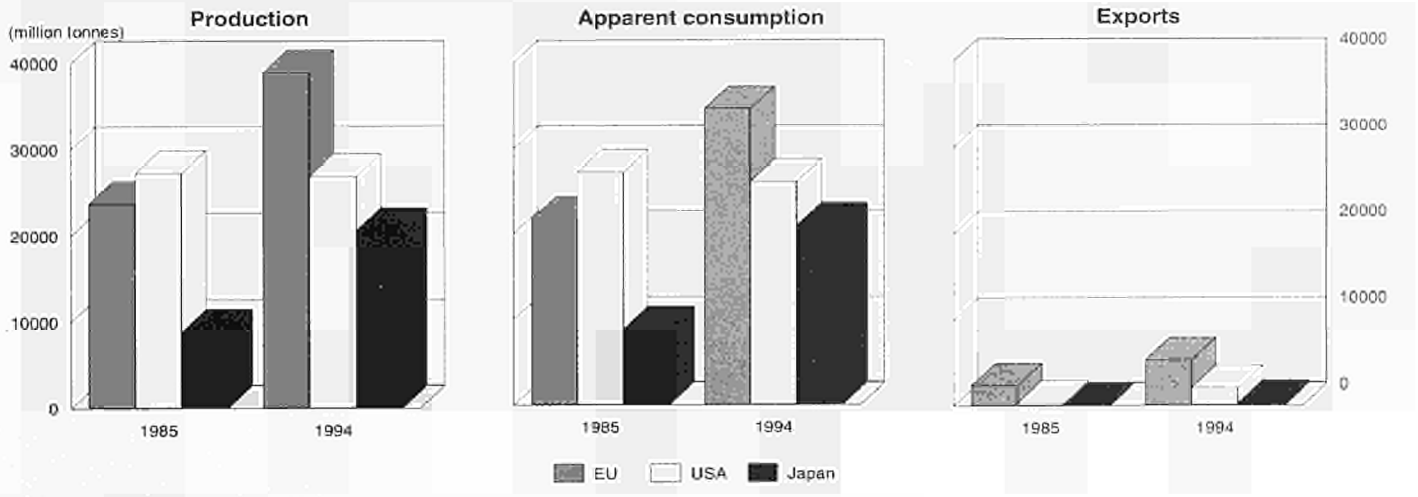
The industry's production as a whole has grown at an average rate of more than 5% per annum over the period 1985-1995. In 1993, however, the economic recession in most Member States resulted in lower growth.

Soaps, detergents and cleaning preparations

The market development of soaps and detergents demonstrates a rather different pattern between countries. In the United Kingdom average annual growth rates reached more than 5% during the 1991-1994 period, whereas sales in Germany only slightly increased in the same period. French growth rates are between those of the two aforementioned countries. In market trends, however, similarities do exist. In most EU-countries, market demand has suffered from the economic recession in 1992 and 1993. After a decline in these years, demand in the individual market segments started to recover in the course of 1994, a trend that has continued in 1995. The dishwashing detergents market is one the fastest growing consumer markets in Europe. In 1995, total sales increased by more than 8%. Concentrated powders hold about 30% of this market, while concentrated tablets account for about 15%. The detergent market seems split by two conflicting movements. One trend is induced by the growing concern for environmental issues and seems to point towards more ecologically formulations. In this context the development of new surfactants such as derivatives, enzymes and enzyme combinations can be mentioned. The other trend is induced by the industry's drive towards lower costs and favours less expensive raw materials. The recent volatile nature of the raw material prices in recent years is one of the driving forces why the industry looks for lower cost raw materials.

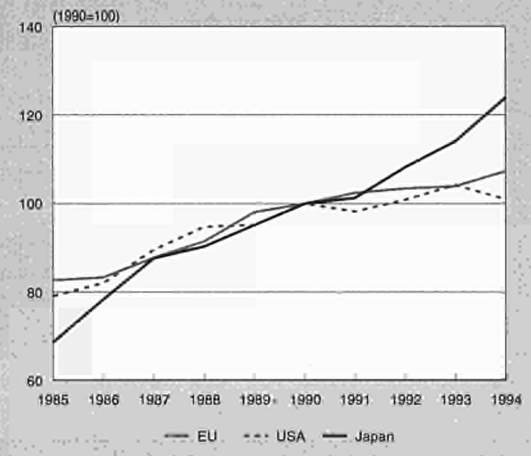
In the market for cleaning and polishing preparations some differences in trends between product markets can be observed.

Figure 4: Soaps, perfumes and detergents
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Soaps, perfumes and detergents
International comparison of production in constant prices



Source: DEBA GEIE

The market for bleaches and toilet cleaners is fairly mature, and the high levels of new product development which characterise other household cleaning products markets is not seen here. Bleach is increasingly under threat from high-performance, specialist substitutes and has lost share to toilet cleaners. The development of multi-surface cleaners and multi-purpose bleaches with disinfecting properties has caused a drop in demand for traditional disinfectants. Over the period 1987-1992, the EU market for maintenance products has grown at an average annual rate of 5%. After a stagnating market in 1993, sales increased in 1994, a trend that has continued in 1995.

Perfumes and toilet preparations

The product markets of class 24.52 have had mixed fortunes in 1995. While bath and shower products recorded growth rates varying 6 to 8%, cosmetics, perfumes and fragrances only recorded small overall growth of around 2%. The other product markets have demonstrated an average growth rate of around 4%.

The most developed area in the men's product market in the EU is the fragrance segment. In recent years men have grown more health and image conscious, leading to an increased interest in personal care and hygiene. Compared with other regions the trend is particularly strong in Europe. Men in France and Italy spend about 13 ECU per capita on grooming products annually, while men in the United Kingdom, Spain and Germany spend between 8 ECU and 11 ECU each. These figures compares with just 6 ECU in the USA and a meagre 1 ECU spent by men in Japan.

International comparison

The industry as a whole has a total estimated production of nearly 50 billion ECU. The industry employed over 200 000 people in 1995, although this is decreasing. In related areas such as distribution, transport and retailing more than 450 000 jobs can be attributed to the industry.

The EU is the largest producer of soaps, detergents and personal care products. The USA and Japan follow with estimated production of 30 billion and 25 billion ECU respectively. Over time, large differences can be observed between the countries. Whereas the EU production increased by 5% per annum over the period 1985-1995, JapanÕs production grew by over 9%, while US production declined over the same period.

Within the EU, Germany and France are the largest manufacturing countries, together accounting for an estimated 50% of total production. Italy and the United Kingdom follow at a distance with respective shares of 13% and 12%.

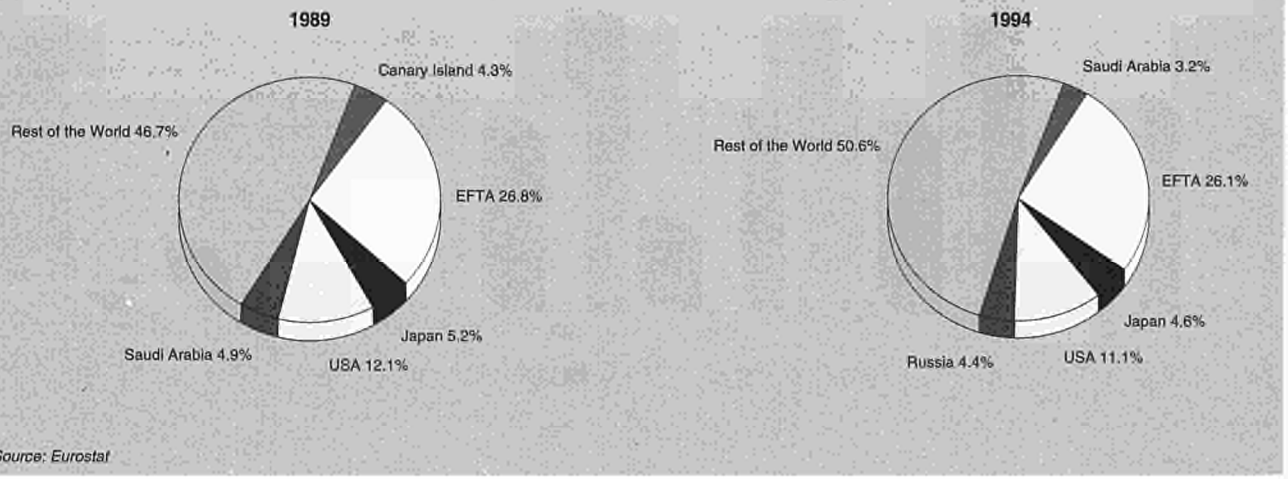
Foreign trade

The industry as a whole is a net exporter. With extra-EU exports and imports totalling 5 570 and 1 128 million ECU respectively, the trade balance showed a surplus of 4 442 million ECU in 1994. The export rate, however, is relatively low (around 11%).

France is responsible for 40% of total extra-EU exports, followed by Germany with 19%. The most important export destinations in 1994 were the USA (11%) and Switzerland (9%). In absolute terms exports to those countries increased by 50-90% in the five years 1989-1994. The EU manufacturers have also taken advantage of the opening-up of the Eastern European markets. Since 1989 EU exports to Russia and Poland have increased from 22 million ECU to nearly 400 million ECU in 1994.

The extra-EU imports mainly originate from Switzerland and the USA, together accounting for 69% of total imports. In absolute terms imports from these countries has more than doubled since 1989.

Figure 6: Soaps, perfumes and detergents
Destination of EU exports



Source: Eurostat

Figure 7: Soaps, perfumes and detergents
Origin of EU imports

Source: Eurostat

MARKET FORCES

Demand

Soaps, detergents and cleaning preparations

The sales of laundry detergents, dishwashing liquids etc., are estimated to be more than 10 billion ECU. In sales value nearly 40% of this market is made up of heavy duty detergents. Growth rates in the EU market, however, are modest. The trend towards super-concentration and lower wash temperatures will continue, causing market share of compact powders to increase. Developments differ, however, between Member States. In France, for instance, standard non-concentrated powders continue to dominate the market. In the Netherlands, and to a lesser extent in Germany, compact powders dominate market demand for detergents with respective market shares of 80% and 52%. The other EU countries follow at a distance with domestic market share of compact powders of less than 30%. While demand for powders looks healthy, the market for liquid detergents is decreasing. Liquids appear to have reached a peak in 1989, when they claimed an overall market share 14% in the EU. The level has fallen to 9%, although market share varies across the region.

The markets for soaps (part of 24.53) and toilet preparations (part of 24.53) are becoming increasingly integrated. This is caused by the introduction of brands covering both markets with one product line, ranging from toilet soaps to bath and shower products and skin care products. Despite big gains for the automatic dishwasher detergents, European consumers still wash their dishes by hand more often than they use the machine. In Spain and Italy, for instance, consumers use three to four times as much hand-washing dish soap as machine soap. Also in the other EU countries, sales of hand wash soap are still higher than sales of dishwasher soap. In the near future, however, automatic dishwasher detergents will continue to gain market share as sales of dishwashers continues to increase.

Most bleaches are now sold in concentrated form. Toilet cleaning products now have a wide range of perfumes and colours. Most of these products are sold in liquid form. In the market for surface cleaners, the all-purpose liquids sector is the largest sector commanding 30-50% of total sales.

Perfumes and toilet preparations

The personal care market includes a wide variety of products of which hair care and skin care products are major segments with shares between 20-25% of total EU demand. Other important segments are perfumes and fragrances, men's toiletries, sun care products, decorative cosmetics, oral hygiene products, bath and shower products and deodorants.

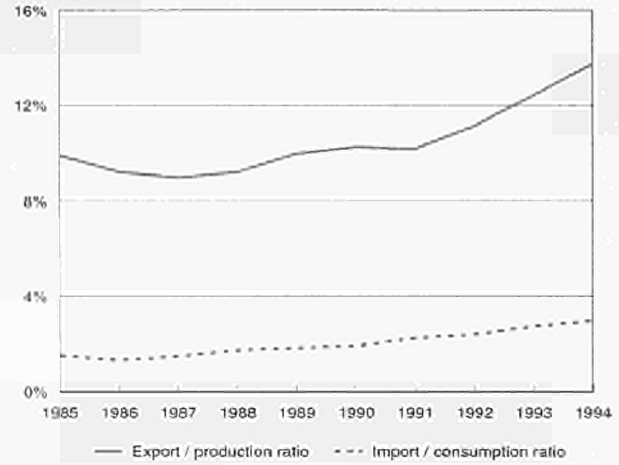
Of these segments, bath & shower products, skin care products, suntan products and hair care products are relatively fast growing with growth rates varying from 5 to 10%. The distinction between the segments bath & shower products and hair care products has started to disappear since the introduction of the two-in-one shower and shampoo products. Demand for convenience has resulted in increasing sales of two-in-one shampoos (both cleaning and conditioning). Three-in-one formulations (additionally either strengthening the hair or providing sunscreens) are likely to be a future growth area. The shampoo sector is highly fragmented with a variety of niche products. Styling products are the fastest growing sector in the market for hair products.

In the skin care segment, consumers now demand a variety of skin care products to suit every skin type and that are capable of alleviating dermatological problems. There has also been an increased demand for more and varied skin care products for men. The picture is the same across the whole of Europe. There is an increased demand for multi-functional products which are safe, naturally derived and either recyclable or biodegradable. A special key growth area is for products which claim to have real benefit to the skin, such as anti-wrinkle, anti-ageing or fat reduction. Recent trends show that the gap between the premium and mass markets has lessened, in particular for skin care products. Products once restricted to an exclusive corner of the market have found their way into mass market products, sales of which have increased dramatically.

Supply and competition

The industry is supplied by a large number of companies. In Western Europe over 1 200 companies are operative in one or more market segments. Supply is not only characterised by a large number of companies but also by a few large companies operating on a global scale. These multinationals are often active in several segments of the market for soaps

Figure 8: Soaps, perfumes and detergents
Trade intensities



Source: DEBA GEIE, Eurostat

and detergents, cleaning and polishing markets as well as in segments of the market for personal care products. In each country and market segment, competition between these companies is rather intense. Through the application of an active, sometimes aggressive, marketing strategy they try to increase their market share. The intensified competition, which is partly due to the existing overcapacity, is reflected in price competition, a further concentration of supply, a growing number of product varieties, large R&D expenditures on new product development, and on advertising and promotional activities.

The concentration on the supply side can also be observed in the channels which are used for the distribution of the products. Soaps, detergents, cleaning preparations and personal care products are to an increasing extent sold through supermarkets, hypermarkets and other channels of mass distribution, that belong to a declining number of retail chains.

The large manufacturers also try to establish growth by exploring new geographic markets and by taking over small and medium sized companies. Mergers and acquisitions are not limited to the less developed markets. On the contrary, in the USA and also within the EU, merger activity is still ongoing, though to a lesser extent than in the late 1980s and early 1990s.

Soaps, detergents and cleaning preparations

In the soaps and detergents segment, supply is highly concentrated. In France, Germany and the United Kingdom 3 or 4 manufacturers of detergents account for 85-90% of sales in this segment. The intensifying global competition between them concentrates on new product development accompanied by large expenditure on R&D and promotion. In 1995, the industry budget for research and development was approximately 2.5% of turnover. By finding and/or creating new trends in market demand manufacturers try to improve their market position. The emphasis on new product development is reflected by an increasing flood of new products or new product varieties. The international market for soaps and detergents demonstrates an increasing number of own retail or private label brands.

Perfumes and toilet preparations

The personal care market is more fragmented, although in recent years the concentration in supply has increased. As in the market for soaps and detergents, competition is fierce, there is an emphasis on sales, distribution and advertising.

A luxury product such as a fine fragrance is not an ordinary commodity but a product of style and artistry and its packaging is often the result of great imagination. The way in which it is presented at the point of sale is also an intrinsic part of its luxury image. In this respect, manufacturers place vital importance on the exclusive distribution of their luxury products and the way in which they are presented. Experience has shown that mass distribution may eventually lead to a loss of prestige resulting in a reduction in demand.

In some countries, the Netherlands in particular, fragrances are to an increasing extent sold through mass distribution channels, such as drugstore chains. This development resulting from parallel imports, is threatening the position of exclusive fragrances which are offered with 50% or more discount.

Faced with the reality of the economic downturn, in France, traditional independent perfume retailers have formed their own voluntary chains and franchises and increased their sales points. They have geared their strategy around product quality, prestige and also assisted self service, having recognised that customers sometimes prefer to choose products unaided.

Production process

As a result of production rationalisation and cost reductions, the industry's labour productivity has been increasing at a higher rate than the unit labour cost. This development demonstrates the growing efficiency of production, but has resulted in a drop in employment, despite production increases.

Due to legal and environmental pressures, the industry is paying growing attention not only to the danger of the use of certain substances, but to all emissions from the cradle to the grave. By applying a life-cycle analysis (LCA), the industry is able to put the production of certain products and the environmental impact in a wider perspective. The LCA approach enables the industry, for instance, to rate detergents on a per wash basis, taking account of elements in the entire production process, including chemical use, packaging waste, biodegradability, aquatic toxicity, etc.

INDUSTRY STRUCTURE

Companies

The world market for soaps and detergents is led by five major multinational companies, of which three are EU based: Unilever (NL/UK), Henkel (D), Benckiser (D), Colgate Palmolive (USA), and Procter & Gamble (USA). Johnson (USA) is a large manufacturer of polishing products and waxes. The flood of mergers and acquisitions seems to have reached its peak in the late 1980s and early 1990s.

Among others, Unilever and Procter & Gamble are also competitors on the market for personal care products. Both companies have been expanding their presence in the personal care market. However, in this market other large companies are also operating, companies such as L'Oreal (F), Shisheido (J), Avon (USA), Wella (D), Sanofi (F), Schwarzkopf (D), Beidersdorf (D), etc.

Table 5: Soaps, perfumes and detergents and maintenance products
Structure of the EU maintenance products industry, 1994

Turnover (million ECU)	18 000
Number of employees (1)	43 000
Number of companies	1 200

(1) The figure includes sales, marketing, distributional activities of total cleaning industries and not only production activities.
Source: FIFE / AIS

The acquisition turmoil of the 1980s and early 1990s has undermined the once clear demarcation lines between the cosmetics industry's distinct markets: class (prestige), mass, and direct sale. The arrival of multinationals such as Unilever (Faberge, Elizabeth Arden, Calvin Klein, Helene Curtis) and Procter and Gamble (Max Factor, Old Spice, Santa Fe, etc.) introduced much more financial muscle to personal care products. The multinational companies are trying to move some of their strong brands towards the mass market by choosing alternative distribution channels. As a result, customers are buying more and more personal care articles in drugstores and supermarkets, putting pressure on profit margins, whilst sales volumes increase.

The large multinationals try to grow either by developing new markets for existing products (the exploration of the East European markets for instance), by developing new products or product varieties for existing markets, by mergers and take-overs, and/or by developing new products for new markets. The smaller-sized companies, active in one or two market niches, are often limited to local markets. Only if they possess a patent for a certain product will they be able to operate on a larger scale. The backward integration tendency towards own brands and generic brands is a retail strategy that directly affects the producers.

ENVIRONMENT

Both classes of industry are characterised by ongoing product innovation driven by competition and by a high level of research and development. R&D efforts, however, focus not only on delivering superior product performance, but also on reducing the environmental impact of the ingredients, the production process, the products in use, and packaging materials.

Soaps, detergents and cleaning preparations

The most important environmental issues in this market are related to safety, toxicity, eco-labelling and packaging. The EU eco-labelling system introduced in 1992 seeks to promote the design, production and use of products with a reduced impact on the environment during their life cycles. As a result, the industry is increasingly using Life Cycle Analysis (LCA) principles for the assessment of the environmental impact of (new) materials and products. The application of LCA in the market for soaps and detergents has already had some positive environmental effects. The use of more compact product formulas in this market has resulted in less packaging. Reuse has been encouraged by the introduction of refill bags, which also resulted in even greater packaging resource savings. Furthermore, several companies are actively participating in the recycling of plastics used for the production of detergent bottles.

Environmental pressures to minimise toxicity and to increase human and environmental safety, have stimulated the industry, for instance, to carry out risk assessments of several surfactants and of hypochlorites. The assessments have demonstrated high removal levels for four surfactants averaging over 99%, and a low accident risk of the use of hypochlorites. Accident statistics show that direct contact of these substances with eyes and skin does not lead to permanent injuries, and that ingestion very seldom leads to serious or permanent injuries. Although the accident risk of the use of hypochlorite products is very low, the industry has strongly supported improved labelling to ensure that hypochlorites are not used incorrectly, and has also developed a public information programme of their benefits and safety when used correctly.

Effective communication of product information is considered important by the industry. For this reason a uniform labelling system has been developed for floor care products and products used to clean hard surfaces. In the near future pictograms for personal care, mechanical ware, and washing and laundry products will be developed.

Perfumes and toilet preparations

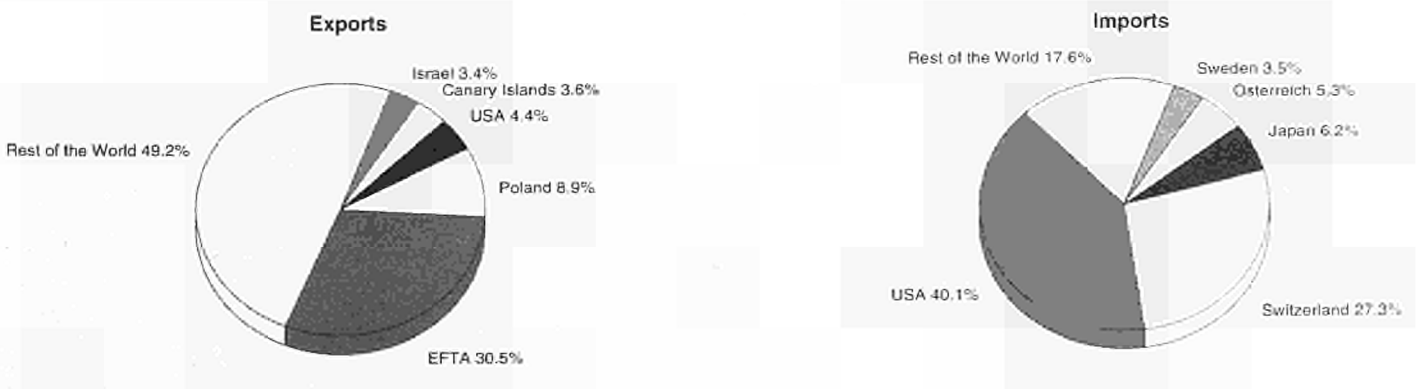
Growing concern for the environment has been reflected in the increased desire on the part of consumers for more environmentally acceptable products. Of particular interest to the industry is the ecological debate on the use of aerosols for deodorants, body sprays and hair sprays. With the rejection of CFC (chloroflurocarbons) aerosol propellants, and VOCs (volatile organic compounds) on environmental grounds, the industry's initial response was to introduce pump sprays as a more environmentally friendly alternative. However, pump sprays prove to be less popular with consumers as they give a lower level of performance and are more difficult to use. Even in countries which first embraced pump sprays, the trend is a return to aerosols.

The industry has also been quick to respond to these new demands in other ways and has given its full co-operation to the EU market-based initiative in which products are awarded an eco-label if certain environmental criteria are met.

REGULATIONS

The EU directive on packaging and packaging waste, which has been approved in 1994, applies to both industries. The

Figure 9: Maintenance products
Origin of EU trade, 1994



Source: Eurostat

directive is designed to assure harmonisation throughout the EU and at the same time provide a high level of environmental protection. The text of the directive recognises that some exceptions should be made in certain cases for luxury packaging, which is especially important for the packaging of luxury products, such as perfumes. Other packaging related directives will follow in the near future concerning marking, material identification and information systems.

Soaps, detergents and cleaning preparations

This sector of the industry is especially covered by Directive 88/379 concerning dangerous preparations. In December 1993, the Commission Directive 93/112 was adopted, defining and laying down arrangements for the system of specific information relating to dangerous substances and preparations.

Other recently adopted or drafted directives concern the assessment of risks to man and the environment of substances notified in accordance with Directive 67/548 on dangerous substances (Directive 93/67), the assessment of the effects of certain public and private projects on the environment and the incineration of hazardous waste.

Furthermore, the Commission's eco-audit proposal has been approved by the environment council of ministers. Although the eco-audit is not compulsory, activities with high environmental impact are expected to carry out eco-audits once a year. Where appropriate the industry can be expected to carry these out alongside existing eco-audits which may be already established.

In 1993, a directive was proposed on biocidal products in the EU. This proposal aims at harmonising the legislation governing the commercialisation of biocidal products across all EU Member States. In this proposal all biocides would be subject to the same authorisation procedures. While in favour of harmonising legislation, the industry is concerned about the workability and practicality of imposing such narrow authorisation procedures on such a wide range of products

Perfumes and toilet preparations

The European cosmetics industry guidelines for consumer and manufacturing safety are contained in the European Union cosmetics directive. Among other issues raised in this directive, in its sixth amendment, the creation of an ingredient inventory and a potential ban on animal testing represent two areas where the industry is having to demonstrate its capacity for prompt adaptation.

Ingredient labelling is an area which has rightly received much attention. The industry, with support from the Commission, is developing a common ingredient nomenclature, the result of which will be that a particular ingredient will appear under the same name on every cosmetic product that contains it, no matter where in Europe it is sold. In this way it will be possible for ingredients to be rapidly and correctly identified from the list of ingredients on the product label and enable consumers to purchase products most adapted to their needs. A similar system is already in use in the soaps and detergents industry.

The early 1980s saw a change in public attitude towards the use of animals in laboratory experiments, and resulted in increased international demands for this practice to end. The cosmetics industry is unanimously in favour of ending animal testing but is guarded about a premature ban. The difficulty in this complex issue lies in the fact that any alternative method has not only to be reliable but also validated and approved by the regulatory authorities. Meanwhile, industry remains committed to ensuring that ingredients and products are safe for consumers.

Tests on cosmetic products, in fact, currently represent only 0.3% of all animal experiments and the number of animals used in cosmetic testing continues to fall. Already many companies have developed in vitro methods for use in the early screening stages of new products.

The industry has set up a specific steering committee to coordinate the efforts of its member companies in the areas of alternative methods and to create a pool of expertise. It is also involved, with the Commission and the European Centre for the Validation of Alternative Methods (ECVAM) in carrying out programmes and generating data which will contribute to the speedy validation of alternative methods.

OUTLOOK

The growth of the market for soaps and detergents and personal care products is expected to continue at a modest but constant rate. The outlook for different markets, however, varies.

Within the market for soaps, detergents and cleaning preparations, detergents will remain the largest single product category with concentrated forms increasing steadily; consumption of surface cleaners is stable, with concentrated general purpose surface cleaners gradually replacing traditional household cleaners. Traditional soap for household and personal use is now the smallest product category in the EU as they have been replaced by newer personal care products. Demand for dishwashing products is expected to continue to grow at a relatively rapid pace as the ownership of dishwasher will further increase.

In the market for perfumes and toilet preparations, bath and shower products, skin care and hair care products will remain the fastest growing segments. Growth in these but also in other segments, will be especially stimulated by the growing demand by men for personal care products.

Despite growing markets, the rationalisation process in the industry is expected to continue, which will lead to a further reduction in employment. Besides cost reducing measures, R&D expenditures will maintain a relatively high level, not only with the aim of developing new products or product varieties, but also with the environmental goal of reducing waste and increasing environmental and human safety.

Written by: Netherlands Economic Institute
The industry is represented at the EU level by: International Association of the Soap and Detergent Industry (AIS). Address: Square Marie-Louise 49, B-1040 Brussels; tel: (32 2) 230 8371; fax: (32 2) 230 8288; and European Cosmetic Toiletry and Perfumery Association (COLIPA). Address: Rue de la Loi 223 Bte 2, B-1040 Brussels; tel: (32 2) 230 9179; fax: (32 2) 231 1587.

Other speciality chemicals

NACE (Revision 1) 24.6

The sector of other speciality chemicals includes a wide variety of heterogeneous products, the production of which could be applied in a tremendous number of industrial and household uses. The economic recession in recent years has resulted in pressures on product volumes of industrial chemical products. As a result, many chemical companies have effectuated cost reductions and have sold non-strategic businesses. In the course of 1994 and in 1995, volumes and utilisation rates have picked up. Manufacturers, however, found themselves unable to pass substantial raw material price increases on to their customers. These declining margins have stimulated manufacturers to look for further cost reductions. Despite the intensifying competition, the outlook for industrial chemical products is still favourable. In order to retain or expand market shares R&D expenditures will become increasingly important. In this context the development of environmentally-friendly products will play an important role as the markets for these products are expected to grow in the near future. R&D efforts are also expected to cut costs in order to allow companies to maintain or increase their profit margins.

INDUSTRY PROFILE

Description of the sector

In comparison with the former NACE '70 classification, the scope of this chapter has been extended. The manufacture of other speciality chemicals products was previously split up into two different groups. Group 256 covered the manufacture of other speciality chemicals products for industrial and agricultural purposes, and group 259 covered the manufacture of other speciality chemicals for household and office use. Both groups have been put together in Group 24.6 of the new NACE (Rev.1) classification.

The manufacture of other speciality chemicals products includes the production of a number of products destined for domestic and non-domestic use. This chapter includes a wide variety of heterogeneous products, for application in a tremendous number of industrial and household uses. Each substance finds its application in quite different market niches. The substances are not necessarily complex, the applications can be though. In their search for new markets R&D activities are concentrated on finding new applications.

A subdivision can be made into the following classes:

- Explosives (NACE 24.61);
- Glues and gelatines (NACE 24.62);
- Essential oils (NACE 24.63);
- Photographic chemical material (NACE 24.64);
- Prepared unrecorded media (NACE 24.65);
- Other chemical products n.e.c. (NACE 24.66).

Explosives

This product group includes propellant powders and prepared explosives, detonators, fuses, flares and fireworks.

Glues and gelatines

This subsector includes gelatine, modified starches, peptone and glues (including man-made polymers). The glues can be subdivided into liquid glues and solid glues. Liquid glues are water-based or consist of a glue-based material liquefied with a solvent that evaporates after gluing. Solid glues have to be activated by water, solvent or air before they can be used. Within Europe 60% of glue production is concentrated in Germany, France and the United Kingdom.

Essential oils

They include essential natural oils such as lemon, orange and lime oils, geranium, jasmine and lavender;, anti-oxidants, colourings, emulsifiers, stabilisers, and enzymes, all to be used as food additives and flavourings (flavourings are not food additives).

Photographic chemical material

This material includes photographic plates and film, instant print film; chemical preparations and unmixed products for photographic uses.

Prepared unrecorded media

This section includes prepared unrecorded media for sound recording or similar recording of other phenomena, excluding cinematographic film.

Other chemical products

This group of products covers a wide range of different chemical products, such as chemically modified animal or vegetable fats and oils, writing or drawing ink, lubricating preparations and activated carbon.

Although the definitions imply a wide diversity of products, two similarities exist between the products. First, the products either have a chemical base or undergo chemical treatment. Second, the products are intermediate goods and will be further elaborated. With respect to this second similarity, however, a major distinction can be made between further elaboration in client industries and elaboration by the end-users themselves. In the first case, the chemical products are input factors for downstream industries, such as the food processing industry. In the second case, the consumer or professional produces the end product by making photographs or recording a tape. As the industrial and end-user markets are quite different from each other, a further distinction will be made in this chapter between industrial chemical products and end-user chemical products.

In the market for industrial chemical products, manufacturers increasingly have to meet the specifications of particular clients in a niche. This requires a service-oriented market approach and an excellent understanding of the clients' products or production process. This customised approach also provide the opportunity for higher profit margins.

Table 1: Other speciality chemicals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	6 296	5 396	5 442	5 813	6 426	6 483	6 615	6 899	8 262	9 127
Extra-EU imports	3 113	2 788	2 733	3 073	3 418	3 591	4 059	4 296	4 384	5 062
Trade balance	3 184	2 609	2 709	2 740	3 008	2 892	2 556	2 603	3 878	4 065
Ratio exports / imports	2.0	1.9	2.0	1.9	1.9	1.8	1.6	1.6	1.9	1.8

Source: Eurostat

Table 2: Other speciality chemicals
Extra-EU exports

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	199
EU	6 296	5 396	5 442	5 813	6 426	6 483	6 615	6 899	8 262	9 12
Belgique/België, Luxembourg	393	320	308	321	359	379	364	408	445	63
Danmark	105	99	107	74	95	88	82	95	132	17
Deutschland	2 267	2 142	2 236	2 439	2 675	2 668	2 706	2 755	3 271	4 05
Ellada	41	17	9	6	9	7	9	11	13	2
España	172	105	96	107	111	114	125	149	195	25
France	1 097	864	851	864	957	963	1 008	1 058	1 299	1 89
Ireland	80	72	64	75	91	105	116	162	241	26
Italia	519	413	418	482	537	559	559	665	744	86
Nederland	543	485	459	462	556	512	521	423	557	73
Portugal	26	11	11	12	17	15	13	13	12	1
United Kingdom	1 054	868	882	971	1 018	1 074	1 112	1 160	1 353	2 14

Source: Eurostat

Recent trends

The economic recession in recent years has resulted in pressures on product volumes of industrial chemical products. As a result, many chemical companies have reduced their costs and have sold nonstrategic businesses. In the course of 1994, volumes and utilisation rates have picked up. In this year, however, manufacturers found themselves unable to pass substantial raw material price increases on to their customers. In 1995 this development continued to result in increasing sales and declining margins. These declining margins have stimulated manufacturers to look for further cost reductions, in which improvement of production processes, reformulations and other product innovations are playing important roles. The difficult situation of markets also lead to a further number of company shake-outs and accordingly to a decline in employment. At the same time, manufacturers of other speciality chemicals are also looking for new geographical markets, such as Eastern Europe. The growing interest for environmental issues and changes in the legal framework will cause shifts in production and demand. Changing consumer requirements are met by new or modified products which in turn lead to a shift in industrial demand for raw materials. The resulting trend towards more environmentally friendly products leads to an increasing willingness and effort to apply natural-based products instead of synthetic products.

The market for end-user chemical products seems to have reached their level of saturation. Although growth patterns differ among countries, most countries have recorded declining or stable sales in volume. In the film market colour films now represent as much as 80-90% of total sales. Blank auc cassettes represent the largest sector of the market for tap with a market share ranging from 50% to 70%.

International comparison

Due to the miscellaneous nature of the market as a who production and consumption figures are lacking. Furthermo a large part of these products are manufactured mainly the following three types of companies: companies own by larger multinational companies, a specific group of m tinational companies, and regional and sometimes local su sidiaries of multinational companies. Notwithstanding th there are a multitude of SMEs catering to more niche mark in the industry. The complexity of the market is further sho by the fact that vertical integration activities have made t market less transparent. Some multinational companies su as Unilever (NL/UK), for instance, manufacture food ad tives, which are used in a downstream food processing facil also owned by the same company.

Foreign trade

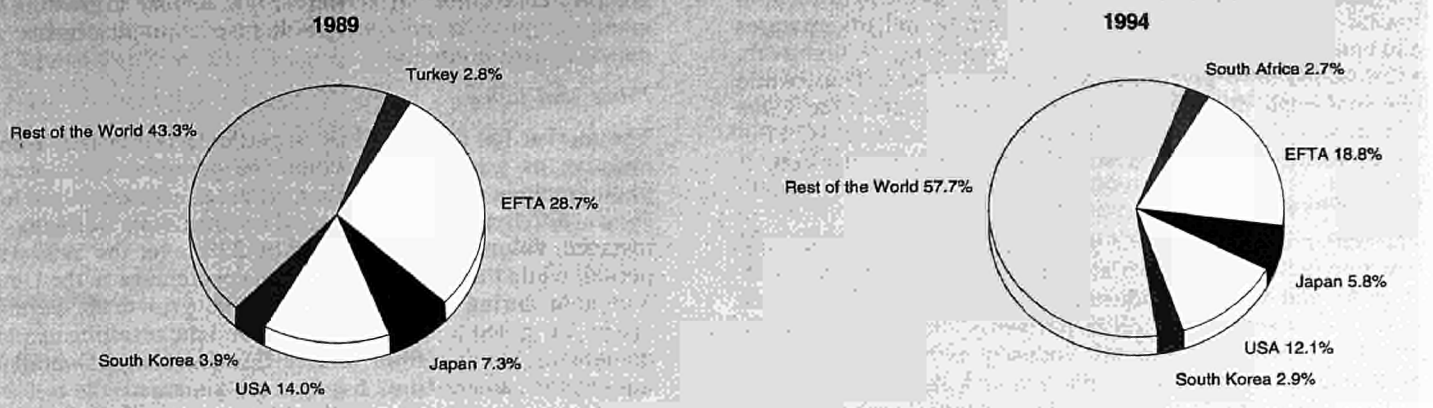
The trade figures discussed in this chapter only cover a p of the trade figures for industrial chemical products. T trends, however, provide an indication of the overall marl development. Extra-EU trade has only slightly increased o the 1985-1992 period. Extra-EU exports have demonstrat an average annual growth of 1.3%, while extra-EU impo grew with an average annual rate of 4.6%. In 1993, howev extra-EU exports increased by nearly 20%, thereby illustrati the higher efforts of the EU manufacturers of other special

Table 3: Other speciality chemicals
Extra-EU imports

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	199
EU	3 113	2 788	2 733	3 073	3 418	3 591	4 059	4 296	4 384	5 06
Belgique/België, Luxembourg	196	177	181	196	224	249	307	329	318	47
Danmark	79	78	74	74	76	79	73	82	93	13
Deutschland	847	766	797	873	957	992	1 157	1 257	1 325	1 55
Ellada	24	28	22	26	30	31	38	41	44	6
España	140	141	142	172	203	217	245	258	215	25
France	577	465	475	500	572	574	580	639	647	89
Ireland	56	63	47	46	72	68	101	96	189	16
Italia	293	267	319	423	434	439	537	560	576	65
Nederland	426	436	324	326	324	339	386	429	378	58
Portugal	39	21	27	30	31	34	39	43	39	4
United Kingdom	436	345	324	408	495	569	596	564	560	71

Source: Eurostat

Figure 1: Other speciality chemicals
Destination of EU exports



Source: Eurostat

chemicals to avoid an under-utilisation of production capacities through the sale of their products outside the EU. At the same time extra-EU imports only recorded a growth of 2%. Both developments resulted in a sharp increase of the trade surplus (49%) in the same year.

In 1994, extra-EU trade further intensified. Extra-EU exports continued to grow with nearly 11% per year, while extra-EU imports increased by an average annual growth of 15%. The last development is an indication of a recovery of EU demand. In 1995, extra-EU exports have continued to grow with a relatively high growth rate (25.6%) against a 8.7% growth of extra-EU imports. The trade developments in 1994 and 1995 have resulted in a considerable growth of the EU trade surplus; from 2 603 million ECU in 1992 to 5 959 million ECU in 1995.

Germany is the main exporter of other speciality chemicals. In 1994, this country accounted for 44.4% of total extra-EU exports. Germany is followed by France and the United Kingdom with respective shares of 20.7% and 23.5%. The USA and the EFTA countries were still the major destinations for extra-EU exports, together commanding a share of 30.9% of total extra-EU exports in 1994. This share however has declined compared to its level in 1989 (42.7%). It is also worthwhile to note that during the same period Eastern European and Far Eastern countries have become important export destinations.

Germany is also the largest market for extra-EU imports. The USA and the EFTA countries were the major suppliers of the EU market for other speciality chemicals with respective shares of 31.8% and 23.4%.

Due to the entry of Austria, Sweden and Finland to the EU, the extra-EU trade figures have changed. In 1995, extra-EU exports for the EU-15 equalled 10 421 million ECU against a corresponding figure of 11 459 million ECU for the EU-12. Extra-EU imports were 5 319 million ECU for the EU-15 against 5 500 million ECU for the EU-12.

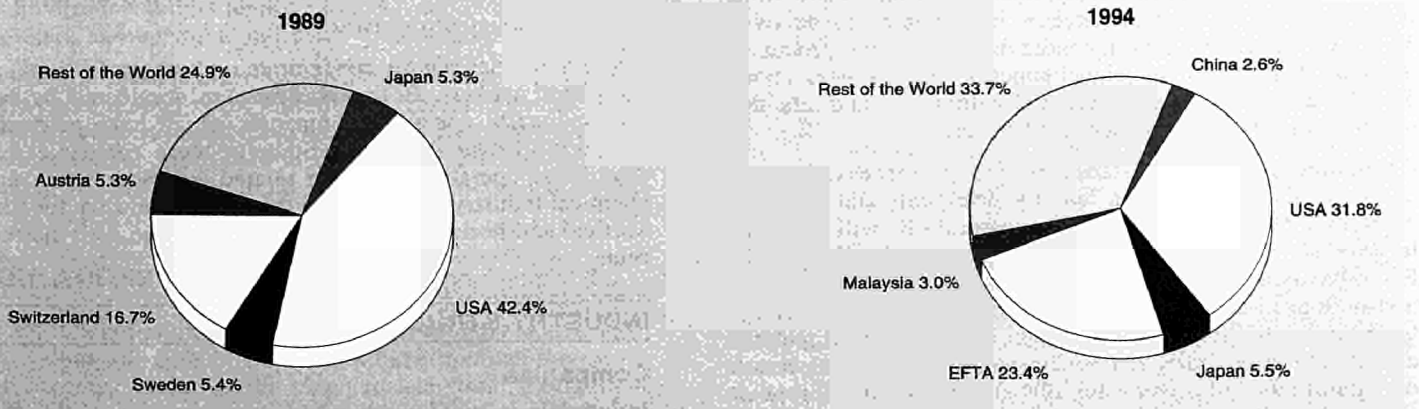
MARKET FORCES

Demand

Explosives

The development of the explosives industry is strongly linked to quarrying and mining activity. Quarrying for stone is dependent on Gross National Product and since the end product is used in the construction of roads, railways, buildings and

Figure 2: Other speciality chemicals
Origin of EU imports



Source: Eurostat

all sorts of infrastructure work, demand has been growing steadily in Europe for the last 10 years. However, this growth has been substantially offset by the decline in mining activity in Europe. In addition, there has been a considerable change in the commercial explosives industry as a result of technological innovation with ammonium nitrate/fuel oil mixtures and emulsion explosives substantially replacing the high-tech, value added nitro-glycerine explosives business. Thus, while the total explosives market has remained constant the value added over the last decade has declined considerably. Fireworks mainly find their destination in consumer markets.

Glues and gelatines

The major applications for glues can be found in the construction industry, the paper and packaging industry, the woodworking and furniture industry, and in other industries such as the electronics, shoe, cigarette, aeroplane and automotive industry. Demand in the last industry is rising as steel is more and more replaced by plastics and aluminium. Consequently, the ongoing upturn of the European automotive industry and other client industries will positively affect the market for glues and adhesives. A minor part of the industry's products finds its destination in end-user markets.

In recent years environmentally-friendly products such as melting glues, dispersions and water-based systems have been introduced. Despite the fact that application of these products often requires new investments, these products are expected to account for the highest growth figures in the next years.

Essential oils

This industry was not affected by the economic recession in Europe. Its performance has been much better than the average of the chemicals industry. In the Far East, for instance, double-digit growth rates are common. Demand for flavours and fragrance is highly fragmented, taking account of the large variety of flavour products.

With respect to fragrances a rough subdivision can be made between applications. Household products are the biggest users of fragrances (30%) with sales amounting up to 1 billion ECU, followed by cosmetics, toiletries (23%), fine fragrances (19%), soaps (18%) and oral hygiene products (10%).

Chemically modified animal or vegetable fats and oils

In this section oleochemicals form an important product group. Oleochemicals are mainly made from beef tallow, fish oils and from vegetable oils extracted from palm fruits, coconuts, grape seeds, sunflower seeds, soya beans and from the seeds or fruits of other oil-bearing plants. Some oleochemicals are also made from tall oil, a paper industry by-product. By applying chemical know-how, these oils and fats are converted into a wide range of chemical products for use in eco-friendly lubricants, soaps and detergents, cosmetics, medicines, food additives, leather, paints and coatings, printing inks, rubber, plastics, metalworking and many other industries. World-wide production of basic oleochemicals is estimated to be over 3 500 000 tonnes, out of which more than one third is produced in Western Europe. The oleochemicals industry uses about 5% of the world-wide production of natural oils and fats, the major share of which is recovered material.

Continuing a trend that started in Europe for environmentally-friendly surfactants in laundry detergents and personal care products, surfactants based on natural oils will continue to grow at a rapid pace with annual growth rates of 8 to 9%. Ecologically safe lubricating and hydraulic oils will replace non-biological oils in important applications such as agricultural machinery, forestry saws, canal locks, outboard motors, etc. By the year 2005, it is estimated that lubricants based on natural oils will account for 12% of the Western European lubricant market.

A great deal of research is going on to produce new ecologically acceptable surfactants for the detergents industry, such as new non-ionic, combining oleochemicals with other natural molecules. This market development is not only stimulated by growing environmental concerns, but also by a growing demand for product mildness with respect to detergents and personal care products.

Films and tapes

The market for camera films is particularly volatile. Colour negative or prints have become the accepted norm among photographers. In recent years, sales of camera films have shown different patterns between countries. In Germany, for instance, volume sales increased by 22% over the 1990-1994 period, while they dropped by a same percentage in the United Kingdom during the same period. The growth in Germany can be attributed to the reunification and the resulting upswing of demand coming from former East-Germany. Overall the market for camera films has become saturated.

In most EU countries blank audio cassettes constitute the largest part of total sales followed by blank video cassettes. Pre-recorded cassettes are not covered by this chapter. The EU market for unrecorded tapes has declined in recent years and this trend is expected to continue. A part of the films and tapes finds its destination in end-user markets.

Supply and competition

Industrial chemical products

During the economic recession overcapacities have led to price deterioration in the market for commodity chemicals. As the market for other speciality chemicals is more heterogeneous and highly fragmented, competition is not only concentrated on price aspects, but also and to a higher extent on service elements. The relatively higher margins in the speciality markets have attracted the large companies which used to focus only on commodities. This growing interest has not only resulted in a tendency towards more concentration, but also in higher efforts to penetrate into speciality markets. As a consequence and also stimulated by demand and environmental pressures in most industries, R&D has become a crucial instrument not only to develop but also to protect existing positions in market niches.

In the course of 1994 and 1995, volumes and utilisation rates have picked up. Raw material prices, however, have started to increase and due to the intensifying competition could only be partly passed on to the customers. These developments have resulted in increasing sales but declining margins, which in turn have stimulated manufacturers to look for cost reductions, in which improvement of production processes, reformulations and other product innovations are playing important roles. The intensifying competition and declining margins have also resulted in a shake-out of companies and in continuing vertical and horizontal merger and acquisition activities.

End-user chemical products

These industries mainly concentrate on both professional and consumer markets. Both industries are dominated by large internationally operating companies which have production facilities all over the world. Some of these companies have their basic operations in other related industries such as the chemical industry for tapes and the camera industry for films. Vertical and horizontal merger and acquisition activities continue.

INDUSTRY STRUCTURE

Companies

Industrial chemical products

Either directly or indirectly through subsidiaries, some large companies are operating in this market, such as Quest (flavour

and fragrances), Dragoco (fragrances) Unichema (oleochemicals) and National Starch and Chemical (glues) of Anglo-Dutch Unilever; Haarmann & Reimer (Bayer) and Givaudan (Roche-group) which are active in flavours and fragrances. In a wide range of chemical products large chemical companies are active such as Hoechst (G), Henkel (G), Elf Atochem and Rhone-Poulenc (F), Clermont-Tonnerre and ICI (UK).

End-user chemical products

In the film market, KODAK (USA), Fuji (Japan) and the European company Agfa-Gevaert are companies which dominate the market. In the EU market for tapes Sony and TDK (Japan), 3M and BASF (D), and Polygram (NL) are large operators.

Strategies

Overcapacities in the commodity markets during the early 1990s have forced manufacturers to cut costs. As most manufacturers have a portfolio composed by a mixture of activities and markets, increasing attention has been paid to expansion in profitable segments, such as the highly fragmented market for speciality chemicals. Large multinational producers have tried, mainly by take-overs, to cover customer needs in several types of applications. Due to this development competition intensified in the market for the industrial chemical products, resulting in the fact that price increases of raw materials could not be passed entirely on to the client industries. The resulting declining margins have stimulated manufacturers to look for further cost reductions, in which improvement of production processes, reformulations and other product innovations are playing important roles. They have also resulted in a shake-out of companies and in continuing vertical and horizontal merger and acquisition activities. Manufacturers are also seeking market growth by developing new products or entering the newly opened geographical markets. In the industry as a whole, high levels are spent on R&D, not only induced by the intensifying competition and the aim for cost reductions, but also by the increasingly stringent environmental requirements.

End-user chemical products

In the markets for films and tapes, branding has become increasingly important. Although some product differences might exist, pricing and distribution have become crucial in order to maintain and increase market shares. This is reflected in the high impact on market shares of special promotion activities.

ENVIRONMENT

Environmental pressures in order to minimise toxicity are more and more translated into new products following high levels of R&D expenditures within the industry. The current industry's interest in environmentally-friendly materials is not only induced by stricter rules and the pressure of public opinion. Environmentally-friendly products are also paying off. People are buying more and more natural-based products.

As a result, in all industries - especially those where households are involved as end-users - product developments are especially directed towards environmentally-friendly products, which are equal substitutes in quality and price to existing polluting products. This trend is expected to continue in the coming years.

REGULATIONS

The EU Commission is playing an increasingly active role in environmental affairs. Few issues have troubled the European chemical sector as the plans to use fiscal measures - the so-called carbon tax to stabilise carbon dioxide emissions. Furthermore, the Commission's eco-audit proposal has been approved by the environment council of ministers. Although the eco-audit is not compulsory, activities with high environmental impact are expected to carry out eco-audits once a year. Other proposals and directives deal with the control of hazardous waste shipments, the control of major accident hazards preparation and the provision of information on emissions and waste to the public.

Directive 88/379/EEC on classification, packaging and labelling of dangerous preparations shall be applied in cases where the preparation is classified as dangerous and it contains at least one dangerous substance. A warning label shall be attached on a package of a dangerous preparation according to the rules defined by the Directive. In certain cases, packages of preparations must carry child-resistant fastenings and tactile danger warnings. Where a dangerous preparation is supplied to professional users a Safety Data Sheet must be compiled and submitted when the preparation is supplied for the first time to a customer.

In 1994 a new Directive came into force concerning additives in feedingstuffs. The Directive contains procedures and regulations for the use and new uses of additives. New uses should be authorised, environmental risks and other technical details should be specified. The European Council further adopted a Directive concerning the use and marketing of enzymes, micro-organisms, and their preparations in animal nutrition.

The EU draft Directive regulating emissions of volatile organic compounds (VOC) especially concerns the glues and adhesives industry. Solvents used in these products is already steadily declining, but would decline much faster if the Directive comes into force. The enforcement of this Directive, however, will not start before the end of the century.

OUTLOOK

Despite the intensifying competition, the outlook for industrial chemical products is still favourable. The heterogeneous and highly fragmented market still registers positive growth rates. In order to penetrate into existing segments or to explore new markets, R&D efforts will become increasingly important. These efforts are more and more directed towards development of environmentally-friendly products as the markets for these products are expected to grow in the near future. They are also directed towards further cost reductions in order to maintain or increase profit margins. R&D expenditures are less important in the market for end-user chemical products. In the market for films and tapes advertising and promotion will become even more crucial to retain or improve market positions in the near future. Higher growth for both manufacturers of industrial and end-user chemical products can be expected from the further penetration into relatively new geographical growth markets of Eastern Europe and the Far East.

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Man-made fibres
NACE (Revision 1) 24.7

As Europe comes out of recession, so the demand for products made from man-made fibres is likely to grow, although the EU fibre industry may be affected by import growth in downstream products. Taking all fibres together, the average real annual growth rate of production was 1.1% between 1985 and 1994, but between 1993 and 1994 the growth rate was as high as 9.8%, and 3.5% between 1994 and 1995. However, the fall in employment which has started in 1985 has continued in 1994 and 1995.

The manufacture of man-made fibres in the EU is confronted with intense competition, particularly from developing countries and New Industrialised Countries (NICs) in Asia. Thus, the European industry is turning its attention to higher value added products, continued work on modernisation to lower production costs, and restructuring to trim excess capacity and the number of producers.

In the last ten years the most marked trend in world man-made fibre production has been the growth of polyester. However, in the EU the most rapidly growing fibre in the last ten years was polypropylene.

INDUSTRY PROFILE

Description of the sector

The man-made fibres sector includes three main types of fibre: synthetic, cellulosic (or artificial) and mineral. Mineral fibres are not considered in this chapter.

The importance of man-made fibres as a whole is illustrated by its 68% share they accounted by weight of mill consumption in Western Europe in 1994, as compared with 24% for cotton and 8% for wool.

Although the cellulosic fibres were the original man-made fibres, having been invented at the turn of the twentieth century, they are now overshadowed in importance by the synthetic fibres, which have been mainly produced since the end of World War II. Synthetic fibres accounted for around 84% by weight of Western European mill consumption of man-made fibres in 1994, with cellulosic fibres accounting for the remaining 16%. The principal synthetic fibres, in terms of Western European mill consumption in 1994, were polyester (35%), polyamide (18%), known sometimes as nylon, polypropylene (18%) and acrylic (13%). The main types of cellulosic fibres, which are made from natural materials such as wood pulp, are viscose, acetate, cupro, modal and lyocell.

There are two types of man-made fibres: filament and staple fibre. Filament yarn is extruded in liquid form through a spinneret (a fine filter), and then solidifies as a continuous yarn. Staple fibre is extruded in a similar fashion, but is cut into short fibres of different length, depending on the intended use. Filament and staple fibre can be extruded in varying cross-sections, or denier. Filament yarn can be used directly as a yarn - in weaving for example - while staple fibre can be converted into yarn on traditional cotton, wool or silk machinery, made into non-woven fabrics, or used in fillings (for example in furniture). In Western Europe, staple accounted for 55% of the total usage of synthetic fibres in 1994, and for 70% of the usage of cellulosic fibres. Polyamide was used principally in filament form, acrylic and polypropylene principally in staple form, and polyester in about equal proportions in both forms.

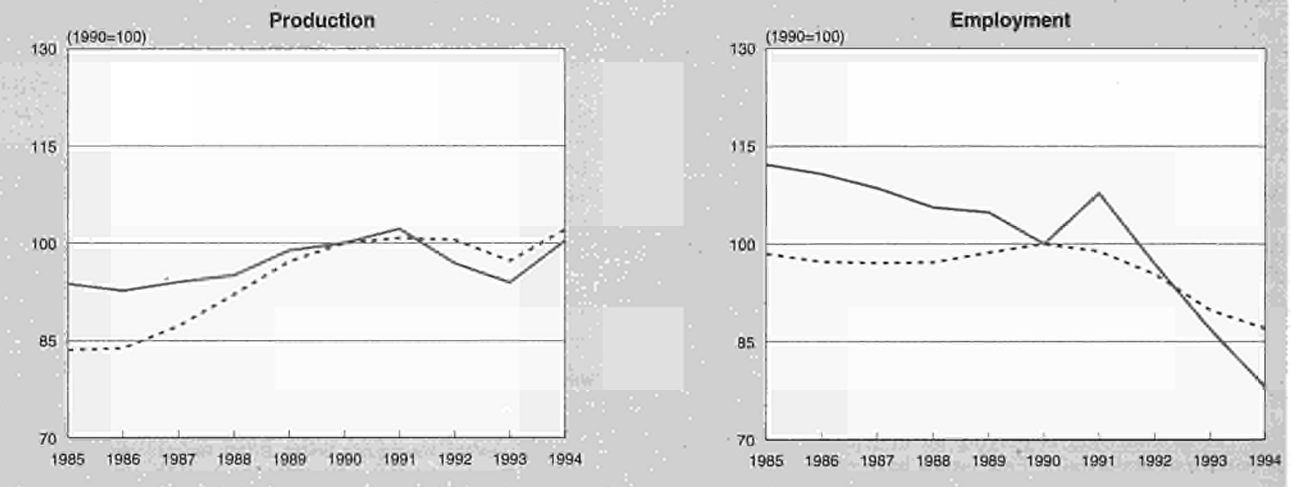
Filament and staple fibre can be treated in many ways, and can be combined both with other man-made fibres and with natural fibres. For example, many shirts, blouses and sheets are made of cotton and polyester staple fibre, and many suits, trousers and slacks are made of wool and polyester staple fibre. Women's tights and stockings ('nylons') represent the principal use of polyamide filament yarn.

Within the EU, Germany is the largest producer of synthetic fibres. In 1994 it accounted for 30% of synthetic fibre production in the EU-15. It was followed by Italy, with 24% of synthetic production, and then by Benelux and Spain (nearly equal) and the UK. In cellulosics Austria is the biggest producer, followed by Germany and the UK. The next largest cellulosics producers were Benelux, Italy and Spain, but they were well behind the UK.

Recent trends

Since 1985, EU production of both synthetic and cellulosic fibres has shown slow growth, with some setbacks, but 1994

Figure 1: Man-made fibres
Production in volume and employment compared to EU total manufacturing industry



Source: CIRFS, DEBA GEIE

Table 1: Man-made fibres
Production, breakdown by sub-sector in volume

(thousand tonnes)	1985	1990	1991	1992	1993	1994
Synthetic filament	919	1 025	1 076	1 012.4	974.4	1 100.6
Synthetic staples	1 579	1 692	1 724	1 614.7	1 579.3	1 687.4
Cellulosic filaments and staples	419	394	379	388	367	422
Total	2 917	3 111	3 179	3 015	2 923	3 210

Source: CIRFS

Table 2: Man-made fibres
Main indicators in volume

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	2 745	2 839	2 860	3 003	3 230	3 334	3 375	3 204	3 093	3 372
Production	2 917	2 883	2 924	2 958	3 076	3 111	3 179	3 015	2 923	3 210
Extra-EU exports	588	516	565	569	496	430	410	447	438	508
Trade balance	172	44	64	-45	-154	-223	-196	-189	-170	-162
Employment (thousands)	80.5	79.5	77.9	75.8	75.3	71.8	77.4	69.6	62.4	56

Source: CIRFS, Eurostat

Table 3: Man-made fibres
Average real annual growth rates

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.0	0.3	2.3	9.0
Production	1.3	0.8	1.1	9.8
Extra-EU exports	-6.1	4.3	-1.6	16.0
Extra-EU imports	9.4	0.6	5.4	10.2

Source: CIRFS, Eurostat

Table 4: Man-made fibres
External trade in volume

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	588	516	565	569	496	430	410	447	438	508
Extra-EU imports	416	472	501	614	650	653	606	636	608	670
Trade balance	172	44	64	-45	-154	-223	-196	-189	-170	-162
Ratio exports / imports	1.41	1.09	1.13	0.93	0.76	0.66	0.68	0.70	0.72	0.76

Source: Eurostat

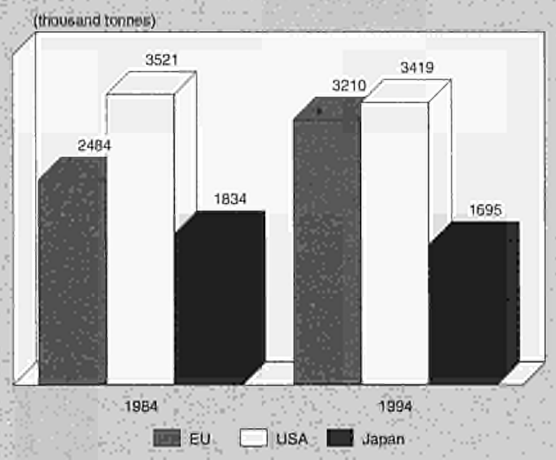
and 1995 represented years of recovery. Production of synthetic filament grew slowly from 1985, and reached a peak in 1991 which represented a level 17% higher than it was in 1985. It then fell back in 1992 and 1993, as recession hit EU industrial production generally. However, it strongly recovered in 1994, as EU industrial production increased to above its 1991 level. This trend continued in 1995, with a further increase of 6% in 1995. Synthetic staple production followed a similar pattern, although the 1991 peak was only 9% higher than its 1985 level. Production fell during the recession of 1992 and 1993, but rose by 7% in 1994, to above the 1991 level. There was little change in synthetic staple production in 1995. For both synthetic filament and synthetic staple, stocks rose during the recession years, and began to fall in 1993 and 1994.

Cellulosic filament and staple production has been even more sluggish, until recently. It reached a peak in 1989, representing a level 3.5% higher than it was in 1985 , but then fell back for some years. There was however a strong recovery in 1994, to nearly the 1989 level, and then an increase of around 8% in 1995.

Taking all fibres together, the average real annual growth rate of production was 1.1% between 1985 and 1994, but between 1993 and 1994 the growth rate was as high as 9.8%, and 3.5% between 1994 and 1995.

The relatively slow growth in production since 1985 has been accompanied with a fall in employment. There was an apparent recovery in 1991, but this was due to the inclusion of employment in East Germany. In the following years employment sharply declined. Thus, in 1994 the level of employment was

Figure 2: Man-made fibres
International comparison of production in volume



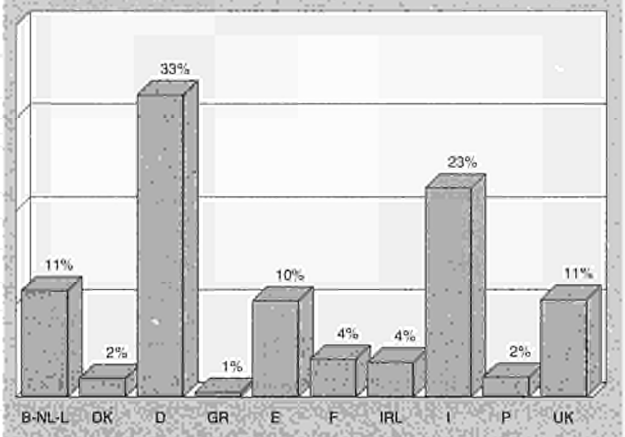
Source: CIRFS

only 70% of the 1985 level, and 1995 saw a further fall of around 5%. The decline was much greater than that in manufacturing as a whole, where employment fell by 12% between 1985 and 1994.

The fall in man-made fibre employment, in spite of the rise in production, can be explained by a considerable rise in labour productivity over the period. Labour productivity showed no marked trend between 1985 and 1991, but it then rose steeply between 1992 and 1994. By 1994 it was 47% above the 1985 level.

The apparent consumption of man-made fibres in the EU-12 has been more buoyant than production. The average real annual rate of growth of apparent consumption between 1985 and 1994 was 2.3%, as compared with 1.1% for production, although the growth took place mainly in the earlier part rather than the later part of the period. This trend led to a big fall in exports, and a large rise in imports, during the years 1985-1990. In 1995, apparent consumption actually fell, compared with 1994.

Figure 3: Man-made fibres
Production in volume by Member State, 1994



Source: CIRFS

EU man-made fibre consumption, together with that of EU textiles generally, has been favourably affected by the regulations affecting Outward Processing Trade (OPT), which insist on the use of textiles largely made within the Union, for the purposes of OPT clothing production in nearby countries.

International comparison

During the ten years up to 1994 there was a marked improvement in the position of the EU producers of man-made fibres. In 1984 the EU possessed 32% of the combined production of the three man-made fibres areas , by volume. By 1994 the EU's share rose to 39%. In the meantime, EU production had risen by nearly 30%, while production actually fell in the USA and Japan. Even so, the USA remained the largest producer in 1994, with 41% of the production by volume of the three areas combined.

Concerning world production, however, these three areas together have been losing market share, as the production of man-made fibres has been growing in other areas, notably Taiwan, China, South Korea, and the ASEAN countries. In 1994, production in the EU, the USA and Japan together represented about 39% of total world production. The combined production of Taiwan, China and South Korea represented over 30%, in response to the growth of textile and clothing production in these countries. In 1985, these last three countries had represented only 18% of world production. Other countries with rapidly growing man-made fibre production include India, Indonesia and Thailand.

During the period 1984 to 1994 the most marked trend in world man-made fibre production was the growth of polyester. Polyester already represented nearly 50% of world synthetic fibre production in 1984, but this share had risen to 64% by 1994. In the EU, on the other hand, the share of polyester production was much the same in 1994 as in 1984, while the most rapidly growing fibre was polypropylene.

Foreign trade

The analysis of EU foreign trade in man-made fibres is subject to considerable reservations, especially on the export side. This is due to the suppression of export data (and some import data) for confidentiality reasons. Among countries with incomplete data on this account are Denmark, Germany, Italy, Spain, the Netherlands and the UK. Published figures may therefore give a wrong impression of the true state of affairs. In addition, much trade is accounted for by intra-company trading.

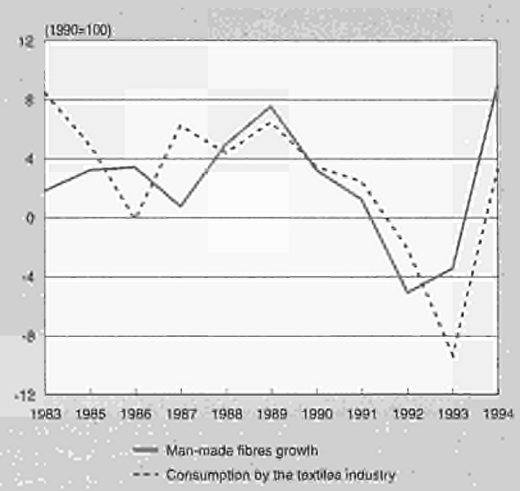
Over the period 1985 to 1994, the volume of extra EU exports of man-made fibres apparently fell at an average annual rate of 1.6%, while extra-EU imports rose at an annual average rate of 5.4%. As a result, the trade balance, measured in tonnes, apparently became negative from 1988 onwards, after having been positive in 1986 and 1987, although the size of the trade deficit peaked in 1990, and has fallen since then.

According to CIRFS estimates, however, the trade balance remains positive in volume terms.

The apparent ratio of extra-EU exports to imports, in value terms, fell from 1.41 to 0.76 over the whole period. There was a marked difference between the experience of the earlier and later periods. Between 1985 and 1990 extra-EU exports fell at an annual average rate of 6.1%, while extra-EU imports rose at an annual rate of 9.4%. In the recessionary period from 1990 to 1994, on the other hand, extra-EU exports rose at an annual average rate of 4.3%, while extra-EU imports rose at an annual rate of 0.6% only. In 1995 there was little change in imports, but a big drop in exports.

The EU's man-made fibres exports are spread widely throughout the world. In 1994 the EFTA countries appeared to be the main export destination outside the EU, with 21% of the total, followed by the USA with 14%. Other important export

Figure 4: Man-made fibres
Volume growth and consumption



Source: CIRFS, Eurostat

destinations were Turkey, Iran and Australia. Extra-EU exports, however, were almost certainly much less important than intra-EU trade. In the case of synthetic filament yarn, for example, some three-quarters of total reported exports from EU countries in 1994 went to other EU Member States.

As a proportion of total world exports in 1994, European exports (both intra and extra), mainly from EU countries, accounted for 67% of world exports of synthetic filament yarn, 37% of synthetic staple, 54% of cellulosic filament yarn, and 61% of cellulosic staple. If the suppressed exports could have been included, these figures would certainly have been even higher.

For EU Member countries, export and import data include both extra and intra trade. The largest EU exporter by far, in the case of synthetic filament yarn, is Germany, followed by Italy, Belgium/Luxembourg and the UK. Germany is the dominant exporter of cellulosic staple also. But for synthetic staple, Italy is the largest recorded exporter, followed by the Irish Republic and Germany. Germany reports few exports of cellulosic filament yarn, although its true exports are thought to be considerable. Belgium/Luxembourg is the largest recorded exporter, followed by France, Spain and Italy.

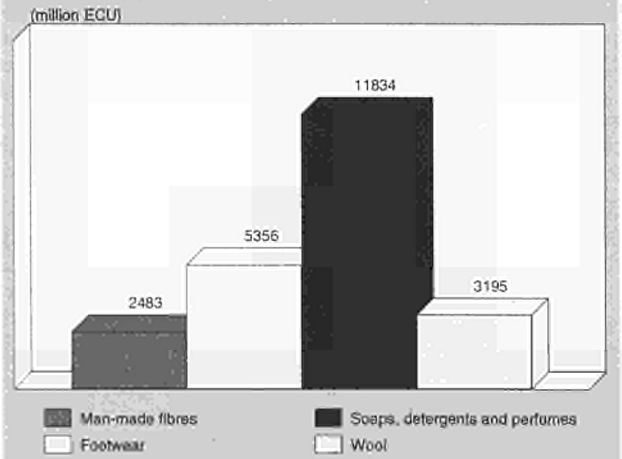
On the import side, intra-EU trade in man-made fibres dominated extra-EU trade. The only exception was cellulosic staple, where 43% only of the total imports of the EU-12 countries in 1994 came from other EU Member States. The largest extra-EU suppliers of imports of all man-made fibres, taken together, in 1994, were Austria and Switzerland, each with about 10% of the total, followed by the USA and Turkey. Switzerland, the USA and Turkey were large suppliers of synthetic filament, and Austria of cellulosic staple.

The principal EU importing countries in 1994 for synthetic filament yarn were Belgium/Luxembourg, the UK, Italy and France; for synthetic staple, Italy, Germany and the UK; for cellulosic filament yarn, France, Germany and Italy; and for cellulosic staple, Germany and France.

This record of trade suggests that, at least for the present, the trade in man-made fibres in which the EU is concerned is largely a trade between developed countries. However, the EU has already imported some man-made fibres from the Far East and South Asia, although a considerable proportion of these imports has been found in Commission investigations to have been dumped. There is no doubt that EU imports from these sources will grow, as the production of these countries increases in both quantity and quality.

Movements in trade intensities (which include extra-EU trade only) reflect the trends in man-made fibre production and trade, as it appears from the published information. In 1985 the EU's recorded export/production ratio was 20.16%, and its import/consumption ratio 15.15%. By 1994 the export/production ratio had fallen to 15.83% and the import/consumption ratio had risen to 20.87%. Over the period, the EU was clearly becoming more reliant on imports than hitherto, although even now it is much less reliant on imports than is the case for many textile and clothing sectors.

Figure 5: Man-made fibres
Value added in comparison with related industries, 1994



Source: DEBA GEIE

MARKET FORCES

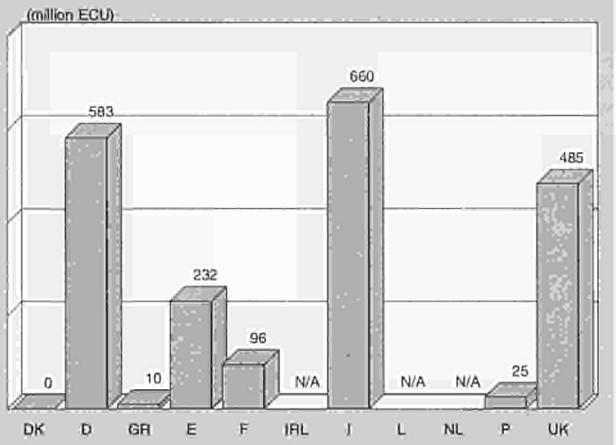
Demand

Man-made fibres are processed in the traditional way, by spinning, weaving, knitting etc., before they go into their final end-uses. In the EU in 1993 some 32% of synthetic filament went into weaving, 31% into knitting, 29% into carpets, and the remaining 8% into other uses, such as narrow fabrics, hand knitting etc. There was a contrast between polyamide and polyester. Only 21% of polyamide filament went into weaving, as compared with 34% into knitting and 39% into carpets. In the case of polyester, on the other hand, 52% went into weaving, as compared with 37% into knitting, and virtually none into carpets. Cellulosic filament went predominantly into weaving.

The share of the synthetic spun yarns consumed by volume with respect to the synthetic filament yarns consumed in the EU was 80% in 1993. Of the total synthetic spun yarns, polyamide represented 13%, polyester 31%, acrylic 46%, and polypropylene 10%.

Some 37% of synthetic spun yarns went into weaving, 36% into knitting, and 20% into carpets. For polyamide, carpets were the main end-use, taking 68% of all polyamide spun yarn consumed. For spun yarns made from polyester, weaving was by far the largest end-use, with 73% of the total. The main use for acrylic, on the other hand, was knitting (64%), as was to be expected from its use in jumpers, cardigans, etc.. The main use for polypropylene was carpet; for cellulosic spun yarns it was weaving.

Figure 6: Man-made fibres
Value added by Member State, 1994



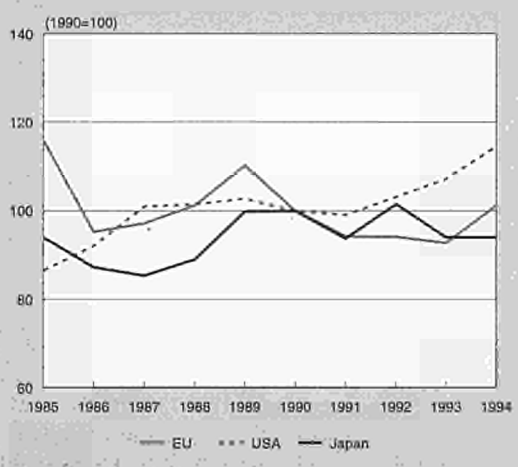
Source: DEBA GEIE

Looking at EU mill consumption, in 1993 of yarns spun from both man-made and natural fibres, man-made fibres represented 39% of the total mill consumption, cotton represented 44%, and wool 17%. In the case of mill consumption of unspun staple fibres, however, man-made fibres were dominant in uses such as cotton wool, wadding and filling, and non-woven fabrics, and represented over 90% of the fibres used.

The main end-use of all fibres consumed in the EU is clothing. In 1993, clothing took 45% of the total fibres used, both natural and man-made. In the case of man-made fibres, clothing took 37%, while carpets took 22%, other home furnishings 17%, tyres 2.5% and other industrial uses 21%. In clothing, synthetic and cellulosic spun yarns accounted for 56% of the total, with filament yarns accounting for the remainder. Polyester was the most important fibre, followed by acrylic and polyamide. In home furnishings, other than carpets, polyester was much the most important fibre. In tyres, synthetics and cellulosics were roughly of equal importance.

Given this wide variety of end-uses, it is not surprising that the demand for man-made fibres does not vary in an uniform manner. Technical advances and fashion can have a large effect on the pattern of usage. The movements of the business cycle have an important influence, especially for industrial uses. In the case of tyres, for example, the demand is likely to vary to a considerable extent with the demand for new cars and trucks, which is known to be cyclical in nature.

Figure 7: Man-made fibres
International comparison of production in constant prices



Source: DEBA GEIE

The case of clothing is perhaps less clear-cut. When incomes fall, consumers may turn to cheaper clothing, so that fibre usage of all types may decline by less than expenditure. However, cyclical factors certainly play an important role as well: EU fibre usage in clothing over the period 1988 to 1993 shows a distinct falling off in the depression years of the early 1990's. Fibre usage in carpets, however, was buoyant throughout the recession years, while the demand for other home textiles and industrial uses was not much affected. It is not easy to explain these disparate swings in demand.

Over and above recent trends, there is little doubt that the demand for man-made fibres will continue to grow in the EU as incomes rise, but the growth in demand is likely to be much less strong than it is in the newly industrialised and developing countries. Within the EU, the growth in fibres imports in customer industries, such as clothing, will tend to reduce the potential market for fibres produced in the EU itself.

Supply and competition

The increasing importance of man-made fibres imports, in relation to domestic EU production, has already been mentioned. Imports are likely to put increasing pressure on the EU market, as man-made fibre output expands in the Far East, ASEAN countries, and elsewhere.

A factor helping the international competitiveness of the EU man-made fibres industry is the steep rise in labour productivity previously mentioned. Thus, unit labour costs in the EU industry, which rose between 1985 and 1991, fell back after that year, and in 1994 were at the same level as in 1985. Total unit costs, affected by raw material and other factors, as well as unit labour costs, were little changed over the period, but fell in 1994, as labour productivity rose steeply, to well below their 1985 level.

The EU industry has suffered from overcapacity for some years. This, together with the forces of competition, has kept down the profitability of the industry. Profit on turnover, or gross operating rate (value added - labour costs/turnover) has fallen steadily from 14% in 1986 to 9.9% in 1992, although since then it has recovered, especially in 1994.

The EU industry of man-made fibres has been characterised by a relatively small number of large firms. This is because of the heavy initial capital costs, and also the economies to be found in large-scale working. There is however a growing number of smaller players, especially in polypropylene. In some fibres the minimum viable production size has been falling. Much competition in the industry is of the oligopolistic type, with each firm keenly aware of the importance of its rivals' pricing and investment policies. Nevertheless, competition exerts a steady pressure on prices and profits. Taking it overall, competition can often be characterised as cut-throat.

Another factor characterising the industry is that very few of its products are sold directly to consumers. The demand for them is industrial, since further processing is needed before items which can be sold to consumers can be produced. Only a few firms in the industry are sufficiently vertically organised to carry out the whole range of processes required, and this exists mainly in carpets.

Production process

Continual improvements and changes take place in the production of both filament and staple man-made fibres, and in their processing. There is a large R & D effort, especially for industrial uses. On the filament side, for example, the

Table 5: Man-made fibres
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	96.5	85.0	85.7	91.4	102.3	100.0	98.5	107.4	118.5	142.0
Unit labour costs index (3)	76.3	88.1	91.5	91.8	88.0	100.0	102.6	99.4	89.4	76.2
Total unit costs index (4)	99.5	96.1	94.2	95.1	97.9	100.0	101.3	98.2	92.3	89.5
Gross operating rate (%) (5)	10.6	14.1	12.8	12.2	12.6	11.1	10.1	9.9	10.0	13.1

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

introduction of polyamide and polyester microfibres is already having an appreciable effect on the knitted and woven clothing sectors, since these fibres combine the feeling of silk with the strength of synthetics. There has also been a new generation of texturing machines using friction to insert the twist in filament yarn, thus extending the range of fabrics that can be produced.

On the staple side, advances have been made in processing technologies, although these apply to all fibres, both natural and man-made. One such is open-end rotor spinning, pioneered in Czechoslovakia in the 1970's. This has advantages in terms of speed and a reduction in the number of processes, thus lowering processing costs. Other new spinning systems have followed, including wrap spinning, friction spinning, self twist systems and air-jet spinning, the last mentioned being commercialised during the early 1980's by the Japanese machine manufacturer Murata.

In spite of these modern spinning techniques, ring spinning remains the major process for the production of spun yarns on the short staple system, especially in Asia and Oceania. Even in developed economies, ring spindle machinery has maintained its technological advantage, since microelectronics in the form of on-line monitoring and machine control advanced during the 1980's, and robotics and linked winding have eliminated much of the labour involved in the various processing stages.

In cellulosics there have also been technical advances. For example, Akzo Nobel in Germany, Courtaulds in the UK, and Lenzing plants in Austria, have pioneered the introduction of lyocell, a new cellulosic fibre, which has made inroads into several sectors.

Table 6: Man-made fibres
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	N/A
Danmark	0.0	0.0
Deutschland	0.7	0.6
Ellada	N/A	0.6
España	1.5	1.3
France	0.4	0.3
Ireland	N/A	N/A
Italia	1.8	2.2
Luxembourg	N/A	N/A
Nederland	N/A	N/A
Portugal	1.9	0.8
United Kingdom	0.8	1.0

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

INDUSTRY STRUCTURE

Companies

The fact that the man-made fibres industry is dominated by large firms can be seen from the figures for turnover and employment in the EU industry. In 1992, for example, enterprises employing 100 or more employees accounted for 86% of industry turnover, and 82% of industry employment. This was in marked contrast with the size of the average spinning, knitting, weaving, or clothing firm.

The main producers of polyester are Hoechst (plants in Germany, Portugal, Austria), Montefibre (Italy) and Rhone-Poulenc (plants in France, Switzerland, Spain, Germany).

The main producers of polyamide are DuPont (Germany, UK), joint ventures between Rhone-Poulenc and SNIA Fibre (France, Italy, Germany, Switzerland, Spain), and DOMO Group (Belgium, Germany).

As regards acrylic, the main producers are Montefibre (Italy, Spain), Courtaulds (Germany, Spain, UK), and Bayer (Germany).

The main producers of cellulosics are Lenzing (Austria), Courtaulds (Germany, UK) and Akzo Nobel (Germany, Netherlands). Akzo Nobel is also the largest producer of industrial fibres, again in Germany and the Netherlands.

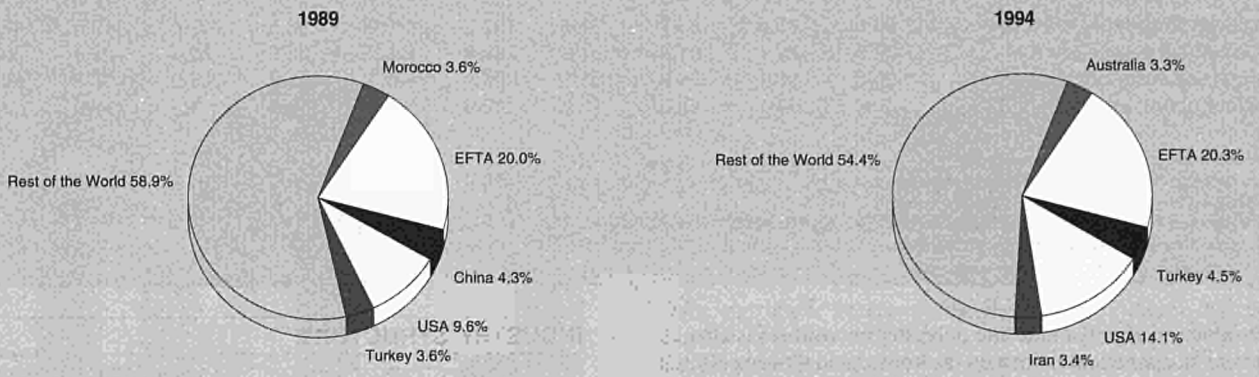
Strategies

The principal man-made fibre firms have a worldwide scope, with operations in Europe and North America, and often in the Far East. This applies to Hoechst, for example, which generates over 80% of its turnover outside Germany.

Recent strategies have included a number of joint ventures. For example, there has been the formation of two joint ventures in polyamide between Rhone-Poulenc and SNIA, and the formation of a joint venture between Courtaulds and Hoechst in acrylics and cellulosics (with a majority share for Courtaulds). There have also been asset swaps, for example that of ICI's polyamide activities by DuPont in exchange for the latter's acrylic business. Among rationalisations of product and plant portfolios, Hoechst has closed its UK plant. Akzo Nobel has sold its polyester textile filament facilities, and closed down its polyester staple production. Until now, however, EU man-made fibre production has been affected far less by delocalisation than the labour-intensive clothing industry, where there has been growing emphasis on OPT (Outward Processing Trade).

New investments have taken place. Allied Signal has undertaken new investments in Europe in polyester, and has acquired existing plants in polyamide. Substantial investments in Lyocell are under way by Courtaulds and Lenzing, and the carpet companies have been making large investments in fibre production and fibre raw materials.

Figure 8: Man-made fibres
Destination of EU exports



Source: Eurostat

There has also been internationalisation. For example, investment by an Indonesian company in a new fibres plant in the UK. There is a strong presence of US companies in Europe - DuPont, Allied Signal, Wellman - and vice versa - Lenzing, Hoechst, Courtaulds, Bayer, Akzo Nobel, with fibres operations in the USA.

In general, there has been a strong concentration on greater specialisation, higher value-added products, R & D, just-in-time customer service, etc..

As a result of all these moves in Europe, there has been greater inter-penetration of EU markets. Most fibres are now produced by companies with operations in several EU countries, with each plant increasingly producing a limited range of products for the whole EU market, rather than a wide range of products for a local market.

REGULATIONS

The large mergers or exchanges of activities in the industry have required the consent of the European Commission. This has caused some problems. The exchanges between ICI and DuPont, for example, were subjected to certain conditions.

More problems have been raised by proposals by Member States to subsidise new or existing man-made fibre enterprises. The Commission has in general been vigilant on the subject of state aids. There are special European Commission controls on state aids in the man-made fibres sector, and these were renewed in April 1996.

Another area in which the European Commission has been involved is that of anti-dumping, when extra-EU firms have been accused of sending exports to the EU at less than their home market prices. Anti-dumping duties have been imposed on man-made fibre imports from a number of countries. For example, provisional anti-dumping duties of 43.5% were placed on imports of polyester staple fibre from Belarus in March 1996.

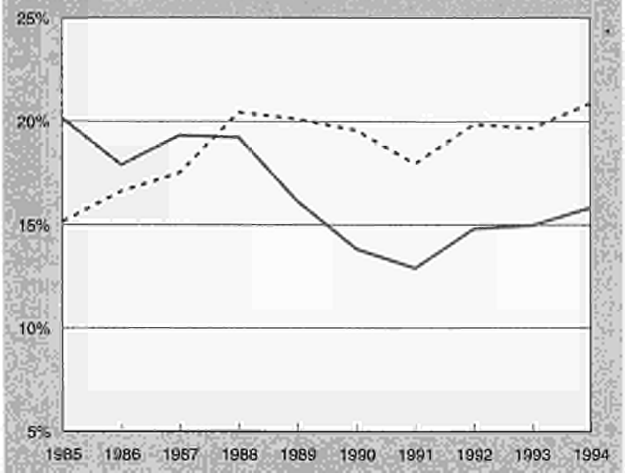
OUTLOOK

If Europe remains out of recession, so the demand for products made from man-made fibres is likely to grow, although the EU fibre industry may be affected by import growth in downstream products. A revival of EU retail sales of clothing, which have been sluggish for some years, and of demand for industrial applications, such as technical textiles, will work its way upstream to EU fibre producers. Already, in 1994 and 1995,

Figure 9: Man-made fibres
Origin of EU imports

Source: Eurostat

Figure 10: Man-made fibres
Trade intensities



Source: Eurostat, CIRFS

EU man-made fibre production grew, although the second half of 1995 saw a downturn, apparently partly linked to stock movements.

Apparent consumption of man-made fibres in the EU increased in 1995, but is expected to be lower in 1996. It should increase in each of the years 1997 to 1999. Exports are thought likely to decline and imports to increase. If these movements occur on the scale envisaged, there might be little or no increase in the production of man-made fibres. There is however likely to be growing concentration on higher value-added fibres. Employment is likely to continue to fall, on account of a continued rise in the productivity of labour.

These forecasts, however, especially those regarding production (which is derived as a residual from the other estimates), are subject to the usual conditions about the tentative nature of such projections.

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Biotechnology

The biotechnology industry is a fast-growing segment, which has applications in sectors, such as the pharmaceutical/health care, chemical, food, agriculture, and waste management. The European entrepreneurial bioscience industry is growing by around 20% annually. This growth rate is indicative of a fast developing industry and this trend can be expected to continue for the forseeable future. Ernst & Young's third annual report on biotechnology estimates that the European biotechnology industry generates revenues of 1 158 million ECU in 1995, employing around 17 200 people in the entrepreneurial bioscience companies.

INDUSTRY PROFILE

Description of the sector

Biotechnology can be broadly defined as the application of scientific and engineering principles to the processing of materials by biological agents. Two generations of biotechnological applications can be distinguished. Classical biotechnology covers inter alia fermentation and preservation processes for food processing, for example the production of beer, wine, cheese, bread, vinegar, etc., where advances have been made predominantly without the use of genetic engineering. Modern biotechnology is a small but rapidly growing segment which is characterised by the use of genetic engineering. In this chapter only modern biotechnology will be considered. Modern biotechnology is based predominantly on recombinant DNA (rDNA) and cell fusion techniques and has a considerable potential for a wide range of applications, especially in the fields of pharmaceuticals, chemistry, agriculture, food production and processing, and environmental applications.

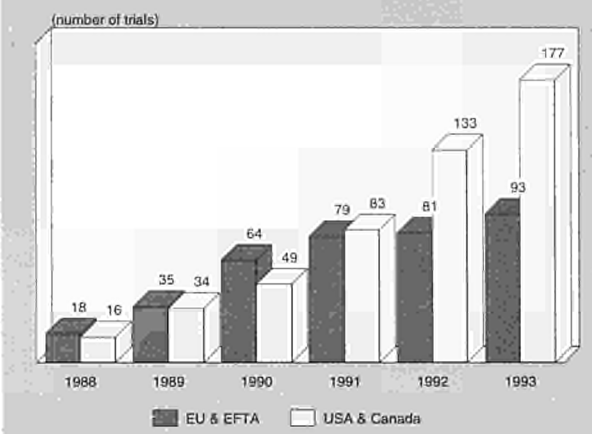
According to Ernst & Young's third annual report on the European biotechnology industry, revenues generated by Europe's entrepreneurial bioscience companies grew some 20% in 1995 to 1 158 million ECU. The main market segments for biotechnological products, calculated in number of companies involved in each segment, are therapeutics (19%), other health care (16%), contract research/manufacturing (18%), industry suppliers (17%), agro-bio (12%), chemicals (8%), energy/environment (7%) and others (3%).

Recent trends

After a slow start, the European biotechnology industry is now expanding through hiring more people, increasing capacities and entering new markets. Ernst & Young estimates that the total number of people employed by Europe's entrepreneurial bioscience companies corresponds to 17 200 in 1995, a 7% increase on the previous year, and about a sixth of the size of the number employed by US biotech companies.

Activity in the European biotech industry is picking up and accelerating, although there is still some uncertainty about the regulatory and political environment. European biotech products are now emerging on the market, with the approval of the first biopharmaceuticals by the new European Medicines Evaluation Agency (EMEA) and the approval of some genetically modified foods by the United Kingdom. But most of the products are still coming from multinational or US biotech companies. Along with the emergence of new markets, corporate activity is consolidating and new firms are being created as former executives start up their own businesses. Mergers, acquisitions and strategic alliances have accelerated dramatically in Europe during 1995, both among EU companies and with non-EU companies, leading some companies to close down and carrying some others to success.

Figure 1: Biotechnology
Comparison for transgenic plant trials



Source: GIBIP data base

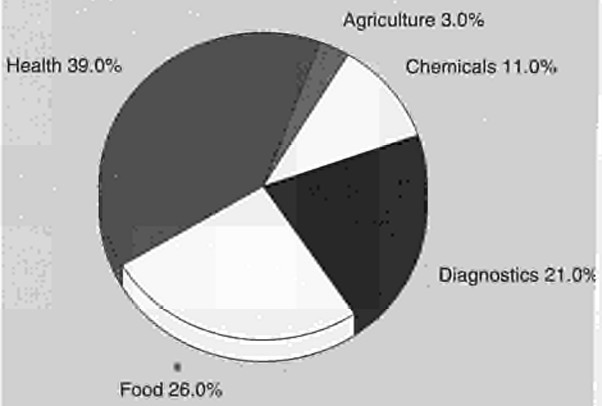
International comparison

In an international comparison, and especially in relation t the US, Europe seems to have a relatively weaker positior The number of companies operating in the modern biotech nology field in Europe is about 600, whereas about 1.30 companies are active in the US. The number of persons em ployed by entrepreneural bioscience companies correspond to about 17.000 in Europe to be compared with a figure c 108.000 in the US. Finally, revenues for the biotechnolog industry in Europe amount to about 1 billion ECU while th corresponding figure for the industry in the US is about billion ECU.

As can be seen from these figures, the industrial developmer in Europe has been much weaker than on the other side c the Atlantic up to date. Some of the explanatory factors t this development would include:

Public funding of biotechnology research and developmer in the EU has been limited in comparison to the US. Combine funding by the European Union and the Member State amounted to about 1,6 billion ECU in 1995, whereas publ

Figure 2: Biotechnology
Share in total sales



Source: DRI Europe

funding at a federal level in the US exceeded 3,4 billion ECU in 1995.

Another explanatory factor is that the current EC legislation is creating unnecessary administrative burdens and costs for the companies. This is so because it is based on the scientific knowledge of the early 80's, but it is currently being reviewed and amendments of existing Directives and new proposals are in the process (see Regulations).

A third factor which plays a key role is the availability of venture capital. The US has a well functioning market for venture capital, among others constituted by NASDAQ. Between 250 and 300 biotechnology companies have been able to raise money on this exchange. However, several private financial initiatives modelled after the US NASDAQ have recently been established, such as AIM, Le Nouveau Marché and EASDAQ. Such initiatives will hopefully alleviate the earlier difficulties in finding start-up and venture capital.

Europe is, nevertheless, starting to narrow the gap to the US through the creation of a number of small high-tech firms and the growing participation of its pharmaceutical groups in biotechnological research.

Foreign trade

At present, trade in biotechnology derived products is principally for pharmaceutical applications. Most trade is either intra-EU trade or extra-EU trade with the US. Biotechnology pharmaceuticals tend, just like other pharmaceuticals, to be high value, specialised drugs designed for ailments prevalent in the industrialised world.

Trade in agro-biotechnology is small in comparison and is comprised largely of seeds.

MARKET FORCES

Demand

The health sector remains the most favourable market for biotechnology products. It is estimated that the number of medicines derived from modern biotechnology will surpass the number of traditional medicines before the end of the decade. However, demand for biopharmaceutical products has not grown as fast as expected. Up until now, it only covers about 1-2% of total pharmaceutical sales.

Demand in the field of diagnostics is growing in a promising way. About 59% of diagnostic examinations in Europe are done with biotechnological diagnostics according to a survey by former SAGB.

The huge potential for agro-biotechnology products is clearly recognised, but they have taken longer to reach the market. In Europe, France and the Netherlands are the leading markets for these products.

A promising sector for biotechnological applications in Europe is environment and waste management. Demand in this field is increasing due to the growing concern over the environment in the EU and in the rest of the world. In the paper industry, Novo Nordisk's estimate of the market related to enzyme applications in about 15 industrial sectors amount to about 1 billion US$.

Supply and competition

Europe's supply in biotechnology has not yet reached a critical mass nor attained the maturity of the industry in the US. In terms of product development, most products originating from European companies are still in phase II or phase III clinical trials, whereas many American products are already on the European market, (e.g. NexStar's DaunoXome treatment of Kaposi's sarcoma was filed in 11 European countries).

Some European products have nevertheless succeeded in obtaining marketing approvals, which leads the way to the development of a specifically European supply.

The main sector in the European biotech industry remains the healthcare sector, which represents about 35% of the number of companies. In this sector, the biotechnology industry focuses on cardio-vascular diseases, cancer, AIDS and neurologically-based diseases as well as diagnostics. Most successes have taken place in this sector, with the approval of Ares Serono's drug against infertility, Gonal F, as well as Schering's Betaseron for multiple sclerosis and Rhône-Poulenc Rorer's drug against cancer, Taxotere.

The second main activity of the biotech industry is agro-biotech (12% of companies), involved in giving plants or animals improved resistance or better nutritional profile. In this sector, the United Kingdom took the lead in approving genetically modified foods, such as tomato paste basted on modified tomates by Zeneca, rapeseed oil from Belgium's Plant Genetics System, or soya-bean products from Monsanto. Biotech insecticides from Monsanto and Ciba were also approved in 1995 by the European Agency, after having received the American approval the previous year.

Other sectors include industry suppliers (who sell reagents or enzymes to other industries), contract research and manufacturing (who perform tailored research or custom synthesis), as well as chemical, energy, environment-oriented and service companies.

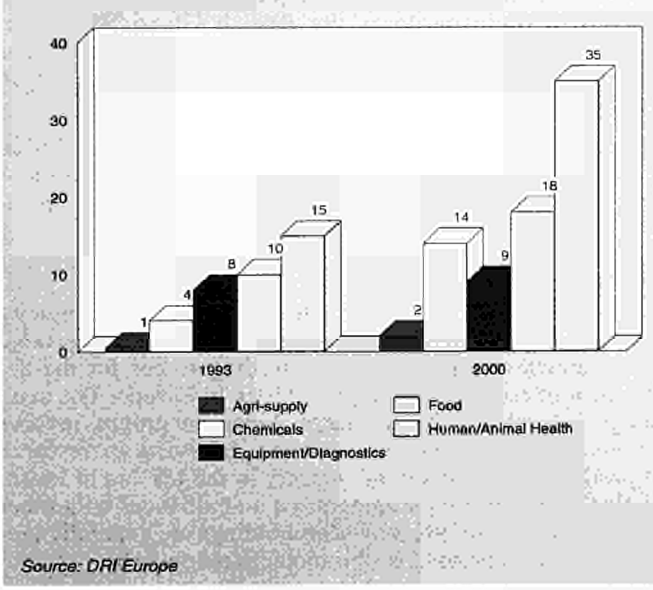
The companies involved in this industry have very diverse profiles, but can be classified in two main groups: large multinational companies and specialized small or medium-sized companies.

Production process

Biotechnology has made great strides in the field of human health since 1980 when insulin became the first product of genetic engineering and modern biotechnology to reach clinical trials. In the pharmaceutical sector, biotechnology is used in three ways: to produce drugs and vaccines using rDNA technology, to make intelligent screens for new compounds and to apply techniques for rational drug design through understanding molecular structures.

Non-food uses of animals and plants will become important for the production of antibodies and therapeutic proteins. More recently, many companies are now using mouse monoclonal

Figure 3: Biotechnology
Expected growth sales 1993 - 2000



Source: DRI Europe

antibodies to target tumours. Some firms have also developed sheep monoclonal antibodies (SMAs) for use in treating cancer of the colon, breast and lung, and restenosis.

In the field of diagnostics, kits are available that use monoclonal antibodies to diagnose such diseases as the AIDS virus. MABs can also be used to direct treatment or attack a target themselves. These applications have important consequences for the treatment of cancer and other diseases. In the chemical sector, biotechnological research is mainly in the field of catalytic enzymes for markets such as washing powder.

In the food sector, developments have included the genetic modification of plants to improve flavour and smell, lengthen shelf life and eliminate toxins. Genetic engineering can be used to improve bacteria and yeast for the production of fermented dairy, meat, vegetable and cereal products. Also, genetically engineered enzymes can be used to enhance efficiency in certain areas of food production. For example, a rennin substitute (Chymosin) eliminates problems of supply and of infection from animal sources of rennin.

In the agricultural sector, developments have been made in the areas of pesticides, plant and animal health and the increasing of yields. Bio-pesticides are produced using strains of the Bacillus Thuringiensis bacteria. Since the first rDNA engineered plant was produced in 1983, there has been much research and development in the area, known as transgenic plant technology. Over 50 species of crop plant can now be genetically transformed. In addition to increased yield, biotechnology has also provided increased resistance to pests, diseases and herbicides, permitting a more selective and effective use of herbicides.

INDUSTRY STRUCTURE

Companies

The number of players in the biotechnology industry in Europe is increasing, with the number of companies rising by 20%, from 485 in 1994 to 584 in 1995. There are 28 publicly quoted firms, but the majority (i.e. 81%) are small private enterprises.

At the beginning of the 1990s, biotechnology in Europe had developed primarily within large pharmaceutical and chemical groups. However, over the last two years several small high technology firms have developed, partly as a result of support programs from the different governments. These firms appeared on the market from 1 to 4 years later than their American counterparts and are still somewhat weaker. The major specialized biotech companies are from the United Kingdom: Elan, British Biotech, ML Laboratories, Celltech, Scotia Holdings, Chiroscience and Cortecs. Major pharmaceutical groups involved in biotechnology, the British Glaxo Wellcome, Zeneca and Smithkline Beecham, the German Bayer and Hoechst, the French Rhône-Poulenc-Rorer and the Danish Novo-Nordisk.

The new biotechnology companies in the European Union are clustered around centres of academic knowledge. The EU's biotechnology industry benefits from ready access to an innovative science base.

Strategies

Even though there is evidence of new, small high technology firms appearing on the European market recently, the large pharmaceutical companies remain leading forces for the development of the biotechnology industry in Europe. The main strategies developed by the large European groups involve increasing research and development, investing in research and production plants abroad, namely in the US and in Japan, and signing co-operation agreements and alliances with other groups. Alliances or minority shareholdings are generally preferred over acquisitions in the biotechnology field.

In 1995 there were more than 200 deals in the European biotechnology field. During the year, Europe's largest pharmaceutical firms pledged more than 3 billion ECU to US biotechnology firms. Major mergers in the pharmaceutical sector include the deals between Glaxo and Wellcome, Ciba and Sandoz, Pharmacia and Upjohn, Hoechst and Marion Merrell Dow and Rhône Poulenc Rorer and Fisons. But there are also deals involving small and medium sized companies (4 out of the 10 major biopartnering deals).

The large European corporations have continued strategies that began in 1985 by entering into major commercial agreements with US biotechnology firms, establishing major facilities in the US and using these to access the American scientific base. They are also concentrating their leading edge research and development in the US. This will pose a problem for the newly created biotechnology firms in Europe, which do not have as close links with the academic world as their American counterparts, and which to a large extent lack complementary relationships to large multinational firms. It is not sure whether the European multinationals will be willing, or able, to transfer technology back from the US to their home countries. The Chief Executive Officers (CEOs) interviewed in a survey nevertheless declared that key priorities for their companies during the next two years include creating and strengthening alliances with partners and academia.

REGIONAL DISTRIBUTION

In Europe, the United Kingdom has been successful in attracting several investments in the research area, namely by providing easier access to the stock market. The biotechnology industry has developed mostly in a few specific locations, such as Oxford, Cambridge, Scotland and London.

Germany has several excellent universities and the world-renowned GBF, the Max-Planck Institute, the Fraunhofer Institute and the European Molecular Biology Laboratory (EMBL) at Heidelberg. While much of German biotech is still contained within major companies such as Bayer, Hoechst, Boehringer Ingelheim and Boehringer Mannheim, there is a fast developing entrepreneurial biotech sector. More gene therapeutic firms than anywhere in Europe are settled in Germany.

France has a large number of companies active in the biotechnology area. Furthermore, the establishment of Le Nouveau Marché will hopefully alleviate the situation for achieving venture capital.

In the Netherlands, the Universities of Leiden, Amsterdam and Rotterdam have a strong medical research orientation with particular emphasis on immunology and cancer.

Sweden has a high number of start-up companies, situated at science parks, adjacent to major universities. Most have fewer than ten employees and focus on providing custom R&D and synthesis services.

Denmark has a commercial bioscience sector that ranks among the largest in Europe. Denmark is a major site for European biotech due to Novo Nordisk with products such as recombinant insulin, growth hormone and enzymes.

Finland is home to a number of very small companies that are strong in the enzymes, agricultural and environment biotech sectors. Many companies in Finland have a link with the pulp and paper and forestry industries.

ENVIRONMENT

Biotechnology reduce the damage to the environment in two ways; the first by reducing the use of plant protection products; the second by remedying the environment by use of GMOs (micro-organisms can be genetically modified in order to break

down industrial chemical waste). Using biotechnology to improve the ability of bacteria to digest wood material could improve biogas production from sewage works, landfill and agricultural digesters, boosting renewable energy production.

There have been concerns about the risks of releasing genetically modified organisms (GMO) into the environment and about how they might affect the ecological balance of the environment. However, both field trials and products are undergoing a thorough safety assessment before receiving approvals. Furthermore, monitoring systems exist that reduce these risks.

REGULATIONS

This section only relates to legislation on a European level.

Biotechnology is a new set of techniques that apply to a number of industrial sectors. It is, therefore, subject to all pre-existing legislation valid for those industries. In addition, there have also been various Council Directives and Regulations specifically directed to the field of biotechnology.

In 1990, two Directives concerning biotechnology were adopted; Directive 90/219/EEC on the contained use of genetically modified micro-organisms (GMMs), which requires all research laboratories and factories working with genetically modified micro-organisms to be approved and aims at minimizing risks to human health and the environment, and Directive 90/220/EEC on the deliberate release of genetically modified organisms into the environment. Safety assessment on the impact of GMOs on the environment must be carried out prior to any release. Authorities must also be informed of any proposed release of live genetically modified organisms into the environment and products containing GMOs must be authorised prior to their commercialisation.

At the end of 1995, a proposal for amendment of Directive 90/219/EEC was put forward. The proposal aims at addressing the weaknesses in the Directive in its present form, while at the same time continuing to provide the same level of protection for human health and environment. This includes, for example, linking administrative procedures and notification requirements to the risk of the activity involved.

The Commission is also reviewing Directive 90/220/EEC in order to take a decision whether a proposal for amendment should be put forward.

Furthermore, specific product legislation are already in place concerning pharmaceuticals and animal feed additives, allowing for more efficient and adapted product legislation than the generalized horizontal directives. Further proposals for product legislation are in the pipeline, for example for novel foods, novel feeds, seeds and plant protection products.

Following the rejection of the European Parliament of the original proposal for a Directive on the patenting of biotechnology inventions in March 1995, the European Commission put forward a new proposal in December 1995.

OUTLOOK

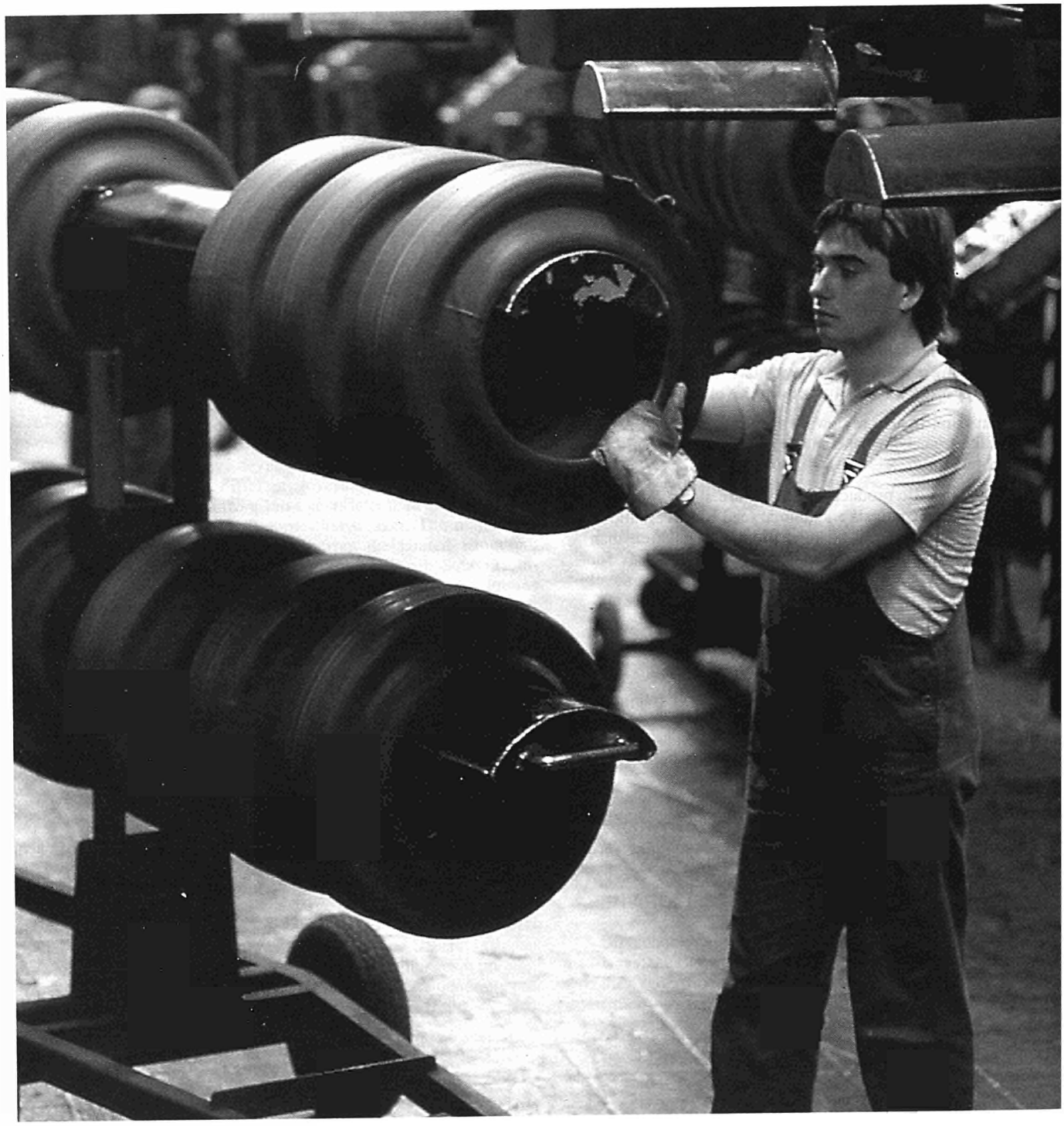
According to a Lehman Brothers study, world sales of biotechnology products could exceed 20 billion US$ in year 2000. They forecast that around 100 biotechnology products will be on the market in 2000, compared with 18 in 1994. In the pharmaceutical sector, biotechnology products are forecasted to increase their proportion of blockbuster sales, from 11% to 17% at the end of the decade.

Given the front ranking position of the US, it is expected to continue to act as a magnet for investment, but several US firms are thinking about downsizing. The Japanese industry too, should experience high growth. The European biotechnology industry is expected to boost until the end of the decade.

All in all, the sectors thought to be fast growing by company CEOs are the human health, animal health and chemical sectors. Sales of biotechnology products in Europe are forecast to rise to 90 billion ECU by the year 2000, with the European human and health care sector reaching sales of 35 billion ECU and the agro-biotechnological sector sales of 593 million ECU.

Written By: ERECO

This industry is represented at the EU level by EUROPABIO. Address: Avenue de l'Armée 6, B-1040 Brussels, Belgium; tel: (32 2) 735 03 13; fax (32 2) 735 49 60.



Rubber products
NACE (Revision 1) 25.1

After the economic downturn in 1993, EU consumption in the rubber products industry rose significantly in the course of 1994 and 1995. Due to this sudden recovery in demand, the European tyre industry had to cope with a raw materials shortage and undercapacity in 1995. In the EU, demand continued to expand at a slightly higher rate than production, reflecting a decreasing trade surplus. Even employment, which has declined since 1989, rose in 1995 by more than 1%. Growth perspectives for this industry are positive.

INDUSTRY PROFILE

Description of the sector

This monograph deals with the NACE Revision 1 group 25.1. Group 25.1 includes three separate classes: rubber tyres and tubes; retread pneumatic tyres, of rubber; and other rubber products. In the old NACE 1970 classification rubber and related products were covered by two different groups NACE 481 (Manufacture of rubber products) and NACE 482 (Re-treading and repairing of rubber tyres).

The rubber tyres and tubes industry includes the manufacture of tyres and tubes for motor cars, motor cycles, bicycles, buses, lorries, aircraft and agricultural vehicles. Also inner tubes, solid or cushion tyres, tyre treads, tyre flaps, camel-back strips and used pneumatic tyres are included.

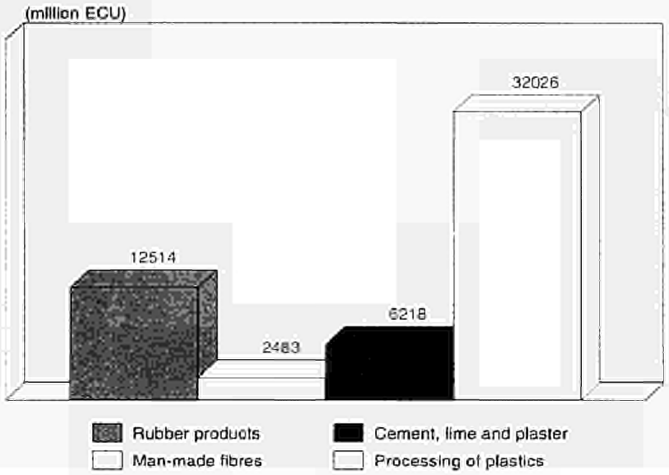
Other rubber products consist of reclaimed, unvulcanized and vulcanized rubber, and other products such as tubes, pipes, hoses, transmission-belts, primary forms, threads, cords, plates, sheets, strips, rods and profile shapes. Waste, parings, and scrap of rubber, powders and granules are also included.

The rubber industry is to some extent connected with the plastics processing industry (Nace Revision 1 group 25.2) as both process polymeric material based on hydrocarbons. The biggest enterprises in the sector of rubber products are also often active in the plastics processing industry. The processing machinery for both branches is similar, but the rubber industry uses mixed equipment in addition because the raw material is mixed by the manufacturers themselves. Compared with the processing of plastics and other related industries, the manufacture of rubber products is a rather small industry. Its value added totalled 14 billion ECU in 1994.

Germany is by far the leading manufacturer of rubber products within the EU, accounting for about 30% of total production. France is the next largest producer constituting 22% of total EU production. Italy ranks third with a production of about 5.5 billion ECU, commanding 18% of total EU production. Fourth is the United Kingdom with a production share of 13%.

Among rubber products, sales of original equipment (OE) within the tyres and inner tubes sector continue to gain share at the expense of replacement tyres, but the latter remains the larger of the two (i.e. 67%). Other rubber products are mainly distributed in five major downstream industries: health and hygiene, clothing and leisure, engineering and industrial as well as construction and auto industries. The production of tyres accounts for about 60% and other rubber products for 40% of the total industry's output in the EU. As relatively more information is available about the European tyre market more attention is paid to these rubber products in this monograph.

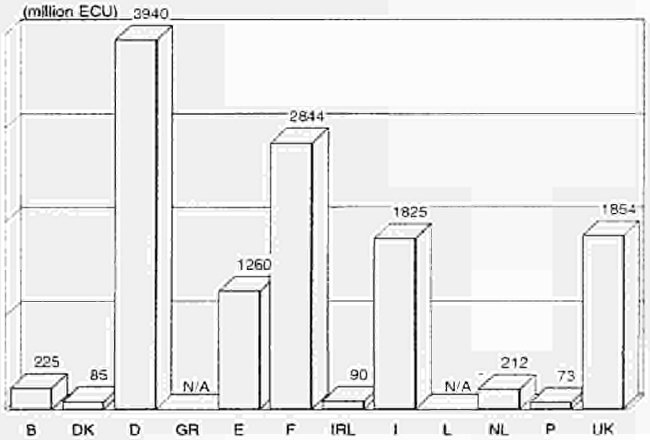
Figure 1: Rubber products
Value added in comparison with related industries, 1994



Recent trends

After the economic downturn in 1993, resulting in weak demand and production declines, EU production rose significantly in the course of 1994 and 1995. During the same period apparent consumption and value added increased, both by more than 9% in 1995. EU demand continued to expand at a slightly higher rate than production, which translated into a decrease in the trade surplus. Due to the low output growth and rationalisation in the industry, employment declined during the 1989-94 period. In 1995, however, employment started to increase again (+1%). Furthermore, the European tyre industry has coped with a change in demand pattern, and, due to the sudden recovery in demand, with a raw materials shortage and undercapacity.

Figure 2: Rubber products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Rubber products
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	20 423	26 387	26 880	27 449	25 436	27 373	30 248	32 589	33 640	34 810	35 980
Production	22 237	27 380	27 653	28 012	26 285	28 040	30 690	32 583	33 630	34 810	35 980
Extra-EU exports	3 647	3 515	3 509	3 681	3 963	4 197	4 474	3 793	3 960	4 110	4 290
Trade balance	1 814	992	773	563	850	667	442	-6	-10	0	0
Employment (thousands)	366.4	357.0	342.1	326.5	308.2	302.5	306.3	319.4	310.0	310.0	300.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Rubber products
Production in volume by country and product, 1995

(thousand tonnes)	Deutschland	España	France	Italia	United Kingdom
Tyres	629.5	396.2	715.0	389.8	360.4
Other	513.6	NA	322.0	309.0	N/A
Total	1 143.1	NA	1 037.0	698.8	N/A

Source: BLIC

Table 3: Rubber products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	3.5	-0.7	1.6	8.5
Production	2.6	-1.0	1.0	7.3
Extra-EU exports	-1.2	1.5	0.0	1.9
Extra-EU imports	5.9	5.3	5.7	10.8

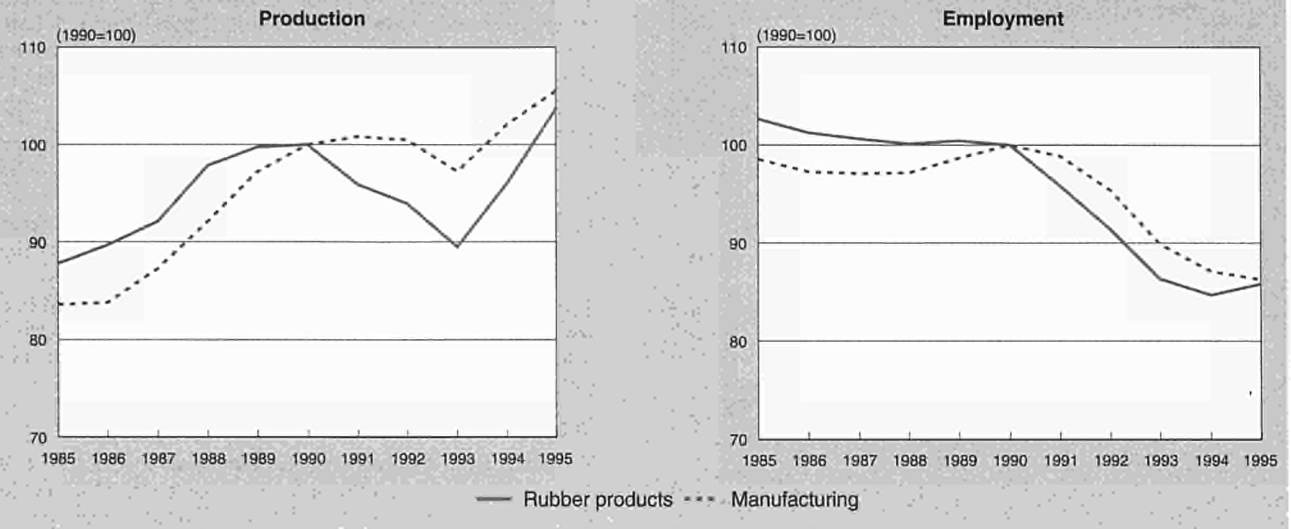
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Rubber products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	3 647	3 217	3 237	3 465	3 796	3 515	3 509	3 681	3 963	4 197	4 474	3 793
Extra-EU imports	1 833	1 607	1 800	2 189	2 478	2 522	2 736	3 118	3 113	3 529	4 032	3 799
Trade balance	1 814	1 610	1 437	1 275	1 318	992	773	563	850	667	442	-6
Ratio exports / imports	2	2	2	2	2	1	1	1	1	1	1	1
Terms of trade index	101	100	99	98	100	100	98	97	97	99	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Rubber products
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

International comparison

Although Japan has recorded high production growth rates during the 1980s, the EU is the leading producer of rubber products in the world (measured in ECUs). In 1984, the USA was the leading manufacturer of rubber products.

Between 1985 and 1995 labour productivity in the EU increased from 60 692 ECU to 100 185 ECU, corresponding to an average annual growth of 5.1%. Despite this growth, labour productivity in the EU was almost half the Japanese labour productivity in 1995 (193 356 ECU versus 100 185 ECU).

Foreign trade

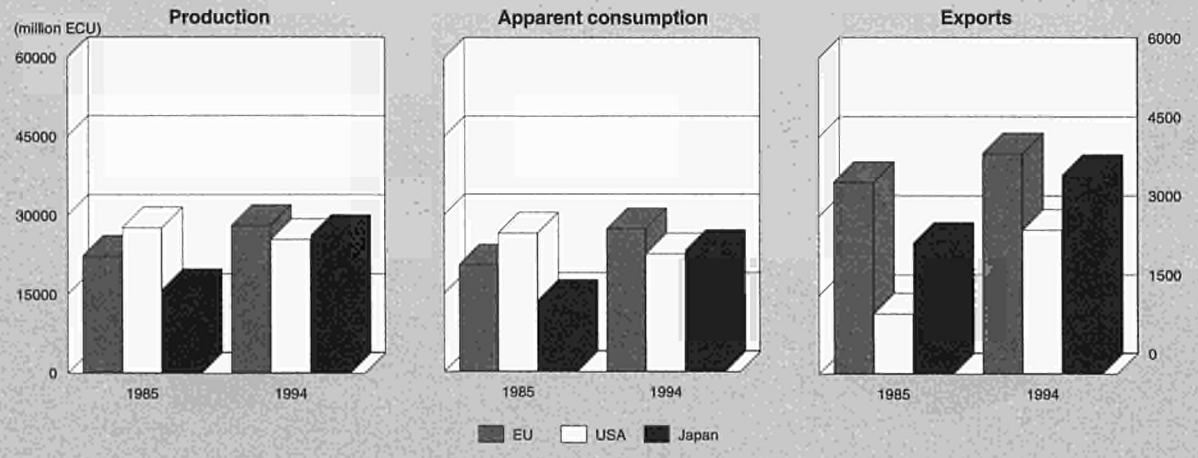
The EU is a net exporter of rubber products. In 1994, extra-EU exports reached almost 4.2 billion ECU, while imports totalled more than 3.5 billion ECU. From 1985 to 1994, however, the trade surplus dropped from 1.8 billion ECU to 0.7 million ECU. This declining trade surplus can be attributed to fast growing extra-EU imports, which more than doubled, and only slightly increasing extra-EU exports during the same period (+15%). Germany is the largest exporting country, with extra-EU exports of over 1.4 billion ECU, representing 34% of total extra-EU exports in 1994. This share is higher than the German export share of 27% in 1985.

The EFTA countries used to be the most important export markets of EU rubber products. However, three of these important trade partners have become members of the EU, which will most probably result in a lower extra-EU exports figure for the EU-15.

The USA, Switzerland and Eastern European countries will remain the major export markets. In 1994, the first two countries accounted for almost 16% and 9% of total extra-EU exports respectively.

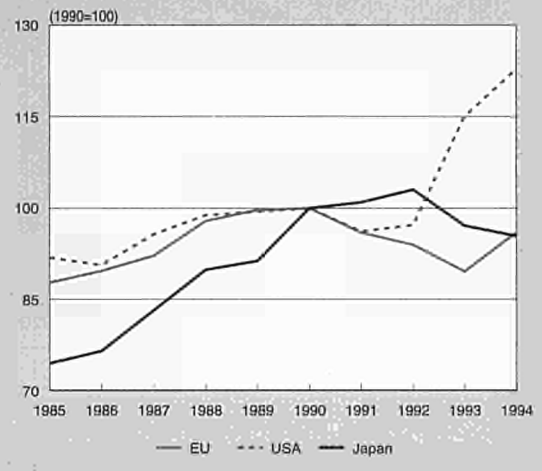
With respect to the imports, Japan is the major supplier of rubber products accounting for nearly 20% of total extra-EU imports. Japan is followed by the USA with a share of 13%.

Figure 4: Rubber products
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Rubber products
International comparison of production in constant prices



Source: DEBA GEIE

Malaysia has become a major supplier of natural rubber. However, rubber produced in the EU is synthetic as oppose to natural. During the 1987-1994 period this country has more than doubled its share on the European market, and in 1994 accounted for almost 8% of total extra-EU imports. Malaysia, Singapore, South Korea, Taiwan and Thailand together accounted for 24% of total extra-EU imports.

MARKET FORCES

Demand

Demand picked up across Europe for car and truck tyres in the course of 1994. As a result, the balance between supply and demand in Europe has been out of equilibrium for the most part of 1995. Certain truck and farm equipment manufacturers were being forced to delay deliveries of vehicles because of shortages of specific tyre types and sizes.

At the end of 1995, European tyre makers experienced healthy winter sales in central Europe. Winter tyres account for 10-12% of the replacement market and up to a quarter of sales in certain areas, especially in Alpine communities.

During 1993 and 1994 freight activity failed to reach the levels expected following the collapse of communism in Eastern Europe and the opening of East-West borders. Consequently, transport companies reduced the number of vehicles on the road and chose to "cannibalise" tyres from idle equipment, creating a dip in replacement demand. In the commercial vehicle segment, most manufacturers have been scrambling since early 1995 in order to keep up with demand.

Truck tyre shipments are estimated to have increased by at least 7% last year - following a 12% jump in 1994 - and might climb again in 1996 to the European peak level of 12.2 million units reached in 1989. This recovery follows a three-year slump that saw truck tyre demand drop by more than 20% from 1980 to 1993 to below 10 million units. Retreads account for another 6-7 million units of replacement market demand or about 40-45% of the total European replacement market. Acceptance of truck retreads has been rising steadily since a few years.

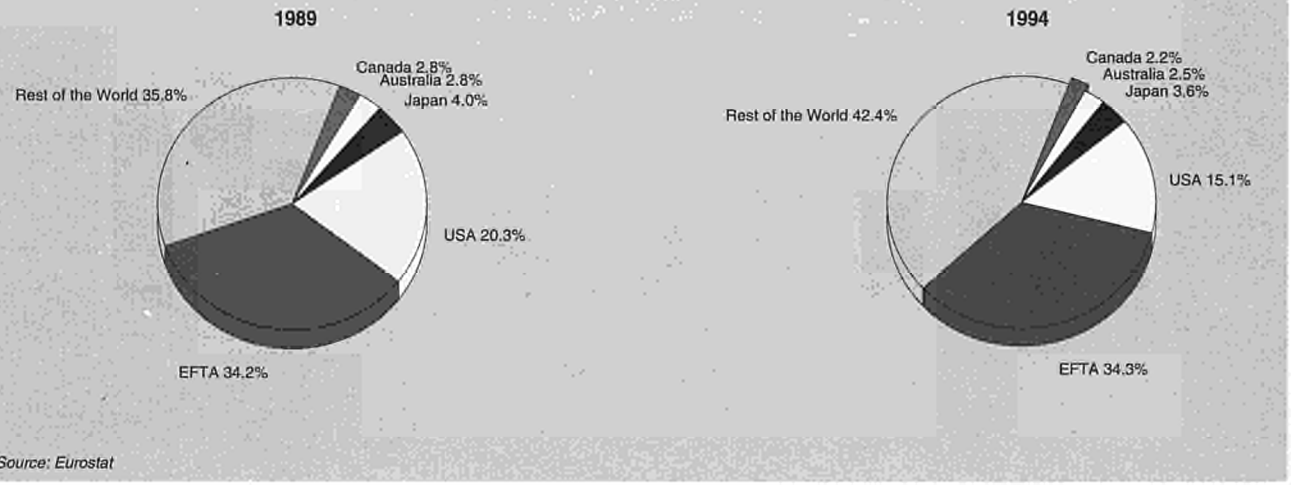
Supply and competition

Resulting from the increase in demand at the end of 1994, there was an immediate rush for raw materials, which created shortages in the last months of 1994. Natural rubber was also in very short supply during the last part of 1994. By the middle of 1995, however, most of the shortages had eased, and the primary limitation was insufficient capacity in the factories and the desire of the workforce to continue with extended periods of overtime through the summer months. At the end of 1995 there was still a shortage of tyres in Europe in a few categories: motor cycles, winter tyres and some truck tyres. In other areas, supply was tight but there was no real shortage. Nevertheless, European tyre manufacturers are still struggling to increase production rates faster than the rate by which demand is actually growing.

Both original equipment (OE) and replacement market customers experienced spot shortages of tyres in 1995. These were mostly felt in the commercial vehicle and in the sectors of farming and forestry, but also in the passenger car market. The shortage of car tyres was unexpected, as car sales across Europe were only about 1% ahead of those in 1994. The need to provide the right product to meet demand, however, was an important factor.

Shortfalls in OE shipments were met primarily either by temporary delivery contracts with non-traditional suppliers or by shipping vehicles to car dealers without spare tyres, forcing them to solve the problem locally.

Figure 6: Rubber products
Destination of EU exports



Source: Eurostat

Figure 7: Rubber products
Origin of EU imports

Source: Eurostat

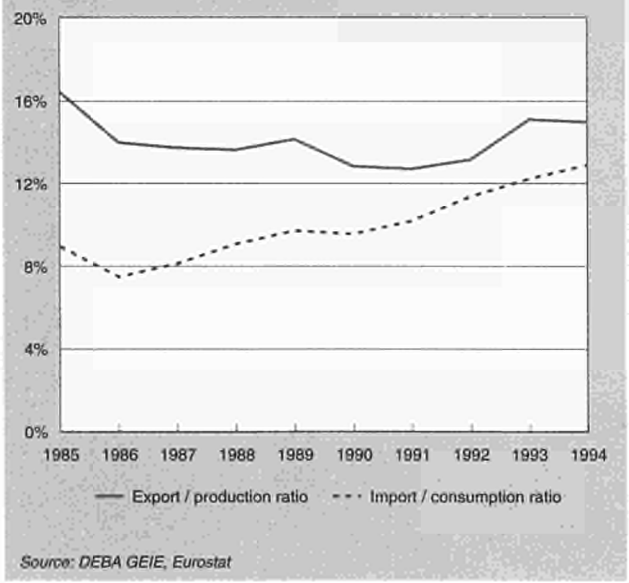
In the replacement market, dealers and consumers across Europe are faced with a continuously increasing array of brands and price categories. In Germany, more than 110 separate new tyre brands are available for sale, with more than half coming from non-EU countries.

The EU labour productivity has increased over the years. Of the four largest producing countries within the EU, Italy has the highest labour productivity (141 000 ECU), followed by France (97 000 ECU), Germany (97 000 ECU) and the UK (69 500 ECU). In terms of labour costs per employee, the UK also accounted for the lowest value.

Production process

Currently, tyres are undergoing one of the most intensive periods of technological development ever faced by the industry. Attention focuses on both productivity and tyre improvements. Productivity improvements, arising both from increased automation and more flexible and efficient team working methods, are considerable. In this context Michelin's so-called full-scale "C3M" automated production plant in France can be mentioned. With respect to tyre improvements, materials are changing, with silica and new types of carbon black appearing to create improved tread compounds.

Figure 8: Rubber products
Trade intensities



Source: DEBA GEIE, Eurostat

Tyre makers are pursuing three main lines of research: greater durability to reduce arising; innovative polymers to allow the use of more scrap rubber in new tyres; and reduction of tyres' rolling resistance to cut fuel consumption. The biggest progress so far has been made in durability. Today's radial tyres last thousands of miles longer than the products used 30 years ago, and the endurance of new products is being steadily extended. New chemical compounds are under constant analysis.

INDUSTRY STRUCTURE

Companies

The world tyre market is dominated by large multinational companies. Among the world's top ten tyre makers (in sales) three European companies are represented: Michelin (F) (1), Continental (D) (4) and Pirelli (I) (6). Of the top ten only Pirelli recorded a net loss in 1994.

Although foreign suppliers are gaining market share, European manufacturers still dominate the EU market. Michelin is the largest European tyre manufacturer with a leading market share of 32.6% of total sales. Continental and Pirelli hold market shares of 16.7% and 8.6% respectively. The largest non-European supplier on the European market is Goodyear with a market share of 11.8%.

Strategies

In an effort to reduce costs, tyre makers cut deeply into their workforce and slashed tyre building capacity during the recession. As a consequence, tyre manufacturers could not respond quickly enough to the sudden increase in demand in 1994. With a time lag of one year the decision was implemented to increase the number of production shifts. With continuing growth in demand almost all tyre makers have taken back employees, a trend which is reflected in an increase in employment.

The need to re-build the inventories, used to meet growing demand for tyres from OE manufacturers and replacement sales across Europe, is reflected in the recent flurry of activity among tyre manufacturers to obtain approval for Sunday shift work. Michelin and Goodyear, in particular, are studying productivity and flexibility improvements afforded by 7-day working weeks to offset high manufacturing costs at their European factories. Pirelli and Sumitomo Rubber Europe -

Table 5: Rubber products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	85.5	88.6	91.6	97.7	99.3	100.0	100.1	102.7	103.7	113.4
Unit labour costs index (3)	88.4	90.5	92.6	91.9	95.1	100.0	104.6	108.1	112.0	106.0
Total unit costs index (4)	91.8	91.1	90.6	92.3	96.2	100.0	103.7	107.2	107.2	104.5
Gross operating rate (%) (5)	10.1	11.4	11.7	11.7	11.2	9.1	10.1	9.9	8.5	9.9

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Dunlop (JPN) have also moved to continuous operation, but to a lesser degree.

As the car market became increasingly international, tyre manufacturers were forced to follow and adopt a worldwide strategy. The size of the large groups increased in the world tyre industry. In addition to acquisitions, firms also engage in strategic alliances. Michelin, Goodyear and Continental are extending their manufacturing networks eastward and buying shares of tyre makers in low wage-countries such as Poland, the Czech republic and Slovenia. The joint venture of Conti-Michelin "Budget Tyre" is awaiting EU approval and is most likely to be located in the Czech Republic, Slovenia, or Portugal. Various European companies are expanding their capacity, modernising their plants, increasing to 21 production shifts per week and adding jobs.

European manufacturers are seeking and gaining presence in Asia through strategic alliances, but also by investing in new plants or by relocating European plants to this continent. Both Michelin and Conti are expected to link up with manufacturers in China. Michelin is also expanding in the rest of Asia.

REGIONAL DISTRIBUTION

Maintaining and expanding distribution channels continues to take considerable management time and energy. Michelin and Continental have the most extensive equity-held retail networks, with 1 200 and 950 depots, respectively, across the continent. Michelin has nearly completed converting all the outlets of its network to commonly signed "Euromaster" depots, whereas Continental continues to operate its various retail chains under their own, regionally recognised names, such as "NTS" in the UK or "Vergoelst" in Germany.

Kwik-Fit Holdings plc., considered as the Europe's largest "independent" tyre retailer for most of the past decade, expanded its reach with the purchase of the 43-outlet UK chain, Tyre Sales Birmingham. This gives the Edinburgh-based company 635 depots in the UK and 135 more throughout Benelux.

ENVIRONMENT

The main environmental problem of the rubber industry is scrap. Despite efforts to find new uses for waste tyres, the world still produces far more tyres than it can recycle. International efforts to handle tyre waste have taken two forms: firstly, manufacturers have tried to develop longer-lasting products to reduce the amount of scrap tyres (arising) each year; secondly, governments and industries have attempted to stimulate existing uses of scrap tyres, such as retreading, and to find new outlets.

Technical progress suggests solutions when it comes to handle scrap. In the UK, the municipal authority in Sheffield has just received an EU subsidy for a proposed pyrolysis plant as part of a wider urban waste management project. If it goes ahead as planned, the new facility will break down scrap tyres into more useable chemical components. In Belgium, plans to build the world's biggest waste-tyres-to-energy plant have reached an advanced stage. The plant expects to burn 100 000 tonnes of scrap tyres a year. Like Elm Energy in

Table 6: Rubber products
The fifteen largest companies in Europe, 1994 (1)

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Michelin	F	10 220	196.3	117.8
Pirelli	I	5 189	58.1	40.6
Continental	D	5 136	36.7	49.2
Pirelli Tyre Holding	NL	2 548	6.3	22.1
T & N	GBR	2 498	-21.3	42.4
Kloeckner-Werke	D	2 150	-0.2	19.8
Sommer-Allibert	F	1 603	48.1	12.9
Hutchinson	F	1 260	85.6	13.2
Perstorp	S	1 124	42.7	8.7
Asko	FIN	1 104	17.8	8.7
British Vita	GBR	991	41.2	12.5
Laird Group	GBR	947	41.4	11.0
Marley	GBR	854	56.0	9.6
Burelle	F	846	10.6	7.3
Uralita	E	757	-4.7	6.3

(1) NACE 48 (NACE 1970).
Source: DABLE

Table 7: Rubber products
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.6	0.6
Danmark	0.4	0.3
Deutschland	1.0	1.0
Ellada	0.6	0.5
España	1.1	1.2
France	1.1	1.2
Ireland	0.6	0.7
Italia	1.2	1.2
Nederland	0.4	0.4
Portugal	0.8	0.5
United Kingdom	0.9	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

the UK, which is the first such European project which is now owned by a mid-western US utility, the Belgian plant will burn tyres to produce heat in order to generate electricity. Spare steel from trace bracing and other waste materials will be recycled. Investments such as those in Sheffield and Belgium will not eliminate entirely Europe's tyre mountain. But a mixture of technical progress and greater use of existing technologies, such as retreading and grinding, should make a sizeable dent.

New chemical compounds are under constant analysis. Some new tyres are being developed, in which a percentage of the weight comprises recycled rubber "crumb" from scrap tyres. This share is expected to reach 10% within the next five years. Furthermore, advanced polymers can decrease friction and weight, reducing rolling resistance in two ways. Lower weight is particularly important when considering a tyre's entire life-cycle. A lighter tyre causes less friction, saves fuel, and also needs less energy to manufacture in the first place.

OUTLOOK

The long-term outlook for the rubber industry seems bright. Worldwide rubber consumption is expected to grow by an average annual growth of 4% between 1994 and 1999. Strong growth in Central Europe, the Commonwealth of Independent States and China will provide the impetus for the increase.

Sales of passenger car tyres are expected to grow by an average annual rate of 2-3% in Europe during the 1995-2000 period. During the same period truck tyre sales are expected to increase by 1-2% annually.

Growth rates, however, will differ among countries. For France and the United Kingdom sales of other rubber products are expected to grow in volume by 15% and 10% respectively over the 1995-2000 period. The tyres and inner tubes market is forecast to grow by 1% in France and 22% in the United Kingdom.

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Plastics processing
NACE (Revision 1) 25.2

The plastics processing industry is still a young industrial sector compared to the traditional materials industries. The sector consists of 27 000 companies, employing around 752 000 people. Environmental pressures have pushed the companies to set up effective recycling and recovery schemes for plastic products in order to contribute to sustainable development. The small- to medium-sized enterprises of this sector remain in a difficult situation, squeezed between strong polymer producers and big retailers.

INDUSTRY PROFILE

Description of the sector

The EU plastics processing industry represents 2.8% of the total EU industry in terms of value added (29.3 billion ECU). Consumption of plastics material in the EU plastics processing industry was approximately 31 million tonnes in 1994. The main plastics materials processed for the different plastic markets were high and low density polyethylene (HDPE, LDPE) 22%, polyvinylchloride (PVC) 20%, polypropylene (PP) 17%, polystyrene (PS) 6%, polyurethanes (PU) 3% and some other plastics like (PET) 3% or Acrylonitrile Butadiene Styrene (ABS/SAN) 1%. Germany, France, Italy and Spain are the biggest plastics materials consumers of the EU. Sales in the EU plastics processing industry represented a total of 94.6 billion ECU in 1994.

The industry's main business is to convert plastic resins and compounds into products. The sector utilises a range of different technologies, such as injection moulding, compression and blow moulding extrusion, hand lay-up of fibre reinforced plastics and coating. It also carries out ancillary operations and a variety of sub-assembly operations.

Plastics converters may produce finished articles which are used by other industries like food packaging, building products, electric & electronic, automotive or consumer goods. They may also be custom processors who produce components on a subcontract basis for other manufacturers, or they may be inhouse operations integrated into the manufacturing process.

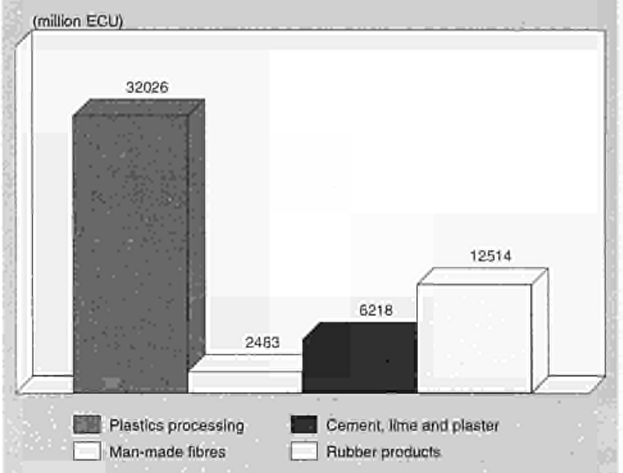
The major markets for plastics are packaging (36%), building (20%), electrical and electronics (7%), automotive (7%), agriculture (4%) and furniture (3%).

Recent trends

The excellent development of 1994 already began losing momentum in the first half of 1995. This was mainly due to currency movements in North America, the UK and Southern Europe. The resulting cost and productivity problems in those countries with strong currencies have not yet been overcome. Following an overheated economic situation with respect to raw materials and their sharply increasing prices in the course of 1994, raw material prices stagnated.

Owing to the expected price increases for oil, ethylene, propylene and other feed stocks, no serious price declines for the major bulk plastics (i.e. polyethylene, polypropylene and PVC) were anticipated in 1993. The European converters built up their stocks as the prices rose and were in the process of reducing them so that inventories should return to a normal level by the end of 1995. The 1995 growth rates among plastics converters has therefore been higher than those of the raw material suppliers. The growth rate of 3.5% has led to a total market of 97.9 billion ECU in 1995.

Figure 1: Plastics processing
Value added in comparison with related industries, 1994



Source: DEBA GEIE

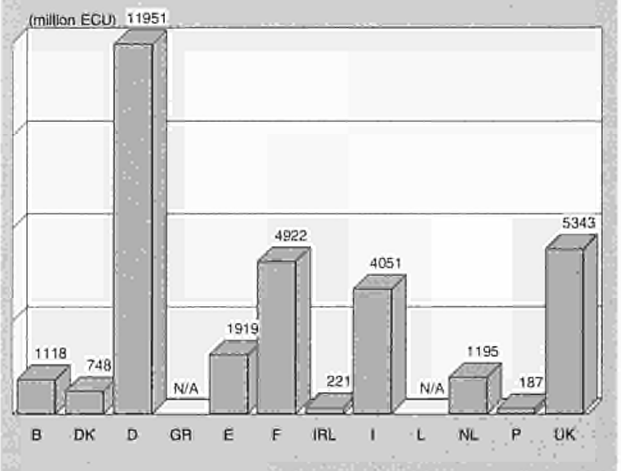
Both consumption and production increased during the 1985-1994 period, by 6.4% and 6.0% per year, respectively. During the same period, employment in the plastics processing industry grew by 25%.

International comparison

The EU and the USA remain the largest producers and consumers of plastic materials. Total production equalled 35.0 and 34.1 million tonnes for the EU and the USA respectively, while the consumption reached 30.9 million tonnes in the EU and 29.3 million tonnes in the USA. The EU and the USA are both far ahead of Japan. Japanese production totalled 13.1 million tonnes in 1994 while consumption reached 10.8 million tonnes in the same year. The existing capacity of polymer production incorporated in large chemical units corresponds to the demand for raw materials for processors.

The US economic recovery which started in the course of 1993 was better for the plastics processors than for the material suppliers. The processing sector performed better than the US economy as a whole. The US processors were able to meet the challenges of their customers with statistical process control, total quality management and advanced technology.

Figure 2: Plastics processing
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Plastics processing
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	41 929	72 947	77 607	80 119	77 695	83 568	92 600	96 395	104 410	113 410	123 060
Production	44 555	75 107	79 313	81 873	79 897	86 051	95 696	99 465	107 670	116 920	126 810
Extra-EU exports	5 203	6 984	7 228	7 575	8 349	9 630	10 546	9 553	10 430	11 310	12 320
Trade balance	2 626	2 160	1 706	1 755	2 203	2 482	3 096	3 070	3 260	3 510	3 750
Employment (thousands)	602.7	782.8	797.0	786.1	751.1	751.7	765.5	795.1	810.0	830.0	850.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Plastics processing
Plastics consumption by market and country, 1994

(%)	Building	Packaging	Teletronic	Transport	Furniture	Agriculture	Others
EUR 15 (1)	19.7	36.3	6.5	6.7	3.2	4.7	23.0
Belgique/België	29.4	29.4	1.1	10.9	6.6	1.4	21.3
Danmark	25.0	25.0	6.0	2.0	4.0	2.0	36.0
Deutschland	21.0	30.0	10.0	10.0	3.0	2.0	24.0
Ellada	3.0	40.0	1.0	1.0	2.0	35.0	18.0
España	12.5	45.5	4.5	7.3	6.9	6.4	16.9
France	25.0	39.0	8.0	11.0	0.0	0.0	17.0
Italia	13.2	43.5	4.0	5.4	5.2	4.2	24.5
Nederland	13.0	38.0	0.0	0.0	0.0	0.0	48.0
Österreich	20.0	33.0	12.0	6.0	7.0	4.0	18.0
Portugal	24.0	30.0	3.0	9.0	0.0	0.0	34.0
Suomi/Finland	22.0	57.0	7.0	2.0	1.5	2.5	8.0
Sverige	25.0	26.0	17.0	14.0	0.0	0.0	18.0
United Kingdom	23.2	35.8	10.7	7.8	4.8	3.1	14.6
Norway	25.0	28.0	18.0	4.0	0.0	0.0	25.0
Switzerland	17.0	40.0	6.0	10.0	0.0	4.0	23.0
Japan	10.1	30.2	12.3	8.5	1.7	2.2	35.0
USA	20.2	30.8	4.7	5.1	4.3	0.0	34.9

(1) Excluding Ireland and Luxembourg.
Source: IPAD - EuPC

Table 3: Plastics processing
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	9.1	3.2	6.4	7.6
Production	8.3	3.2	6.0	7.9
Extra-EU exports	3.1	7.1	4.9	14.8
Extra-EU imports	11.5	8.3	10.0	13.4

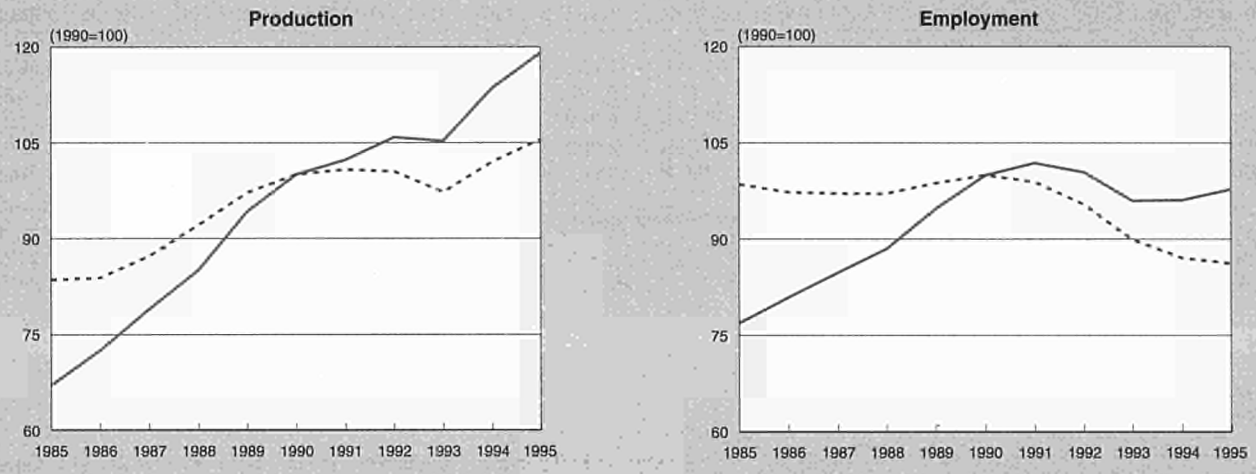
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Plastics processing
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	5 482	5 189	5 377	5 980	6 785	6 984	7 228	7 575	8 349	9 630	10 546	9 553
Extra-EU imports	2 721	2 693	3 019	3 833	4 494	4 824	5 522	5 821	6 147	7 148	7 450	6 484
Trade balance	2 762	2 496	2 358	2 147	2 291	2 160	1 706	1 755	2 203	2 482	3 096	3 070
Ratio exports / imports	2.0	1.9	1.8	1.6	1.5	1.4	1.3	1.3	1.4	1.3	1.4	1.5
Terms of trade index	94.1	97.5	99.3	99.4	97.8	100.0	101.2	101.6	99.2	97.2	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Plastics processing
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

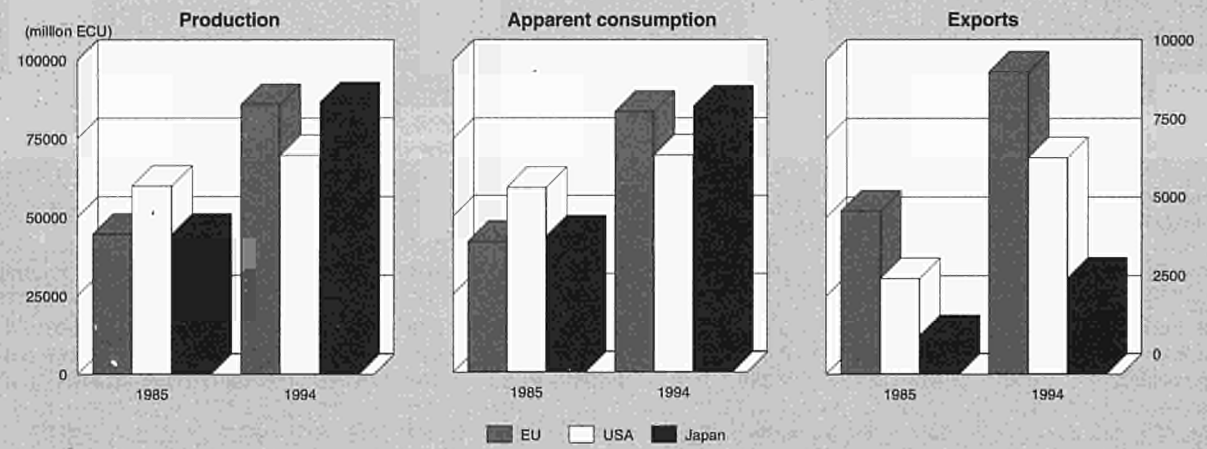
Asian economies are becoming more dependent on each other and less dependent on the US and Europe. In constant prices, Japanese production decreased in 1993, a trend which could also be observed in the EU. Japan, Korea, Taiwan, China and Singapore are the main plastics processing countries with a production of about 25 million tonnes, or 25% of world production. Asian Pacific countries consume 27.7% of total world consumption. In this region, growing application areas include mono-layer and multi-layer insulation and packaging in wire and cable applications, and agricultural film. Market opportunities include automotive applications, textiles for reducing soil erosion, competing closures, consumer items and packaging. China's output of plastics products has been growing at an annual rate of more than 13% during the 1990s. China has more than 17 000 plastics processing companies, employing over 1.6 million people.

Foreign trade

Extra-EU imports grew at an average annual rate of 10.0% during the same period, which is a higher than the corresponding growth rate for extra-EU exports (4.9%). Despite the differences in relative growth rates, the trade surplus remained at a more or less stable level of around 2.2 billion ECU. From 1985 to 1994 the value of the export/production ratio decreased from 11.7 to 11.2 while the import/consumption ratio increased from 6.5 to 8.6. In 1995, however, the export/production ratio fell slightly to 11%, while the import/consumption ratio declined to 8.0%.

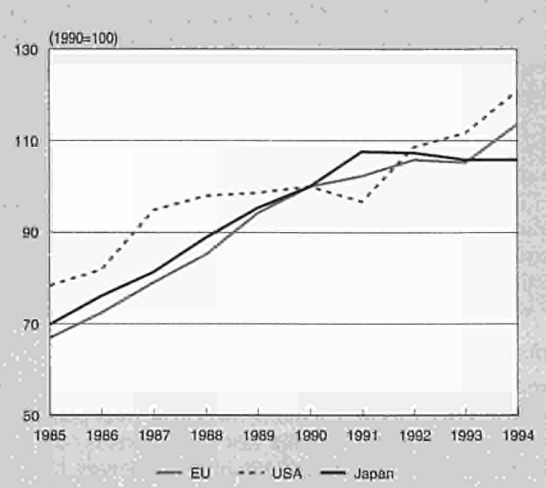
During the 1989-1994 period there has been an increase of EU-trade with the USA. Extra-EU imports from the USA grew by 38.1% during this period, reaching a value of 1.44 billion ECU. Extra-EU exports to the USA increased by 16% to reach a value of 1.2 billion ECU. Other major destinations for Extra-EU exports in 1994 were Switzerland and Austria with values of 1.18 billion and 1 billion ECU. Also Sweden

Figure 4: Plastics processing
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Plastics processing
International comparison of production in constant prices



Source: DEBA GEIE

and the East European countries such as Poland and the Czech Republic are important export markets. Besides the USA, the EFTA-countries and China have also been major suppliers for the EU.

MARKET FORCES

Demand

In 1994, thermoplastics consumption grew approximately 8.4% over 1993, while the general economic growth for Europe was only 3% in the same year. There is an extensive and diversified demand for plastics goods. Consumer goods and technical applications are characterised by continuous developments.

Products made by plastic processors range from such massproduced items as small injection mouldings and continuously produced low density polyethylene packaging film to such specialised items as composites used in Space Shuttle components. In short, virtually every product manufacturer uses, or can use, plastic components.

Demand for plastics can be subdivided into six important markets: packaging (e.g. food, beverages); building (e.g. window frames, insulation); teletronic (e.g. electrical/electronics for offices, telecommunications); automotive; other transport (e.g. railways, shipping, aircraft); other markets (e.g. agriculture, leisure, toys, household, garden, furniture). The first five sectors mentioned deliver to other industries, while the last sector, "other markets," delivers directly to consumers via distribution outlets such as department stores.

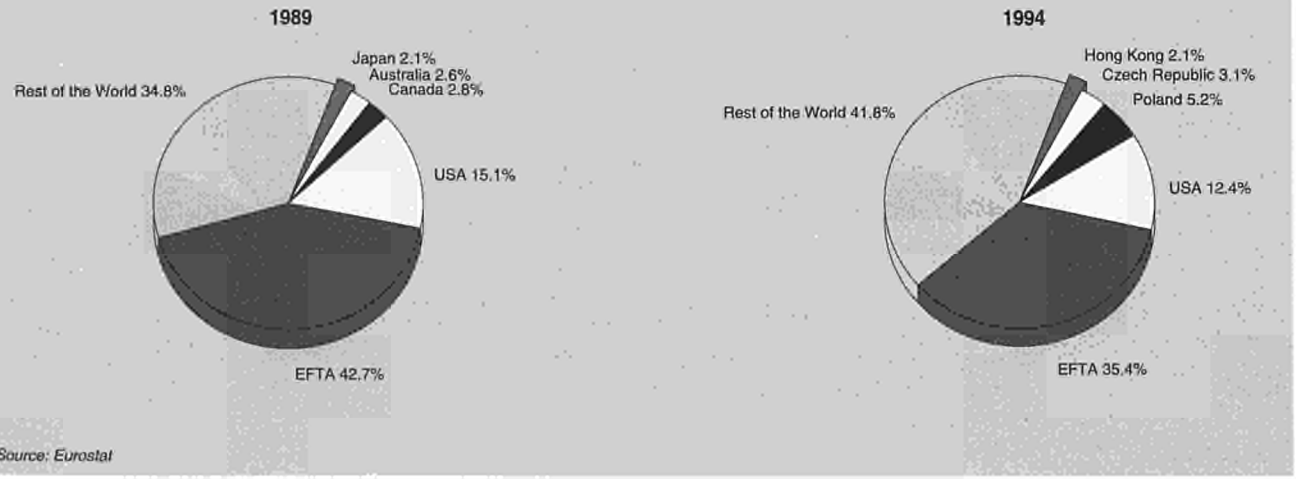
Many industries use components made of numerous types of polymers; for example, the automotive industry is replacing more and more metal parts by plastics. 5 000 types of polymers, alloys and combinations enhance the design and manufacturing of various applications (from compact discs and television casings to medical instruments). The energy crisis increased the need for low-weight materials.

Packaging

Representing one-third of the demand, the production of packaging material is the largest subsector of the plastics processing industry. In the packaging sector, plastics have been replacing glass for bottles (mineral water, soft drink, milk) and jars (yoghurts). The food industry is the major end-user followed by the distribution industry and beverages. The trend to reduce packaging weight and volume should create long term changes in demand for plastic materials. In spite of economic downturns in the EU and the burst of legislation which could impose severe pressure, pharmaceuticals, toiletries and cosmetics also thrive in the packaging sectors. Cleaning powders are starting to move away from cartons to blow-moulding plastics while cleaning fluids change blow-moulded containers to bag-in-box packaging. The European PVC packaging market has generally been declining in recent years. Due to the strong uptake in PET bottles, the PVC demand fell by 10% per year in 1993 and 1994. In other packaging applications, PVC is also losing out to PP, PET in thermoformable sheets and PP and PE in film overwrap. The best growth rate is expected for PET particularly in the carbonated drinks market (from 512.8 million ECU in 1992 to 940.2 million ECU by 1995).

Most of the polymers used in packaging are converted into plastic film. Plastic films made of PE, PP, PVC, PET are the biggest outlet for the plastics packaging industry. The major end uses are printing films for automatic packaging, shrink and stretch film for agriculture and horticulture, films for construction and for all kind of bags and sacks. Films are also used in a wide range of technical applications such as magnetic tapes, credit cards, hot foil stamping, cables, motor insulation, furniture films and office films.

Figure 6: Plastics processing
Destination of EU exports



Source: Eurostat

Building

The building sector represents one of the main markets for plastics, accounting for 20% of plastics consumption in the EU in 1993 and 1994. The downturn in the European building and construction industry in 1993 was therefore a severe blow to the plastics processors, but this was to some extent offset by the overall growth of the use of plastics in building in many European countries.

The main applications are window profiles (PVC), insulation foams (XPS, EPS, PUR), flooring (PP, PVC), wall covering (PVC), pipes and fittings (PVC, PP, PE), waterproofing membranes (PE, PVC), electrical conduits (PE, PVC), facade cladding (PVC) and internal partitions (PS, PUR, PVC). PVC is a very efficient, flame-retardant material, contributing to an all-round performance as a building material which is unrivalled. The global campaign by environmentalists against PVC does not appear to be having an impact on demand for the resin in exterior building profiles and other housing applications. On the contrary, government demands to cut energy consumption and the clear-cutting of forests actually are driving PVC into a number of construction markets (e.g. window profiles). Building products have a long life cycle and provide interesting opportunities for the use of recycled plastics materials from products with a short life cycle.

Automotive

Accounting for 7% of EU plastic consumption, thermoplastics in automotive applications should continue to rise at an average of 6% a year until 2000. The average weight of polymer per car will be more than 100 kg in 2000 (versus 95 kg in 1994). For the moment, plastics represent 11% of total weight in vehicles. The total consumption of thermoplastics in cars in West Europe reached 1.2 million tonnes in 1994 (a 7.25% increase over 1993) and this total is forecast to be 1.7 million by 2000.

PP represents 42% of the market and is predicted to gain another 20% by the year 2002. PP is used for interior and exterior products, such as bumpers. Its share should also increase by 8% per year to 2000, with strong increases in interior applications. With 18.6% of the market share, PVC is the second major material used in automotive applications and is predicted to grow at 4% per year. This will be partly due to some substitution by other materials such as PP-based foils for interior trim.

ABS has been struggling and has lost ground to alternative materials like PP. Its consumption should remain at about 105 000 tonnes during the rest of the decade. Due to the increasing use of HDPE for car fuel tanks and growth of LL/LDPE for cable and wire applications, PE materials are forecast to grow rapidly (above 8% a year up to 2000).

Germany is the largest market in Europe where 441 200 tonnes of thermoplastics were used in car components in 1994. In the UK, the demand is forecast to increase by more than 10% until 2000.

Electrical appliances

The consumption of the electrical appliances sector accounted for 7% of plastic consumption in Europe in 1994. The major plastics processed are PS, PP and ABS. The main household electrical appliances are: refrigerators and freezers, washing machines/dishwashers, ovens, food processors, coffee makers and vacuum cleaners.

Agricultural

More than 4% of plastics products in the world are used in agriculture. This sector accounts for 3% of total plastics consumption in Europe. Over the last twenty years, the use of plastics films for covering greenhouses grew very fast. From simple tunnels, they have evolved to the present multi-span structures which offer the same advantages as traditional glass-covered structures. Other applications include silage sheets and bags, sacks, screens, irrigation systems and slurry pits. Land mulching consists of covering either totally or partially the soil with a plastic sheet, most commonly made from linear polyethylene.

Other

In Italy and Spain furniture is the third outlet in order of relevance (after packaging and building) accounting for over 5.2% of the total plastics demand. This is mostly due to PP garden furniture. Plastic medical appliances should increase in the future linked to high technology industry developments.

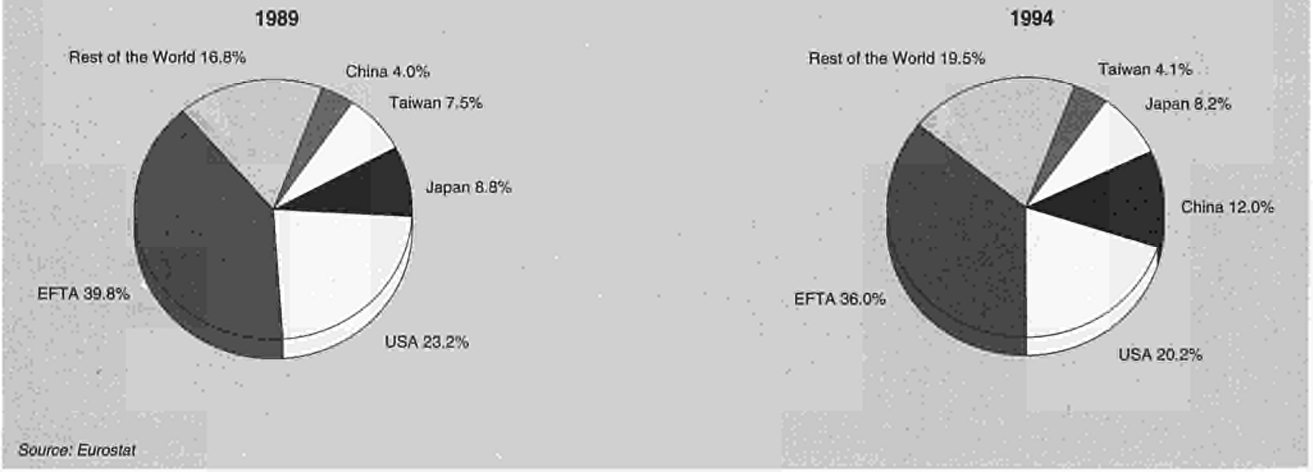
Plastic Materials

The consumption of plastic materials for 1994 in the EU was about 30 million tons. Although there was a global increase in the overall market for thermoplastic polymers, demand varied by individual polymers and markets. The following breakdown by material illustrates the growth rates for the total consumption in Europe.

LDPE

The market for LLDPE/LDPE in 1994 was good with demand up by more than 5% to stand at 5.9 million tonnes. Some areas reported increases of 12% and stretch film was the strong-

Figure 7: Plastics processing
Origin of EU imports



Source: Eurostat

Table 5: Plastics processing
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	87.0	89.6	93.2	96.1	99.4	100.0	100.5	105.4	109.7	118.2
Unit labour costs index (3)	88.9	90.6	90.8	92.5	94.6	100.0	106.1	108.1	106.9	101.1
Total unit costs index (4)	89.1	88.1	89.2	94.7	98.1	100.0	102.6	102.6	100.2	98.5
Gross operating rate (%) (5)	11.0	11.9	12.4	11.5	11.3	11.4	11.6	11.4	11.3	12.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

est performing market. Conventional grades recorded some growth in 1994 with demand up by 2% to 3%. Most of this growth occurred in the second half of the year with a particularly strong recovery for industrial packaging while consumer packaging markets remained steady.

HDPE

The market of HDPE was up by 5% in 1994 to reach 3.5 million tonnes. The best performance came from injection moulding and film applications. HDPE injection moulding demand generally tends to be similar to PP growth as these two materials compete directly for many applications depending on price and availability. Until now HDPE had the price advantage in applications where these two materials can be interchanged, such as crates, boxes and housewares. Due to a reduction in finished film product imports from Southeast Asia, film had also shown strong growth. Prices for finished products from China and other Asian countries rose, making them less attractive to Europe thus stimulating European domestic production.

PP

PP emerged as one of the best performing markets in 1994 with a further boost to demand of at least 10%. Some element of stock building by converters during the latter half of 1994 was the result of tightening supply and rising prices. These stocks were probably being rapidly depleted because suppliers report they were sold out and users were put on allocation. One of the main factors behind this growth was the recovery in demand from the automotive industry, particularly in Italy. The predictions for 1995 and 1996 concerning PP growth rates are more than 5%. The main danger for the market is that rising prices and supply shortages may lead to re-substitution by other materials.

PVC

Having to cope with the twin pressures of depressed demand and opposition from environmentalists, PVC had a difficult time in 1993 and 1994. Nevertheless in 1994, the market was up by 4.6% mostly due to growth in demand for rigid building products. Packaging remained weak, with the decision of mineral water producers in France to move over entirely to PET bottles in 1995 and 1996 causing the market to be in terminal decline. With demand recovering in 1994, PVC is a stronger market with relatively tight supply and rising prices. Future growth should be driven almost entirely by the building sector.

PS

Market growth of up to 5% was achieved in 1994. Improved export demand for domestic appliances was one reason for this growth as well as increases in packaging applications. Germany was lagging a bit behind other European countries and the strongest growth was in South Europe, especially Spain and Italy. Most applications benefited from this increase. Some 100 000 tonnes of capacity were mothballed or closed by European producers because of the difficult conditions of the past few years. The expected influx of cheap material from new Asian plants did not occur because of the strong growth in that region.

ABS, Polyamide (PA), and Polyethylene Terephtalate (PET)

Demand for these resins recovered in 1994 and was up 12% after a fairly flat market in 1993. As a result of substitution by PP and the general recession in its main sectors, ABS had declining markets for the past two years. With the recovery in the automotive trade, and particularly strong growth in the German market, demand was up by 7% to 8% to reach approximately 535 000 tonnes. For PA the improving automotive sector had also been good news. Growth of 15% for 1994 is shown although it included some element of stockpiling by processors.

Underlying market growth is likely to be 10%, putting demand over 400 000 tonnes, with Italy particularly strong because of improving car production and the development of new automotive applications. Packaging film and electronic applications had also seen good growth.

Demand for PET was reportedly up by 20% in 1994. Because PET experienced a fast growth rate in the past years, the world-wide capacity increased, which resulted in surplus supplies during 1993. This helped to keep prices down, which further encouraged the substitution of PVC and alternative packaging materials such as aluminium and glass. Although demand for PET will remain strong, increased growth further will find no capacity to supply another leap in demand.

Other Plastics

For PU the key end markets were furniture, transport and construction (together 60% of PUR consumption).

Glass fibres represent 98% of the total tonnage of reinforced fibres used. The other 2% is shared between carbon and aramid fibres. The main resins concerned were Unsaturated Polyester resins (UP), Epoxy Resins (EP), Phenolic Resins (PF) and Melamine Resins. The most important markets were domestic appliances (pot and pan handles, control buttons, table ware), electrical engineering (wiring devices, electronics), automotive industry (brake parts), sanitary section (seats), closures (caps for pharmaceutical and cosmetic use) and other markets (sliding elements, sealing).

Supply and competition

The existing capacity of polymer production, mostly in the hands of the main petrochemical groups, is in general in accordance with the demand of raw material by the processors. The plastic processing industry is mainly composed of small- and medium-sized companies. On one hand for the procurement of raw material, the medium-sized plastics processor has to deal with strong polymer producing companies, and

Table 6: Plastics processing
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.0	1.1
Danmark	1.3	1.1
Deutschland	1.1	1.1
Ellada	0.8	0.8
España	1.0	0.8
France	0.8	0.8
Ireland	0.8	0.6
Italia	1.1	1.1
Luxembourg	N/A	N/A
Nederland	0.7	0.9
Portugal	0.7	0.5
United Kingdom	0.9	1.1

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

on the other hand it has to sell its plastic products through large scale industries like car makers, manufacturers of electrical and electronic equipment and department store chains.

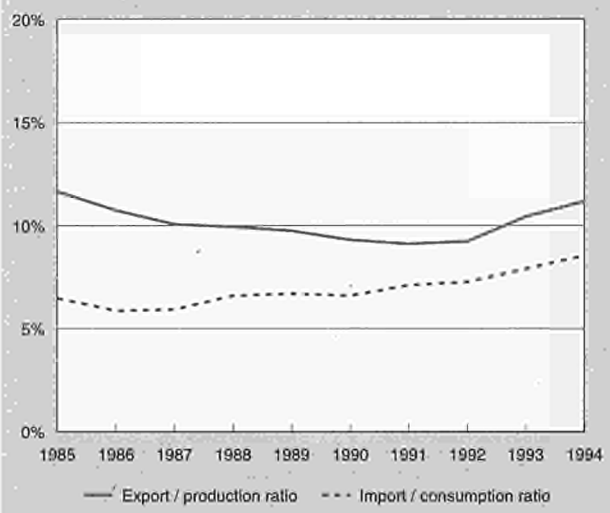
The highly advanced technology in the European processing companies enables them to export 11% of their total production in spite of the high transportation costs for plastics products. The same happens to the imported goods where extra-EU imports account only for 8% of total EU consumption. Margins have narrowed due to relatively low sales prices.

Production process

The plastic processing industry utilises a variety of production methods and plastic materials. For every production method, a skilled labour force and important investments in numerically controlled machines are necessary. Professional training is very important for the plastics processors in the EU. Plastics are increasingly used because they offer complete freedom of design, because they are resistant and low in energy content. Plastics lead to many new applications in consumer products as well as in hi-tech applications. Different technologies operate such as injection moulding, compression, extrusion, blow moulding extrusion, calandering, thermoforming, film extrusion blowing, blow moulding, hand lay up of fibre reinforced plastics and coating.

The breakdown of EU production of thermoset GRP by manufacturing technique shows that manual techniques still account for about 35%, followed by automated techniques like SMC (Sheet Moulding Compound)/BMC (Bulk Moulding Compound). Semi-finished products and finished parts are at the centre of the developments mainly linked to the requirements of the automotive industry and transport sector in general (118 000 tonnes).

Figure 8: Plastics processing
Trade intensities



Source: DEBA GEIE, Eurostat

INDUSTRY STRUCTURE

Companies

The number of plastics converting companies in Europe is adding up to 27 000 mostly small- and medium-sized companies. Only a dozen companies employ more than a thousand persons. All together this industry sector employs around 752 000 people in the EU countries. The sector experienced consistent growth during recent years. This was not only achieved by an extension of the sales of the existing companies, but also by the market entrance of new companies.

In spite of being a sector of small- and medium-sized companies, the plastics processing industry in Europe also has larger scale companies in terms of production and turnover, such as the following: Plastic Omnium (F), Wavin (NL), Alphacan (F), Rehau (D), CMB Packaging (F), BPI (UK), Schöller (D), Autobar (UK), Allibert (D), Klockner (D), Peguform (D), Freudenberg (D), subsidiaries of Hoechst (D) and Solvay (B), Fardem (NL), Danaklon (DK) and Ilpa (I).

Strategies

The general downturn in European economic activity in the early 1990s resulted in rationalisation programmes in major firms. The best growth opportunities in the coming years may come from new markets in East Europe and new applications in leisure and health care. Plastics lead to many new applications in consumer products as well as in high tech applications. This is the reason why the sector as a whole experienced a consistent growth rate during recent years.

High wages, social environmental and energy costs could increasingly lead to a move of production facilities to lower cost locations in Asia or East Europe, particularly with regards to the lower value goods. Concentrations are expected in different fields such as subcontracting for consumer electronics and automotive sectors.

ENVIRONMENT

The adoption of the Packaging and Packaging Waste directive, the Eco-label regulation, the Eco-audit system and the priority waste stream project all have caused some concern to the plastics processors. European firms have to comply with these EU directives or guidelines which may pose severe problems for the smaller and medium sized companies of the plastic converting industry to adapt their products and production methods.

On the EU-level, the industry has developed a "Sustainable Development Chart" that incorporates the basic principles of the Rio Convention signed in 1992 (cfr. Agenda 21). According to this chart the plastics products should deal with different waste management options in order to remain sustainable. Recycling as one of the options has been developed in different countries and for different applications. PVC bottles transformed into structural core foam for heavy profiles and large diameter pipe, EPS packaging transformed into floor insulation panel, floor transformed into floor insulation panel, pipes transformed into pipe and window profiles transformed into window

profiles are examples of plastics recycling in the building sector in particular.

New "cleaner" technologies are being developed by research institutes in order to contribute to sustainable development. Saving energy and saving resources has become a tradition of the plastics industry in general. Experience such as national initiatives on ELVs show that "negotiated agreements" (i.e. voluntary agreements) are deemed to overcome the need for EU legislation and create deregulation within the EU, especially for environmental issues.

REGULATIONS

The EU Commission is elaborating decisions or regulations which are affecting the industry of plastics converters. Concerning food contact applications, the Commission is elaborating positive lists for such items as monomers, additives and colorants used in plastic products. The building sector is confronted with the Building Products directive and a possible directive on building waste. One of the major concerns in the plastics industry is the management of waste. The EU Commission produced legislation, based on the framework Directive on waste (91/156/EEC), which covers different fields touching the industry (e.g. Development of packaging and packaging waste Directive). Other waste streams projects are finalised (e.g. automotive, building, hospital, teletronic) and are of major concern to the plastics converters industry. A new classification (Euroclasses) for building materials according to the essential requirements of the construction products directive (reaction to fire) will be developed during 1996 in order to harmonise European standards for building products.

OUTLOOK

The consumption of plastics will further increase in the next years. The existing production capacities can provide additional consumption rates for most product classes. At present it is still difficult to judge to what extent recycled products can decrease the future consumption of virgin polymers.

For 1996, the plastics converters expect growth of 3%, with food and beverage industry packaging applications lagging behind the other sectors. This trend can also be assumed for the years following 1996. A recession in the coming years is not foreseen since the transition to a flatter growth level will be supported by positive impulses resulting from sharp increases in world trade. Nevertheless, certain risks remain owing to the economic mood among consumers and businesses. A degree of uncertainty exists, with unemployment and currency turmoil accounting for a large share.

The different growth rates in the plastics raw materials and converted plastics sectors in 1995 is the result of the difference in inventory levels. For the coming years, equal growth rates are being assumed and will probably lie between 4% and 5%. For polyethylene and polypropylene, relatively good capacity utilisation is also expected. The plastics industry is working at heightening public awareness of its many initiatives to contribute to a cleaner environment. Taking into consideration the efforts in developing recycled plastic products, the plastic processing industry is foreseeing a bright future.

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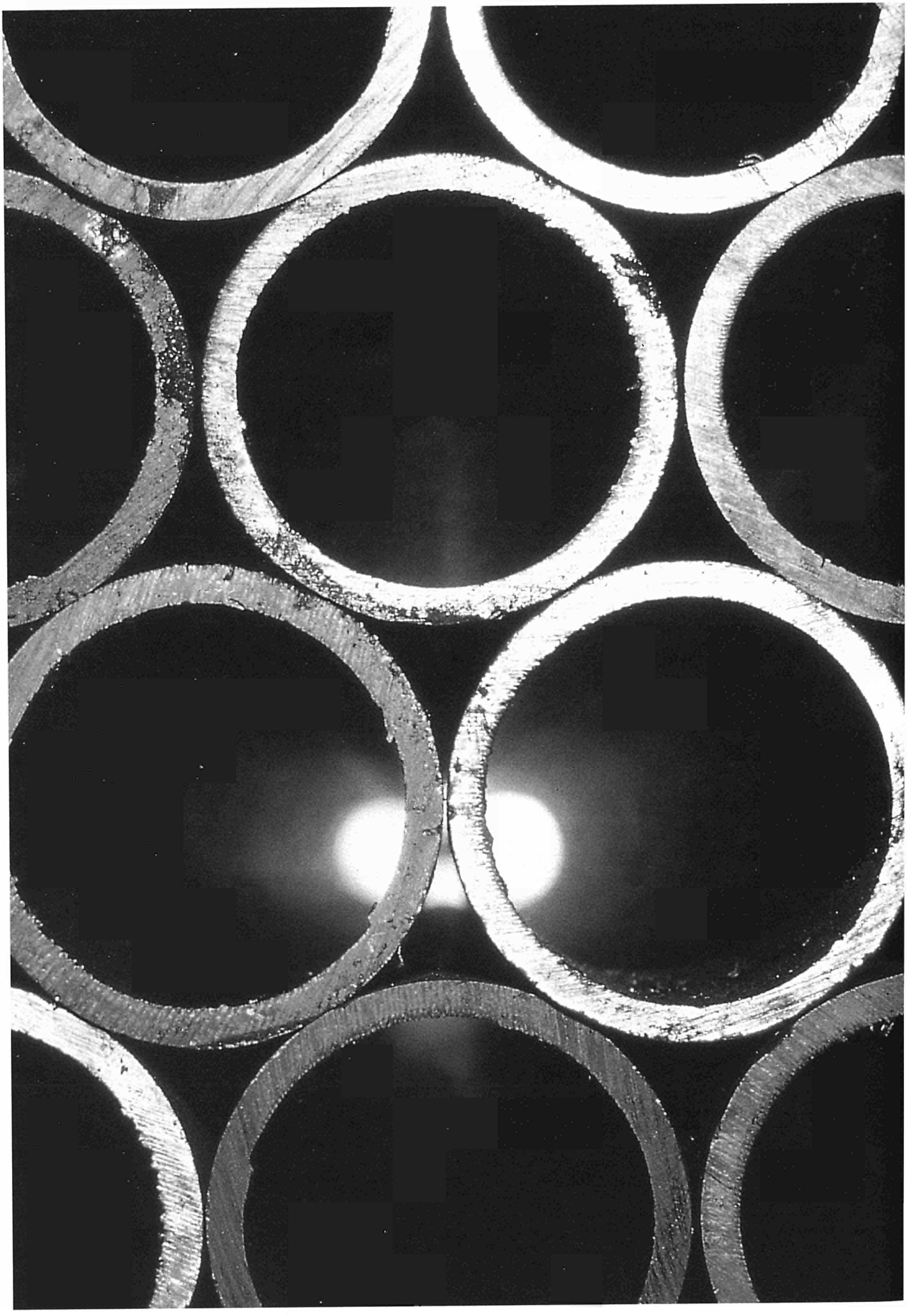
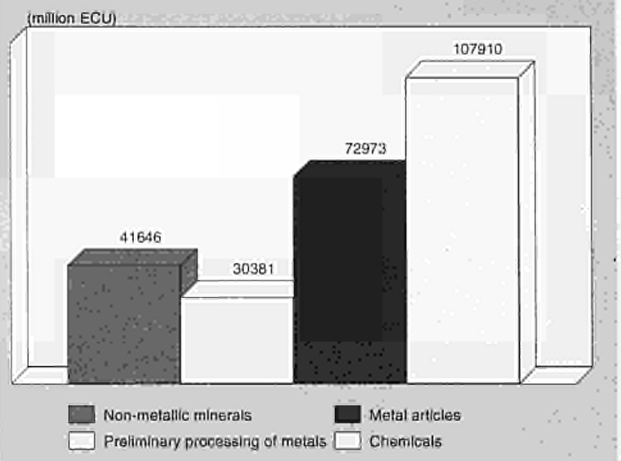


Overview

Nace (Revision 1) 26

The non-metallic products industry concerns products which are largely related to the construction sector. Thus after the prosperous years of 1994/95, the current slowdown in construction activity in the EU is adversely affecting some major segments of this industry. Nevertheless the decline is being read as only marginal and short term and more favourable conditions are still being predicted beyond 1997. The EU industry is technically advanced and generally competitive on a world level, although the process of restructuring and modernisation can help the process. Generally speaking, imports form a small part of total consumption but, for certain sub-sectors (particularly for certain glass and ceramic sub-sectors), imports have been growing in recent years, especially from countries with low labour costs. The sector is a major user of fossil fuels and is thus heavily involved in environmental issues regarding energy conservation and atmospheric pollution.

Figure 1:Non-metallic mineral products
Value added in comparison with related industries, 1994



Source: DEBA GEIE

INDUSTRY PROFILE

Description of the sector

Non-metallic minerals products are made up of the following groups: glass (Nace Rev1 26.1); ceramic goods (Nace Rev1 26.2 + 26.3); clay products (Nace Rev1 26.4 - bricks and rooftiles); cement, lime, and plaster (Nace Rev1 26.5); concrete (Nace Rev1 26.6 - precast and ready-mixed); and stone (Nace Rev1 26.7).

Clay products, cement, concrete, and plaster are used almost exclusively by the construction industry, which is also prominently featured as a major customer for lime, glass, and ceramic goods (particularly tiles and sanitaryware). Nevertheless these latter products are widely used across a broad spectrum of industries embracing metallurgy, chemicals, food and beverages, electronics, and electrical and mechanical engineering. A number of glass and ceramic items are considered as domestic consumer items.

Recent trends

EU production of non-metallic mineral products was valued at 102 billion ECU for the EU-12 countries in 1994 and 114 billion ECU for the EU-15 countries in 1995, and involved materials measured in hundreds of millions of tonnes. The real annual growth rate over the 1985-1994 period averaged 2.2% for both production and consumption. In current price terms 1993 was the only year in the 1985-95 period to display a fall in activity (4.9% for production and 5.8% for consumption) and strong growth was experienced in 1994 and 1995.

The EU is a major exporter of non-metallic mineral products with extra-EU exports accounting for over 10% of production in both 1994 and 1995. Imports are also significant – about 5% of consumption in 1994/95 – but the trade balance remains strongly positive at 6.1 billion ECU in 1995 and the export:import ratio is growing again, reaching 2.2 in 1995 after the low of 2.0 in 1992.

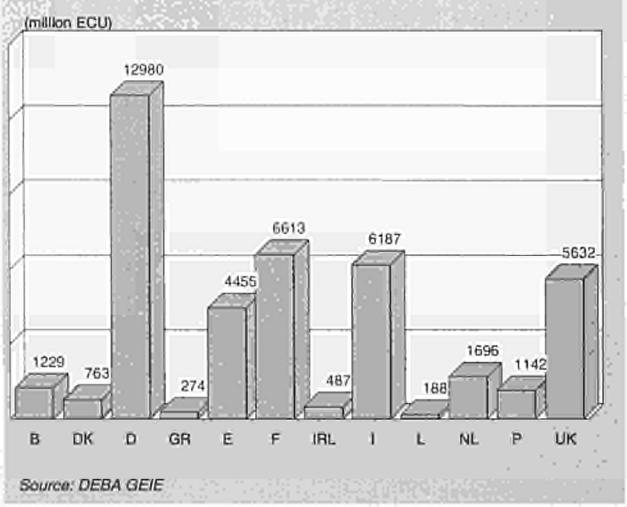
International comparison

The EU is the world's leading producer of non-metallic mineral products and its 1994 production value exceeded those of the USA and Japan by factors of 1.9 and 1.3 respectively. The industries of both the EU and USA have remained stable in real terms since 1990, whereas that of Japan has contracted.

Foreign trade

Foreign trade plays a somewhat modest role in the overall picture, imports averaged 5% of consumption and exports averaged 10% over the 1990-1995 period. But its significance varies from high in the glass, ceramics, and dimension stone sectors to low in the concrete and clay product sectors. As suggested above the trade balance is strongly positive at just over 2:1. The effect of Austria, Sweden, and Finland joining the EU will have a broadly neutral effect on the trade balance since all three have been significant importers and exporters of the products of this group.

Figure 2: Non-metallic mineral products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Non-metallic mineral products
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	63 482	91 921	95 062	96 342	90 729	96 478	99 067	108 172	114 400	121 120	128 650
Production	68 949	97 001	99 633	100 623	95 688	101 941	105 152	114 235	120 800	127 880	135 790
Extra-EU exports	8 077	8 515	8 582	8 623	9 379	10 363	11 268	10 719	11 460	12 180	12 950
Trade balance	5 467	5 079	4 570	4 281	4 959	5 463	6 085	6 063	6 400	6 760	7 140
Employment (thousands)	1 040	1 048	1 037	1 002	940	917	919	981	980	980	980

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Non-metallic mineral products
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Asbestos	647	723	115
Cement, lime and plaster	14 163	14 285	527
Ceramic goods	12 956	15 767	4 232
Clay products	6 189	6 420	295
Concrete	31 058	31 239	372
Glass	21 217	22 387	3 123
Grindstones	1 572	1 687	478
Stone	8 676	9 432	1 221

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Non-metallic mineral products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.3	-0.3	2.2	5.2
Production	4.2	-0.2	2.2	5.3
Extra-EU exports	0.1	3.4	1.6	16.2
Extra-EU imports	-3.7	6.3	0.6	28.7

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Non-metallic mineral products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	8 077	7 165	6 989	7 594	8 627	8 515	8 582	8 623	9 379	10 363	11 268	10 719
Extra-EU imports	2 610	2 222	2 350	2 769	3 199	3 435	4 012	4 342	4 420	4 900	5 183	4 656
Trade balance	5 467	4 943	4 638	4 825	5 428	5 079	4 570	4 281	4 959	5 463	6 085	6 063
Ratio exports / imports	3.1	3.2	3.0	2.7	2.7	2.5	2.1	2.0	2.1	2.1	2.2	2.3
Terms of trade index	151.0	131.1	119.0	110.4	108.5	100.0	85.7	79.5	86.1	95.0	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 5: Non-metallic mineral products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	82.0	84.4	88.7	96.2	100.4	100.0	99.2	102.2	104.9	113.3
Unit labour costs index (3)	93.5	94.2	94.4	93.0	95.0	100.0	108.2	110.8	110.8	105.7
Total unit costs index (4)	90.3	88.8	88.7	89.8	95.3	100.0	106.5	108.9	107.9	107.0
Gross operating rate (%) (5)	12.9	15.3	16.3	17.7	16.7	15.5	14.3	13.4	13.1	14.5

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Major extra-EU15 sources of imports in 1994/95 were China, the Czech Republic, Japan, Poland, Switzerland, Turkey, and the USA. Major destinations for exports (by region and most prominent countries) were North America (the USA, Canada, and Mexico); the Middle East (Saudi Arabia, Israel, and the United Arab Emirates); the Far East (Japan, Hong Kong, Singapore, Taiwan, and South Korea); the remaining EFTA countries (Switzerland and Norway), and Eastern Europe (Poland, Czech Republic, Hungary, and Russia),

MARKET FORCES

Demand

The construction industry accounts for over two-thirds of the consumption of non-metallic mineral products and thus the fortunes of producing companies in the cement, concrete products, and bricks and tiles sectors have tended to follow closely the marked ebb and flow of this industry. Glass and ceramic goods demand is also partially affected by construction activity, but overall consumption is spread more evenly across a range of industries from general manufacturing to food, beverages, and catering. Advanced materials will continue to grow fast from a small volume base.

Supply and competition

Most of the products of this group are major bulk items of relatively low value, which are based on local raw materials and are sold primarily to local markets. Transportation costs are always a major consideration and have generally proved a deterrent to competition from distant sources. Some of the higher value products in the glass and ceramics segments have always been exempted from such considerations, and the EU is fortunate in possessing both excellent "domestic" raw material sources as well as technical and design skills to make these industries into top export performers.

However, it should be noted that during the past 20 years, major bulk items such as cement were being shipped increasingly long distances due to the low cost of ocean transportation by large bulk carriers. Thus a modern cement plant close to a shipping point can supply markets at competitive prices on the other side of the globe, providing there is a bulk terminal at the other end to handle and store the products. European producers were actually among the first to take advantage of such opportunities. However, because of the new production expansions in former importing countries (for instance, in the Middle East) the international market has become more competitive and certain regions of the EU have become more vulnerable to competition from other regions such as Eastern Europe.

Production process

Europe has been at the forefront of many of the technological advances in processing methods employed by the non-metallic mineral products industries, from specific examples such as the float glass process and ceramic forming and firing techniques to energy saving measures that apply to the industry as a whole. A close relationship exists between this industry and its equipment suppliers which can be expected to be just as fruitful in the future as it has been in the past.

INDUSTRY STRUCTURE

Companies

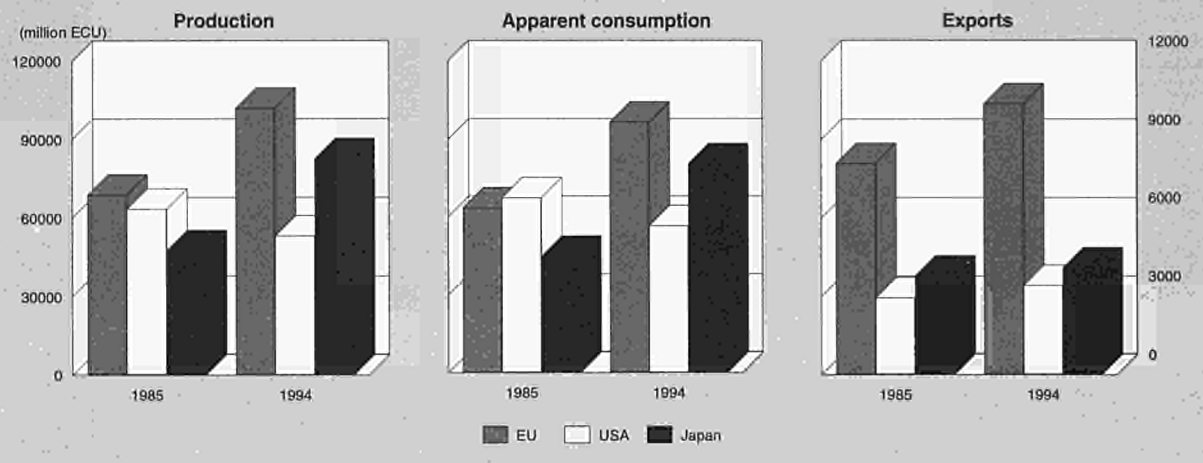
The diversity of products contained in this group is mirrored in the diversity of companies involved, which range from major international construction groups with turnovers measured in billions of ECU and employees into tens of thousands to small family-owned businesses with a handful of employees and a highly regional sphere of interest. Concentration is higher in cement and glass than in concrete products, bricks, and ceramics. Also the process of concentration has developed further in the UK and France than in Germany, Italy, and

Table 6: Non-metallic mineral products
Breakdown by size of enterprise, 1992 (1)

(%)	Number of enterprises (units)	Share of number of enterprises	Share of employment	Share of turnover
Less than 20 employees	77 146	89.5	24.4	20.3
20-99 employees	7 304	8.5	22.8	22.8
100 or more employees	1 745	2.0	52.8	56.9

(1) Estimates for EUR15.
Source: Eurostat Enterprises in Europe

Figure 3: Non-metallic mineral products
Production and employment compared to EU total manufacturing industry



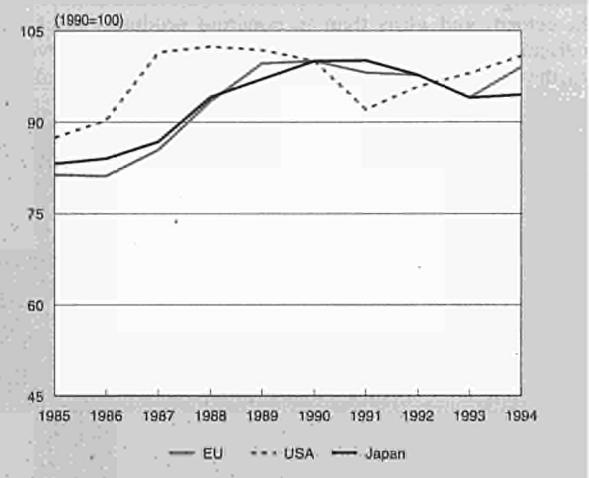
1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Spain, and has gained momentum in recent years as groups acquire a more obvious pan-European status. The top six EU companies [Saint Gobain (F), Lafarge Coppee (F), RMC group (UK), Pilkington (UK), Heidelberger Zement (D) and Redland (UK)] plus the Swiss-based cement giant, Holderbank, account for over 30% of total production. Nevertheless "small-to-medium is beautiful" is a suitable slogan for a number of modern and efficient companies operating in more specialised areas of non-metallic mineral product manufacture.

REGIONAL DISTRIBUTION

EU production of non-metallic mineral products is widespread throughout the Community. The location of production sites is often governed by the raw materials used, e.g. cement factories based on limestone deposits, ceramics industries close to clay deposits, etc.

Figure 4: Non-metallic mineral products
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

ENVIRONMENT

The industries of the non-metallic mineral products sector are highly energy intensive, yet have achieved high energy efficiency through technological advances and best-practice procedures. Overall these industries have been highly successful in tackling environmental issues such as control of sulphur and dust emissions and in developing recycling (where glass is in an industry leader). Nevertheless in a highly competitive international environment they would be particularly vulnerable to legislation which penalised users of fossil fuels (i.e. the carbon tax).

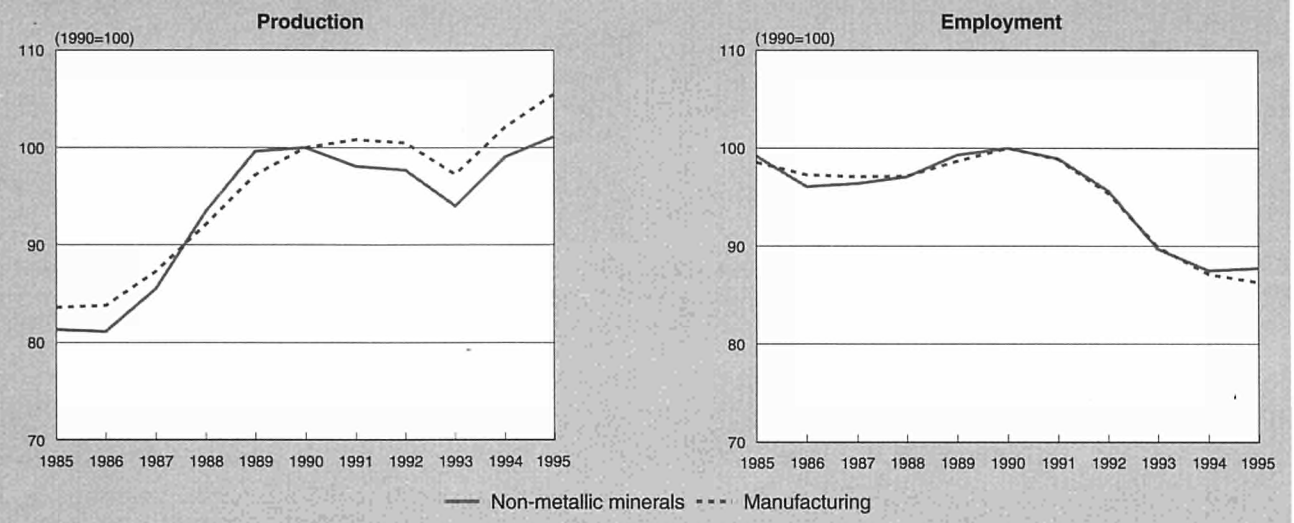
REGULATIONS

The EU building industry is well advanced in its standardisation programme channelled through the European Committee for Standardisation (CEN). The industry associations tend to view standardisation programmes and quality certification systems in a positive light because of the contribution to consumer confidence and high quality image of the products concerned. A further aim is to prevent or at least minimise the possibility of sub-standard products appearing on the market (from sources within or outside the EU) which could tarnish the image of the industry as a whole.

It should be recognised that standards must be technically appropriate and commercially realistic and not be drawn up for protectionist reasons. Thus where possible standards should be expressed in performance terms rather than too closely defining materials peculiar to particular European regions. In certain cases, for instance, for many concrete and ceramic clay-based products, a framework specification is more appropriate than single unique European-wide standard.

It should be recognised that international standards already exist for a number of non-metallic mineral products such as glass, cement, and refractory products. Thus European standards to some extent confirm existing practice but often help in the process of removing grey areas. Other products, such as clay bricks and tiles and certain concrete products, are very regional in nature and products are defined by such factors as raw materials and climate and are not amenable to European-wide uniformity. The same can be said for different reasons for products such as ceramic whitewares which incorporate aesthetic as well as functional characteristics. Nevertheless the aim to standardise certain testing procedures and

Figure 5: Non-metallic mineral products
International comparison of production in constant prices



Source: DEBA GEIE

Table 7: Non-metallic mineral products
The fifteen largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Compagnie de Saint-Gobain	F	11 325	551.1	80.91
Lafarge	F	4 993	338.3	33.23
RMC Group	GBR	4 746	174.3	27.37
Pilkington	GBR	3 475	-421.5	37.10
Heidelberger Zement	D	3 256	111.3	24.17
Italcementi	I	2 718	-51.9	18.76
Blue Circle Industries	GBR	2 259	128.0	19.69
CRH	IRL	2 033	117.2	13.69
Ciments Francais	F	2 020	-16.1	11.40
BPB Industries	GBR	1 733	143.4	11.04
Euroc	S	1 444	79.5	8.44
Cimenteries CBR Cementbedrijven	B	1 335	72.8	11.65
Imetal	F	1 142	83.7	6.45
Dyckerhoff	D	1 133	53.2	5.04
Partek	FIN	998	-31.4	8.13

Source: DABLE

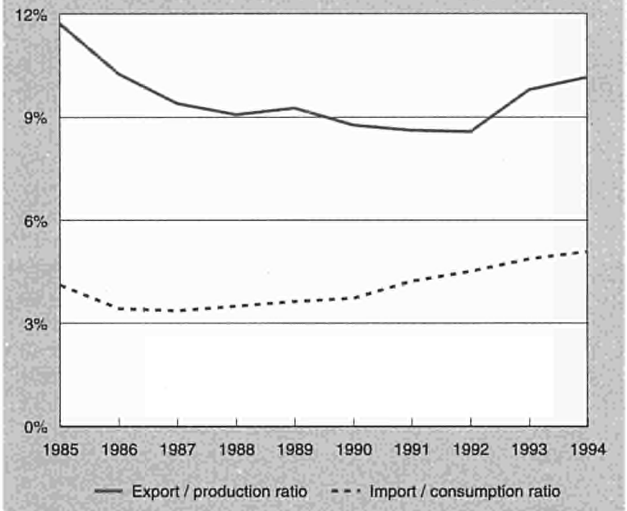
Figure 6: Non-metallic mineral products
Destination of EU exports

Source: Eurostat

Figure 7: Non-metallic mineral products
Origin of EU imports

Source: Eurostat

Figure 8: Non-metallic mineral products
Trade intensities



Source: DEBA GEIE, Eurostat

Table 8: Non-metallic mineral products
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.9	1.0
Danmark	1.0	0.9
Deutschland	0.9	1.0
Ellada	1.4	1.5
España	1.4	1.5
France	0.9	0.8
Ireland	1.4	0.8
Italia	1.3	1.1
Luxembourg	1.3	1.9
Nederland	0.6	0.8
Portugal	1.4	1.9
United Kingdom	1.1	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

developing quality certification systems, backed up by third party certification, can only assist in raising standards in "non-standard" products.

OUTLOOK

The performance of the non-metallic mineral products sector as a whole is likely to be somewhat subdued in 1996/97 compared to the relative boom years of 1994/95, because of the close ties of much of this sector with the construction industry. Nevertheless a number of the EU's internationally orientated companies will benefit from more positive construction activity elsewhere (including Eastern Europe). Furthermore the less-construction-orientated sub-sectors of the glass and ceramics industry appear to be enjoying continued growth.

Written by: B.M. Coope & Partners

Glass
NACE (Revision 1) 26.1

The EU is the world's largest glass market, in terms of both production and consumption. Its glass industry showed positive growth over the 1983-1994 period, apart from 1992-93, when it was affected by the general economic recession. Large firms performed particularly well, reaping the benefits of restructuring and the technological advances made in the 1980s. These structural improvements significantly boosted competitiveness in world markets, and balanced supply with growing demand. Significant progress has been made in recycling and in energy-saving production processes.

INDUSTRY PROFILE

Description of the sector

The glass industry accounts for 27% of the non-metallic mineral sector. It is categorised under the NACE Rev.1 group 26.1, and includes the following five main product areas (see individual monograph for a more detailed description):

- container glass (consisting of glass bottles, jars and "flacons");
- flat glass (consisting of window glass);
- tableware (domestic glass);
- fibre glass (for insulation and reinforcement);
- special glass (such as optical and industrial glassware).

In 1995, EU glass production totalled 25 073 794 tonnes, of which container glass accounted for 65.3% and flat glass 24.8%. Tableware, fibre glass and special glass accounted for 3.8%, 1.8% and 4.3% respectively.

The principal raw materials for glass manufacture are mineral products such as silica sand, limestone, dolomite, soda ash, feldspathic materials, and borates.

The principal consuming industries are the food and drink industries (for container glass) and the construction and motor vehicle industries (for flat glass), although the full range of glass products finds important applications across the whole spectrum of industry.

The major producing countries are Germany, France, the UK, Italy, Spain, and Belgium.

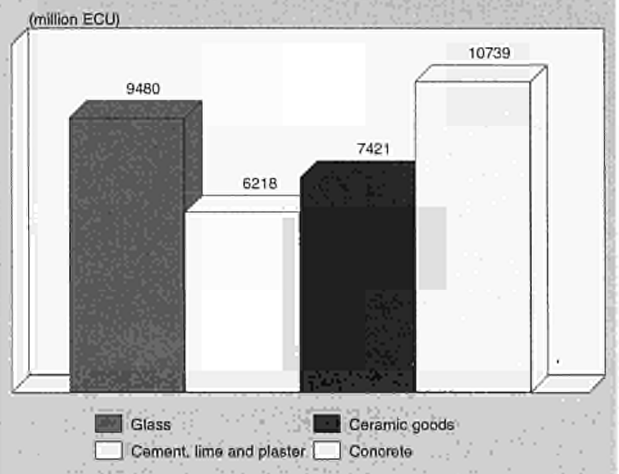
Recent trends

Apart from a fall in both production and consumption during the period 1992-1993, the EU glass industry has displayed excellent growth, with production averaging 2.7% and apparent consumption averaging 3.2% per annum in real terms, between 1985 and 1994. In 1994, the industry maintained a healthy trade balance, with exports at 1 725 148 tonnes (accounting for 6.9% of production) outstripping imports at 1 607 087 tonnes (accounting for 6.4%% of apparent consumption). It should be noted, however, that different segments have had mixed fortunes over the 1985-1994 period, which the following monographs will expand upon.

International comparison

The EU was the world's largest glass producer in 1995, with a total output of 24.4 million tonnes valued at 24.1 billion ECU. US glass production was approximately three-quarters and Japanese production just over two-thirds of the EU level. Over the 1985-1994 period, Japan's production grew the fastest (by nearly 50%), followed by the EU, with 43%. In contrast, US production was slow with 11% growth over the decade.

Figure 1: Glass
Value added in comparison with related industries, 1994



Source: DEBA GEIE

Foreign trade

Overall, foreign trade plays an important, though not dominant, role in the EU glass market. With a total of 576 030 tonnes, unworked flat glass accounted for the highest share of total extra-EU exports, which was down from the very high figure of 1994, when export demand, in particular, was buoyant.

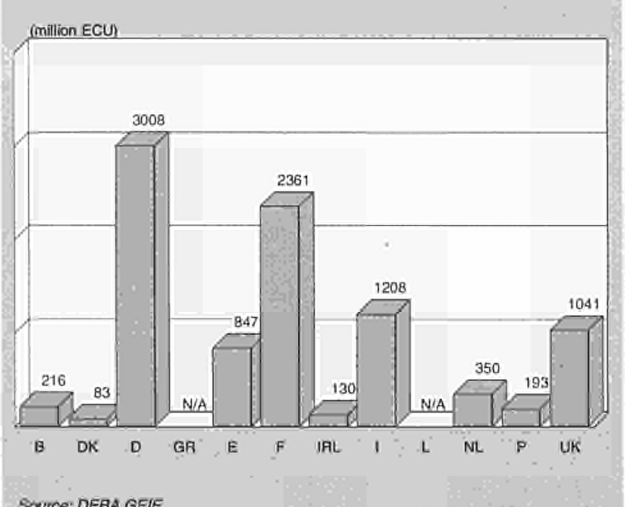
However, exports were of greatest importance to the tableware sector, with extra-EU exports representing 35% of production in 1995. Exports were of the least importance to the container sector, where the equivalent figure was less than 3%. Foreign trade of fibres and special glass sectors accounted for 15% and 31% of production respectively, with foreign trade in the flat sector accounting for 9% of production.

MARKET FORCES

Demand

About 80% of glass sales are to other industries, and therefore glass is not tied too closely to a single or narrow range of

Figure 2: Glass
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Glass
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	14 229	19 559	20 112	20 922	21 077	20 041	21 217	22 594	24 206	25 680	27 270	29 040
Production	15 610	15 996	21 104	21 703	21 807	20 994	22 387	23 739	25 498	27 030	28 690	30 530
Extra-EU exports	2 490	2 210	2 475	2 490	2 488	2 714	3 123	3 163	3 019	3 260	3 490	3 750
Trade balance	1 402	1 199	992	781	731	953	1 170	1 144	1 292	1 360	1 420	1 490
Employment (thousands)	240	246	245	246	242	227	222	221	235	237	238	239

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Glass
Main indicators in volume broken down by sector, 1994

(thousand tonnes)	Apparent consumption	Production	Extra-EU exports
Container glass	15 791.6	15 824.4	445.6
Flat glass (unworked)	6 023.2	6 166.7	753.0
Tableware (1)	744.2	963.2	361.6
Fibres (reinforcement)	396.5	368.5	101.4
Others (1)	1 099.4	1 064.2	214.1
Total	24 055.1	24 387.0	1 875.6

(1) Excluding Spain.
Source: CPIV

Table 3: Glass
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.0	1.0	3.2	5.9
Production	3.9	1.2	2.7	6.7
Extra-EU exports	-2.2	3.6	0.3	12.0
Extra-EU imports	6.3	3.4	5.0	5.3

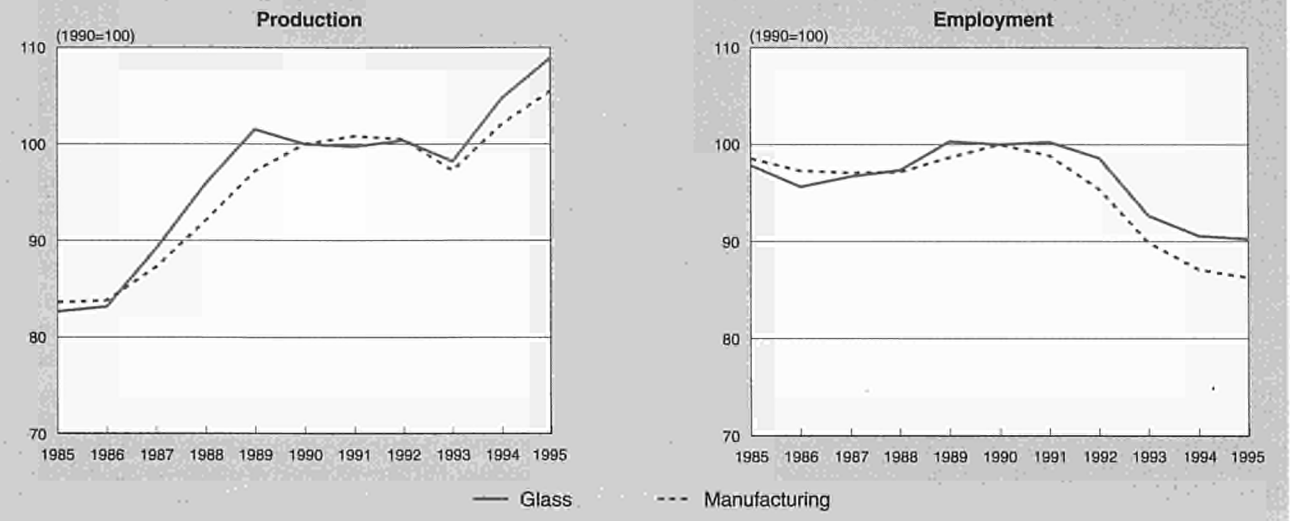
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Glass
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 490	2 210	2 116	2 265	2 565	2 475	2 490	2 488	2 714	3 123	3 163	3 019
Extra-EU imports	1 087	1 011	1 080	1 228	1 425	1 483	1 709	1 758	1 761	1 952	2 019	1 727
Trade balance	1 402	1 199	1 036	1 037	1 139	992	781	731	953	1 170	1 144	1 292
Ratio exports / imports	2	2	2	2	2	2	1	1	2	2	2	2
Terms of trade index	95	96	96	98	98	100	98	100	98	95	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Glass
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

client industries. However, the fortunes of particular sub-sectors of the glass industry are often related to specific industries.

Glass is mainly used for packaging (container or hollow glass) and as such, the food and beverage industry accounts for about 25% of glass sales. Other important glass users include the construction sector, accounting for 15% of sales and the car industry, which accounts for 6% of sales. Private consumption accounts for 10% to 15% of glass sales.

Supply and competition

As the world's major market for glass, the EU is a natural target for foreign companies wishing to expand their sales through acquisition (e.g. Asahi Glass in Belgium and the Netherlands) or by building new plants (e.g. Guardian in Luxembourg and Spain). Thus EU producers undoubtedly operate in a very competitive environment.

The major competitive threat to EU firms is from East European countries which are able to produce glass at lower cost. The low labour costs and close proximity to markets have provided East European countries with the platform for the growing export trade described above.

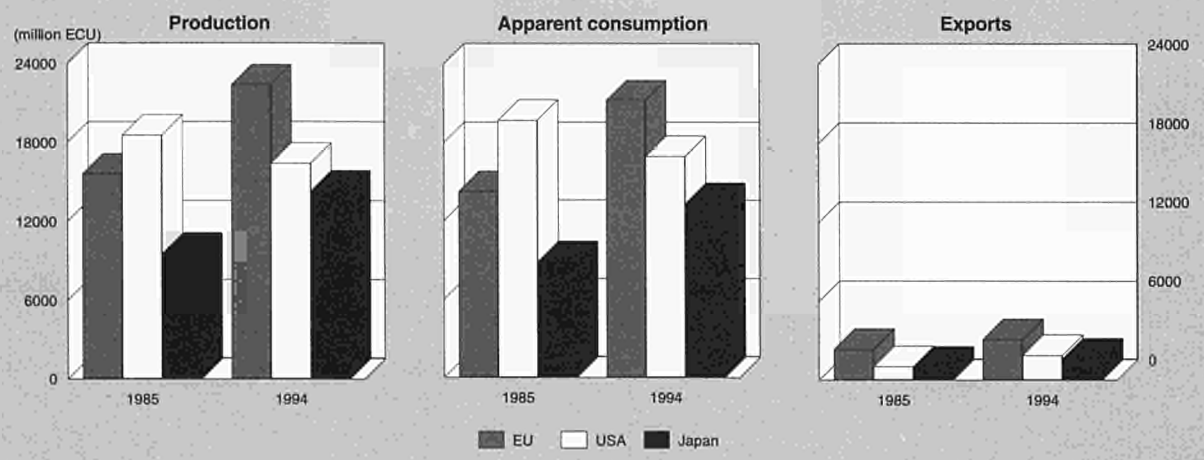
Due to increasing competition, companies are now also offer their clients planning, special commissioning and after sales services.

Production process

Technology in the glass industry has considerably improved in the past few years, and there is still potential for improvement.

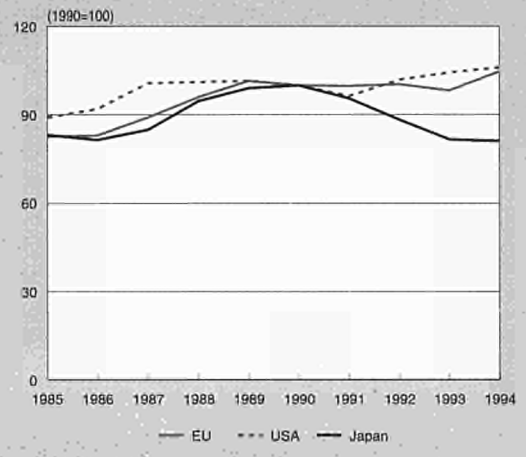
For the glass container sector, the past 10 years have been marked by major advances to productivity, process monitoring and control systems, and quality, as well as recycling and lightweighting (the production of strong lightweight bottles). Research has been done on furnace performance with regard to energy efficiency and the uses of recycled glass: it has been shown that reductions of stone inclusion in glass is achieved by using cullet that is transformed into powder. The float glass process (originally launched over 30 years ago)

Figure 4: Glass
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Glass
International comparison of production in constant prices



Source: DEBA GEIE

continues to dominate flat glass production in Europe and has resulted in the closure of all but a handful of older technology sheet glass plants.

Other innovations relate to improvements in monitoring, analysing and reacting promptly to temperature fluctuations in the glass stream of the forehearth, one of the most critical factors for ensuring consistently high quality products; new low-emissivity, solar control and anti-static and anti-reflective coatings; hydraulic pressing systems, provision of on-line information about the actual behaviour of the glass inside the mould; edge roll machines for float glass, ensuring the continuous revolution of a toothed knurl with a finely adjustable, stable revolution speed; heat extractors, designed to increase cooling capacity; head drilling machines which handle glass for a maximum size of 400mm x 200mm.

INDUSTRY STRUCTURE

Companies

The EU glass industry is highly concentrated. 80% of glass is produced by a handful of large multinational companies, each with more than 500 employees. The other companies are medium or small in size, often of a traditional family type. This structure is due mainly to the capital intensive nature of the production process: production for hollow or flat glass using modern processes requires heavy investments and thus sizeable financial resources.

Strategies

The glass industry is going through a period of re-organisation. In order to reduce costs and compete more effectively in an increasingly global market place, smaller companies are merging together to benefit from economies of scale. Firms are also responding to the huge variations in the world-wide labour market, and are making investments in lower-cost countries to benefit from these cheaper factors of production.

In addition, the major groups that dominate the glass sector are tending towards the internationalisation of their operations, and users are increasingly asking for homogeneous quality, regardless of their country of residence.

With the extensive investments that introduced the float glass production process into the flat glass sector progressively from the early 1970s, came the modernisation of the European flat glass industry, but also the threat of excess production capacity in times of reduced demand. These factors have caused extensive restructuring and major job cuts.

REGIONAL DISTRIBUTION

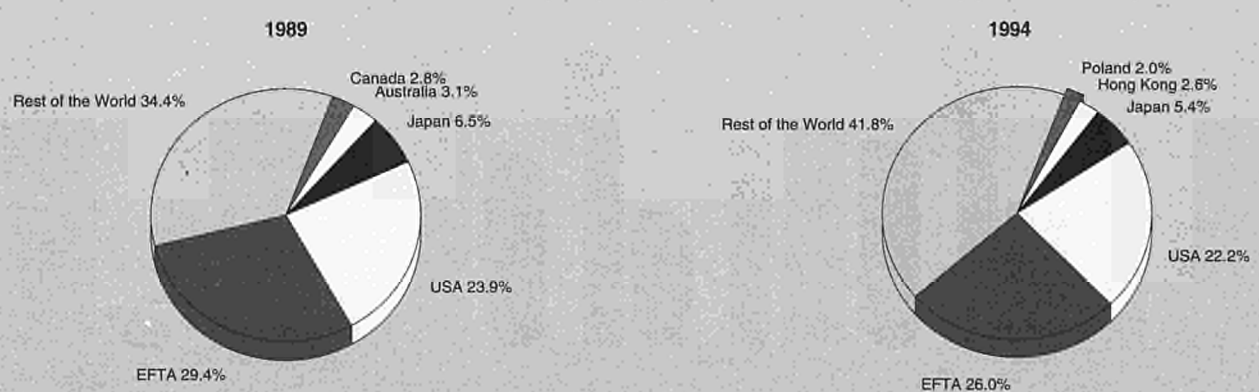
The location of glass manufacturing facilities may be governed by proximity to raw material sources (e.g. Belgium with its abundant supplies of high quality silica sand, limestone, and soda ash) or by proximity to consuming industries (e.g. bottle factories located in wine-growing districts or close to major breweries) or a combination of these factors tied to a good communications network.

ENVIRONMENT

The industry continues to work to improve existing practices, not only to reduce emissions but also to further improve energy efficiency.

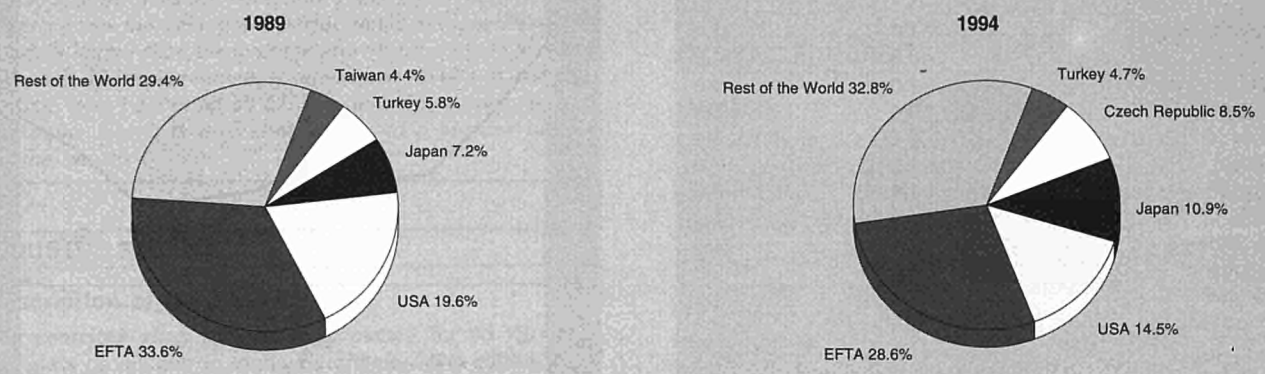
Glass, and in particular container glass, is at the forefront of all major industries in its ability to process waste and to use waste glass. The flat glass industry significantly contributes to energy savings and the reduction of CO_2 emissions. Recently, the rising cost of water and sewerage services has caused the glass industry to look at ways of reducing the amount of water it uses and the effluent it discharges.

Figure 6: Glass
Destination of EU exports



Source: Eurostat

Figure 7: Glass
Origin of EU imports



Source: Eurostat

Table 5: Glass
External trade in volume by sector, 1994

(thousand tonnes)	Container glass	Flat glass (unworked)	Tableware	Fibres (reinforcement)	Other
Extra-EU exports	445.6	753.0	361.6	101.4	214.1
Extra-EU imports	412.8	609.4	142.6	129.4	249.3
Trade balance	32.7	143.5	219.0	-28.0	-35.2
Ratio exports/imports	1.08	1.24	2.54	0.78	0.86

Source: CPIV

Table 6: Glass
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	84.5	87.0	92.2	98.6	101.2	100.0	99.5	101.8	105.9	115.7
Unit labour costs index (3)	94.0	95.2	93.8	93.4	94.4	100.0	107.6	109.9	109.2	102.9
Total unit costs index (4)	91.4	90.2	89.8	89.9	94.6	100.0	104.0	106.3	105.1	102.5
Gross operating rate (%) (5)	11.5	13.6	14.5	16.1	14.8	13.0	12.3	10.3	9.8	11.6

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 7: Glass
The fifteen largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Compagnie de Saint-Gobain	F	11 326.8	551.2	80.9
Pilkington	GBR	3 381.4	-410.1	37.1
Flachglas	D	928.2	31.5	8.9
Glaverbel (Asahi)	B	883.5	-2.9	9.1
Gerresheimer Glas	D	832.7	-6.9	7.5
Rockwool International	DK	688.7	35.4	5.6
Avir Finziaria	I	515.4	32.2	4.1
Oberland Glas	D	429.8	4.8	2.8
Santavaleria Societa di Partecipazioni	I	311.2	-38.0	2.8
Vereenigde Glasfabrieken	NL	264.2	11.3	1.9
Leifheit	D	202.9	11.1	1.5
Pochet	F	194.6	26.9	2.5
Vetrerie Italiane	I	189.7	8.4	1.1
Industrie Zignago S. Margherita	I	144.1	16.5	1.2
Baume-Marpent et Thirion	B	118.7	1.6	1.3

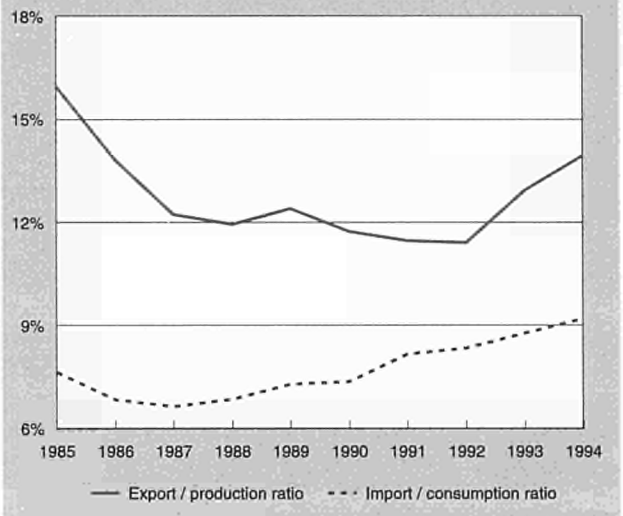
Source: DABLE

Table 8: Glass
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	1.6	1.4
Danmark	0.3	0.5
Deutschland	1.0	1.0
Ellada	0.4	0.3
España	1.1	1.1
France	1.3	1.3
Ireland	1.4	0.9
Italia	1.0	1.0
Luxembourg	N/A	N/A
Nederland	N/A	0.8
Portugal	1.1	1.5
United Kingdom	0.8	0.7

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Glass
Trade intensities



Source: DEBA GEIE, Eurostat

Table 9: Glass
Production capacity utilisation rate

(%)	1986	1987	1988	1989	1990	1991	1992	1993	1994
Sheet glass and flat glass (1)	82.5	90.7	91.9	88.4	85.4	83.4	82.7	78.8	84.3
Container glass	88.0	91.5	92.0	93.0	94.8	90.5	84.0	86.0	92.0
Fibres (reinforcement)	83.0	83.0	95.0	98.0	75.0	75.0	75.0	75.0	95.0

(1) Including estimates for former East Germany from 1990 onwards.
Source: CPIV

REGULATIONS

The industry is directly affected by the EU Directive 84/360 concerning air pollution. New measures will add substantially to costs and put EU producers at a considerable disadvantage to competitors in countries with lower environmental standards.

In April 1995, Regulation 1836/93 implemented the EU Environmental Management and Auditing System (EMAS).

In December 1994, Directive 94/62 was adopted. This Directive aims to prevent packaging waste, reduce the final disposal levels of such waste and fix recovery and recycling targets. This is particularly important for the container glass sector.

OUTLOOK

The EU glass industry is at the forefront of technological developments, and thus likely to benefit from improved industrial performance in the years ahead. There is concern that the current capacity expansion in the flat glass industry may be lead to oversupply. Nevertheless the potential for high growth exists. Although cheap imports from East Europe may be seen by some as a threat in the short term, the longer term outlook is for greatly expanded markets as these countries develop.

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Container glass

In 1995, growth in the container glass sector slowed down slightly from the very good performance seen in 1994, but was still higher than the average growth rates of the previous 10 years. The achievement of significant results in glass recycling, now backed up by EC legislation on packaging and packaging waste, is also contributing to a positive outlook for the industry.

INDUSTRY PROFILE

Description of the sector

The container glass sub-sector accounted for 65.3% of all EU glass production in tonnage terms in 199It comprises of the manufacture of packaging mainly for the food and drink industries. The principal products of this sub-sector are bottles, jars and "flaconnage" (small bottles for pharmaceuticals, perfumery and cosmetics). Container glass is classified as hollow glass and includes the production of automatically moulded hollow tableware.

Recent trends

Over the ten years from 1984 to 1994, average annual production growth was 2.5%. However, growth reached 6% in 1994, against a backdrop of economic recovery, offsetting the decline in 199In 1995, production grew 3.5% compared with 1994.

In 1995, Germany was the EU's largest producer of container glass, with a total of 4.6 million tonnes, followed by France, with 3.5 million tonnes, and Italy, with 2.9 million tonnes. The countries which performed the best in 1995 were Greece and the United Kingdom, with 9.6% and 5.5% increases respectively in production over the preceding year.

In 1995, capacity utilisation averaged 93%, just 1% up on 1994, when it had been 6% higher than the previous year. Apparent consumption rose by 7.4% in 1994 for the EU-12 countries, recovering from the fall of 4.2% in 1993.

Foreign trade

In 1995, extra-EU exports of container glass represented just 2.5% of total EU production. They amounted to 420 043 tonnes, almost 11% down on 1994, which was a good year for exports of this product. The principal destinations were Switzerland (18.39% of all extra-EU exports), the USA (16.70%), and Israel (10.51%).

Extra-EU imports, in 1995, amounted to 370 824 tonnes, or 2.3% of apparent consumption. Of this, 82% came from countries of central and eastern Europe, mainly the Czech Republic (24.67% of all imports), Croatia (16.33%), Bulgaria (15.35%), and Poland (7.77%).

MARKET FORCES

Demand

Demand for glass containers is closely linked to developments within the main client industries, namely the food and beverages industry, the pharmaceuticals industry, and the perfumery and cosmetics industries.

The food and beverage sector accounts for roughly 95% of all container glass demand, with around 5% being used in the cosmetics and pharmaceutical sectors. Strong recent demand from the food and beverage industry has impacted favourably on the container glass sector.

Supply and competition

As in the past, the main threat to container glass demand comes from other packaging materials such as metal cans, plastic (mainly PET) and cardboard. PET continues to be one of the main rivals, gaining market share in the soft drinks and mineral water markets. In Norway, returnable PET containers have been introduced for beer. Another threat to glass has come from the polycarbonate bottle, which was launched on the milk market.

The traditional positive image of container glass as a product with a good quality-price ratio offering the choice between returnable or non-returnable, and with a good level of recycling, has helped the sector to face up to competition from other products. Recently, container glass has been performing strongly on the grounds of performance, cost, and ecological advantages based on its recyclability.

Production process

The past 10 years have been devoted to improvements in productivity, process monitoring, control systems and quality.

The need to use more recycled glass of a better quality is an important challenge. Recent research shows that a dramatic reduction in the stone inclusion in glass is achieved by using cullet transformed into powder. Aside from the technical advantages, milling cullet powder is also economically efficient.

With the need to reduce the amount of packaging placed on the market, the sector has made progress over recent years towards lightweighting - producing containers which have thinner walls and are therefore lighter. In parallel, there have been moves to producing combined products, glass containers

Table 1: Container Glass Production in volume (1)

(thousand tonnes)	1984	1992	1993	1994	1992/93 (%) Change	1993/94 (%) Change	1984/94 (%) Change
EUR12 (2)	12 369	15 304	14 932	15 824	-2.4	6.0	27.9
België/Belgique, Danmark, Ireland, Nederland	1 131	1 298	1 340	1 325	3.2	-1.1	17.2
Deutschland	2 928	4 388	4 197	4 430	-4.4	5.6	51.3
Ellada	76	93	85	85	-8.6	0.1	12.3
España	1 139	1 386	1 268	1 374	-8.5	8.4	20.6
France	2 784	3 364	3 127	3 315	-7.0	6.0	19.1
Italia	2 379	2 480	2 643	2 863	6.6	8.3	20.3
Portugal	272	551	558	645	1.1	15.7	137.5
United Kingdom	1 661	1 742	1 714	1 787	-1.6	4.2	7.6

(1) Bottles, jars and flacons.
(2) Excluding Luxembourg.
Source: FEVE

with a plastic coating, reducing the reliance on thick glass walls in bottles.

INDUSTRY STRUCTURE

Companies

A small number of companies account for the majority of the production of container glass in the EU. These companies operate many plants, often in different Member States. The French group Saint-Gobain is the largest producer in the EU. Other main producers are AVIR (I), Gerresheimer Glass (D), PLM (S), Heye (D), Rockware (UK), United Glass (UK) and BSN (F Danone group).

ENVIRONMENT

Container glass plays a primary role in helping the environment in its ability to use both process waste and waste glass. Enormous progress has been made in the recycling of glass in recent years, and in 1994, the amount of glass recycled in the countries represented by FEVE (EU-15 plus Norway, Switzerland, and Turkey) topped the 7 million tonnes mark for the first time. In 1988, the first year when figures referred to the present FEVE membership, the total recycled was less than 4 million tonnes.

In tonnage terms, Germany is the biggest recycler with 2.8 million tonnes in 1994, followed by France with 1.3 million tonnes. The highest percentage share of recycling was the Netherlands, with 77% of national glass consumption, followed by Austria with 76%, and Germany with 75%. Big efforts are ongoing at the industry level to ensure that these trends continue.

REGULATIONS

In December 1994, Directive 94/62 was adopted on packaging and packaging waste. The legislation's first priority was the prevention of packaging waste and the reduction of the final disposal of such waste.

This directive set recycling targets, and in all EU countries the recycling level of glass already far exceeds the minimum percentage required for each material (15%), and for most of them even exceeds the maximum glass recycling target stipulated (45%).

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Flat glass

The flat glass industry in the European Union grew in the first half of 1995, but declined in the second half due to a general weakness in house building, commercial building, and renovation. The start-up of new capacity in 1995 changed the capacity balance into one of surplus, and this has continued into 1996 with continued weakness in the construction industry. New products, particularly high insulation multiple glazing units, have increased sharply as a result of new technology, and tighter building regulations in some markets. New technological developments have led to energy savings and to a reduction in CO_2 emissions.

INDUSTRY PROFILE

Description of the sector

Flat glass accounts for 25% of total glass production in the European Union in tonnage terms. It is a sheet glass material which is used principally for glazing in the construction and motor vehicle industries.

The primary flat glass product is frequently subjected to extensive secondary processes such as cutting, laminating and toughening, and coating for high insulation double glazing units. In general, "untransformed" flat glass is glass that has come out of the furnace and has been simply cut, but not worked. Meanwhile, "transformed" flat glass has been worked, i.e. bent, edge-worked, engraved, drilled, enamelled etc. Flat glass can be of different types: float glass (a flat, transparent, clear or tinted soda-lime silicate glass with parallel and polished faces, which are obtained by continuous casting and floating on a metal bath), drawn sheet glass (a flat, transparent, clear or tinted soda-lime silicate glass, which has a regular thickness and with the two surfaces fire polished which is obtained by continuous drawing), patterned glass, wired patterned glass, polished wired glass; wired or unwired channel shaped glass.

Recent trends

In 1995, the production of basic flat glass in the European Union amounted to 6.213 million tonnes, very slightly under the figure for the previous year.

In particular, insulating glass, accounting for 65% of flat glass output devoted to construction, is now benefiting from new coating technology, which has resulted in increased demand for high insulation multiple glazing units.

In 1995, capacity utilisation for sheet glass and float glass, was down to 88.4% from the 89.4% rate seen in 1994.

Foreign trade

In 1995, EU imports of untransformed flat glass amounted to 604 269 respectively, which represents a fall of less than 1% compared with 199The biggest share of these imports comes from eastern Europe (the Czech Republic, 15.96% of all untransformed flat glass imports; Hungary, 11.81%; and Poland, 11.32%). Israel is the third biggest source with 11.67%, and Turkey the fifth biggest with 11.03%

It should be noted that the eastern European countries have all seen investments in recent years from major glass companies: Glaverbel is producing in the Czech Republic, Guardian in Hungary, and Pilkington in Poland, and SaintGobain soon to start up there.

As far as EU exports of untransformed flat glass are concerned, 1995 saw a decline of almost a quarter over 1994, from 752 954 to 577 018 tonnes. The reasons for this could be the coming to an end of contracts with users in the USA where there was a shortage of flat glass in 1994, together with a fall in prices in 1995, which made exporting less attractive.

The biggest share of EU exports went to Switzerland (16.11%), the Czech Republic (10.30%), Norway (5.64%), and the USA (5.24%).

MARKET FORCES

Demand

Flat glass is heavily dependent on the construction and automotive industries for its sales. Trends in demand are similar to the evolution of the domestic construction market. The recent installation of new float glass production lines has coincided with a decline in demand from both automotive and construction sectors and has resulted in overcapacity and falling prices.

Supply and competition

Flat glass does not meet the same degree of competition from alternative materials as other glass products; however, EU producers do face competitive pressures from imports and from increasing foreign involvement in EU production. Compared to 1994, when demand for flat glass was buoyant, 1995 showed a negative turnaround in demand in Europe. The problem of surplus capacity has reappeared in 1995, as a result of new capacity coming on stream coinciding with weak demand in the second half of the year. It is unlikely that any improvement will be seen in the situation in 1997, as further new capacity comes on stream both inside and outside the European Union.

Production process

Nearly all flat glass in the EU is produced by the 'float method' invented by Pilkington in 1959, which is now used world-wide under licence. During this float process, molten glass is floated on a shallow bath of molten tin, instead of being transformed through the old drawing method.

Many furnaces today have online coating systems which allow for the online production of solar control and energy retention glasses. Latest developments include the introduction of new technologies to reduce noxious emissions.

INDUSTRY STRUCTURE

Companies

The EU flat glass industry is made up of a small number of multinational companies who manufacture only 39 float glass lines. These manufacturing groups include Pilkington (head office - UK), Saint-Gobain (head office - F), Glaverbel (B; principle shareholder Asahi Glass of Japan), PPG (USA), and Guardian (USA). Together with the high concentration of the automotive sector (one of its main client industries), plant modernisation is inducing a restructuring of the industry, with a trend towards fewer but larger firms with low labour intensive activity.

ENVIRONMENT

Through the increased use of high performance double glazing, the flat glass industry contributes to energy savings and to a reduction in CO_2 emissions.

Based on the fact that the heating of homes in the EU accounts for about 20% of energy use in the Community and that about 60% of European dwellings are still equipped with single glazing, the glass industry is promoting an accelerated 10-year programme for upgrading the glazing of existing dwellings could save nearly 1 billion GJ of energy per year, worth over 11 billion ECU.

Improvements in oxy-fuel emissions technology have led to the significant reduction of NOx^3 emissions during continuous operations. In addition, the latest forehearth design has achieved energy savings of 30% compared to standard forehearths with equal loading.

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Tableware

1994 and 1995 saw an improvement in demand for glass tableware after the recession ending in 199The rate of this recovery has varied depending on the part of the sector involveFor instance, the manufacturers of expensive crystalware were affected by the recession much earlier and to a greater extent than the producers of lower-priced non-crystal glassware, and have been the slowest to show signs of recovery. The share of exports in the order books continues to be an important factor for the sector.

INDUSTRY PROFILE

Description of the sector

This category includes a variety of hollowware products. In tonnage terms, drinking glasses account for about 60% of the tableware produced, while the remaining 40% is accounted for by other glass accessories for the table and articles used at home and in the office.

There are some large producers in the EU, but the sector has a large number of small and medium sized enterprises.

Recent trends

In 1995, tableware production amounted to approximately 944 000 tonnes, almost 2% down on 1994, which had shown a 5.7% increase in output over the previous year. Over the decade 1984-1994, the average annual growth rate for production was only 0.7%.

International comparison

Whilst the EU is the world's largest exporter of glass tableware, it faces strong competition on its domestic markets, principally from the countries of central and eastern EuropTurkey was the source of the largest share of imports in 1995, with 21.7%, followed by Poland and the Czech Republic with 15.1% and 14.7% respectively.

European tableware producers have traditionally had a strong presence on the American market, which accounted for 23.1% of all extraEU exports in 199This was followed by Japan and Poland, with 5.7% and 5.6% respectively.

Foreign trade

Approximately a third of all EU tableware glass production is exported to non-EU countries. In 1995, extra-EU exports of glass tableware totalled 328 299 tonnes, a fall of some 9% over 199At the same time, imports into the EU totalled 166 960, up 17% on 1994. These movements in imports and exports reverse the trend seen in 1994.

The EU's largest exporter is France, with 70% of production, followed by Italy, while the largest importers are Germany and the UK.

MARKET FORCES

Demand

Demand for tableware glass is closely linked to changes in lifestyle and disposable income. Tableware and decorative glass products are widely used by the hotel, catering, and leisure industries as well as providing direct sales to private consumers.

INDUSTRY STRUCTURE

Companies

France is the biggest producer with one of the largest companies, Crystal d'Arques. Other large companies include Schott (D), Ravenhead (UK), Durobor (B/UK). Amongst many smaller companies, often specialising in higher value added products, are Waterford Crystal (IRL) and Edinburgh Crystal (UK).

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Fibre glass

Although representing only a small share of total glass production, the sector has shown good growth in production and apparent consumption. 1994 was a year of general recovery for the sector, and there was continued growth in 1995, based principally on domestic demand, although there was an upsurge throughout the world. Many producers are working at or near their operational capacity. In many cases, equipment that has been left dormant and out of use has been brought back into service.

INDUSTRY PROFILE

Description of the sector

Fibre glass is categorised within a group of man-made materials historically referred to as man-made mineral fibres. However, a more appropriate definition should be man-made vitreous fibres, which reflects the non-crystalline nature of the material.

While it has various uses, fibre glass is generally produced in two basic forms: wool-type fibres, usually referred to as glass wool or fibre glass insulation; and continuous filament glass fibres, produced in long, continuous strands or filaments. Applications are in textiles and reinforcement, circuit boards for computers, motor cars, telecommunications, televisions and household appliances.

Recent trends

In 1995, production of insulating fibre and reinforcement fibre reached 600 000 tonnes and 462 000 tonnes respectively, 9% and 25% higher than in 1994, which had already showed considerable growth rates of 10% and 8% over the previous year. Over the decade 1984-1994, the annual average growth rate in the production of reinforcement fibres was 3.9%.

In 1994, capacity utilisation for reinforcement fibres was 95%. The increase of 26% over 1993, was the highest among the other products with available data. With the 1995 boom, capacity utilisation was even better.

Foreign trade

In 1995, imports of glass fibres comfortably exceeded EU exports to third countries. Imports amounted to 175 1783 tonnes, a 25.8% increase on the previous year. The main suppliers were the USA (27.86% of all imported glass fibres), Slovakia (14.80%), and the Czech Republic (8.60%).

At the same time, EU glass fibre producers exported 107 352 tonnes, representing 10.7% of their production, and a 2.3% fall over 199The biggest export markets were the USA (11.85% of all extra-EU exports) and Switzerland (11.42%).

MARKET FORCES

Demand

Reinforcement and insulating glass fibre both have "high-tech" associations including uses in engineering plastics.

The continuous filament form of glass fibre is used to reinforce a broad variety of textiles, plastics, rubber products, as well as in applications, including automobile parts, tractor/trailer panels, sporting equipment, boats, oil tanks and computer housings. These fibres are also used to reinforce cement, papers and roofing materials and are woven into fabrics for protective apparel, printed circuit boards and industrial fabrics.

Supply and competition

Fibre glass faces competition from a range of mineral and ceramic fibres (and flakes) for both reinforcing and insulating applications. Although there have been some closures of fibre glass plants in recent years, producers are now working at or near their operational capacity and companies are even starting to re-commission old furnaces in order to avoid an international shortage of fibre.

Production process

Continuous filament glass fibre is produced by a continuous drawing process where control can be maintained over the fibre diameter variation.

The trend within the industry for continuous fibre glass has been to achieve the greatest output of fibre per unit weight of platinum employed in the production process. Adjustments to the size, spacing and manufacturing technique of jets have been the most important changes. In recent years, a rapid evolution has taken place in the manufacture of insulating fibres, mainly by the introduction in the furnace of new chromic oxide-based bonded refractories and the creation of the potential for the re-use of the spent refractories.

INDUSTRY STRUCTURE

Companies

Most of the EU production of fibre glass is concentrated in five companies: Europe Owens-Corning, Saint-Gobain, Silenka, Bayer, and Pittsburgh Plate Glass (PPG).

Vetrotex of the Saint-Gobain group is the EU's main producer of glass fibre. Some 54% of its output is sold within the Europe, 39% is exported to the USA, 6% to Asia-Pacific and the remaining 1% to Africa, the Middle East and the Indian sub-continent. The company has five production sites in Europe, one in North America, two in South America and one in Asia.

HEALTH AND SAFETY

An important issue for the fibre glass is the possible health effects of respirable glass fibres. These issues have resulted from years of industry sponsored research, which has focused on the effect of fibre glass on human body through inhalation, and hence the determination of potential to cause lung disease. The diameter and length of the fibre determine whether it can be respired into the lower regions of the lung: fibres larger than 3 microns are not respirable. A study sponsored by the European glass fibre manufacturers on workers employed in the manufacture of continuous filament glass fibres concluded that there is inadequate evidence for the carcinogenity of continuous filament glass fibres in humans.

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Special glass

The strong recovery in the special glass sector seen in 1994 continued into 1995. Over the 1984-1994 period, in terms of production and export growth, special glass was the best performing glass sub-sector. Increasing competition from Japan and the USA as well as the need to meet the rise in demand has enhanced specialisation and the use of new production processes, particularly for technical glass.

INDUSTRY PROFILE

Description of the sector

Special glass is identified by its use and applications. It includes a vast range of different subgroups such as lighting glass, laboratory glass, optical glass, and glass for other specialist applications such as in TV tubes. They are characterised by high chemical and thermal durability and a variety of optical, electrochemical or special technological properties.

France, Germany, Italy and the UK account for almost 95% of all production.

There are a small number of large manufacturers in the sector such as Philips, producing TV tubes, and the technical glass producer Schott.

Recent trends

Production of special glass products reached 1.081 million tonnes in 1995 in the European Union, an increase of just under 2% on 1994, which had shown an increase of almost 15% on the previous year.

Foreign trade

In 1995, extra-EU exports totalled 75 632 tonnes, slightly down on the figures for 1994, which had shown growth of about 55% over the previous year. The two biggest outlets by far were the USA, with almost a fifth of total special glass exports, followed by Poland, with just over 13%.

Extra-EU imports reached 101 454 tonnes in 1995, a 47% increase on 199Almost 80% of these imports came from just four countries. The largest share was from Japan, with 46.70% of total extraEU imports of special glass, followed by the USA (13.40%), Taiwan (11.15%), and the Czech Republic (6.14%).

MARKET FORCES

Demand

Special glass has many "high-tech" applications, such as for optical and electronic glassware, industrial and laboratory glassware etc. The main markets are the electro-technology and electronics industries, accounting for 50% of total special glass products, chemicals & pharmaceuticals with 20%, and optical industries, 15%.

For technical glass, 1995 production capacity utilisation reached its maximum, in order to meet the rise in demand (technical glass includes products such as special flat glass, ceramic glass, fire protective glasses, laboratory glassware, electronic special glass, pharmaceutical glassware).

Supply and competition

Overall the industry faces strong competition from Japan and the USA, dominated by Asahi (Japan) and Corning (US).

The more specialised industrial glass faces competition from plastics in some applications, although operating environments where products are subject to high temperature, reactive chemicals, or radiation tend to favour glass-based products.

Concerning glassware for optics and ophthalmic glasses, the most traditional business of the special glass sector, turnover for optical glass in 1995 increased due to higher investments, an effect expected to peter out in 199Sales are expected to contract in 1997.

In 1995, sales of laboratory glassware increased only very little, despite favourable developments in the chemical and pharmaceutical sectors. One of the reasons for this is increased pressure from low-priced imports, especially from central and eastern Europe.

The situation on glass equipment and installations was positive in 1995 - these are mainly capital goods for the pharmaceutical industry. The outlook was good for exporters, particularly in south-east Asia.

For other special glass products, performance in 1995 differed between the different subsectors, but in general, increased lowpriced imports from the far east and from central and eastern Europe are being seen.

Production process

Companies are specialising in new production processes, due also to the developments of machinery for the physical and chemical toughening of glass lenses and a wide variety of products such as halogen lamps, car headlights, divers' masks, watch glasses, and protective screens.

Advanced production technologies for toughening glass with poor toughening properties, such as borosilicate glass, have been developed.

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Ceramic goods
NACE (Revision 1) 26.2 and 26.3

The ceramic goods industry covers a range of clay- and mineral-based products, including tiles, toilets, tableware, refractories and technical ceramics. It is hard to think of another EU industry in which the diversity as regards company size and markets served is so great -ranging from small family-owned companies producing clay products according to traditional methods, to important materials producers developing highly advanced ceramics for emerging markets. In order to maintain and strengthen the EU's position as the world's leading producer of these labour-intensive goods, the industry is in a constant process of modernisation and restructuring.

INDUSTRY PROFILE

Description of the sector

The principal ceramic products covered under this heading are wall and floor tiles (NACE 26.30), sanitary ware (NACE 26.22), table- and ornamental ware (NACE 26.21), technical ceramics (NACE 26.23 and 26.24) and refractories (NACE 26.26). Other ceramic products include bricks and roof tiles (also covered in this chapter), clay pipes and abrasive products.

Products described are based on the industrial minerals covered in Chapter 2, mainly on clays and other silicates (feldspar, talc, wollastonite), silica (sand, quartz, quartzite) and mineral oxides derived from magnesite, dolomite, bauxite, limestone etc..

Ceramic goods are used across a wide range of industries, from basic industries such as metallurgy (refractories) and electrical engineering (insulators), through mechanical engineering, electronics and the automotive industry (advanced ceramics), to the construction industry (tiles, sanitary ware) and leisure industries (tableware, hotel ware, ornamental ware). Thus, ceramic products are not only consumer items, but they are also vital to a range of other industrial processes.

Recent trends

EU production and consumption of ceramics showed steady growth in the 1984-1991 period, with a consistently positive trade balance, as EU exports exceeded imports by a 3:1 ratio. However, most of the ceramics industries were hit by a significant decline in consumption in the years 1992 and 1993. The expected recovery did not materialise across the industry in 1994; decreasing sales in the tableware and sanitary ware sub-sectors offset expanding sales by producers of tiles, refractories and technical ceramics. In recent years the external trade position remained largely positive for the industry as a whole, but import penetration increased considerably, especially for tableware.

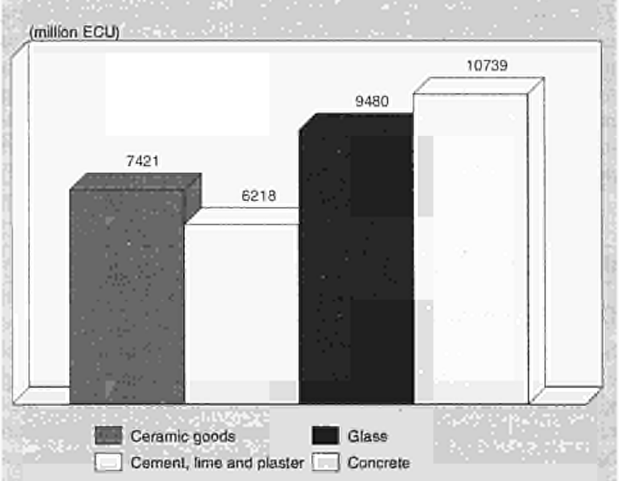
The ceramic industry is quite labour-intensive. Rationalisation and automation, combined with only moderate consumption growth, resulted in a continuous decline of employment in the industry. An acceleration of this trend was noted in the last few years in the tableware industry, which had to cope with shrinking markets.

International comparison

The EU remains the world's largest ceramic producing region, providing around a third of total world production.

The ceramic industry covers a range of products, from relatively high volume/low cost refractory bricks to high priced ornamental ware, for which the price per tonne may be 100 times as high.

Figure 1: Ceramic goods
Value added in comparison with related industries, 1994



Source: DEBA GEIE

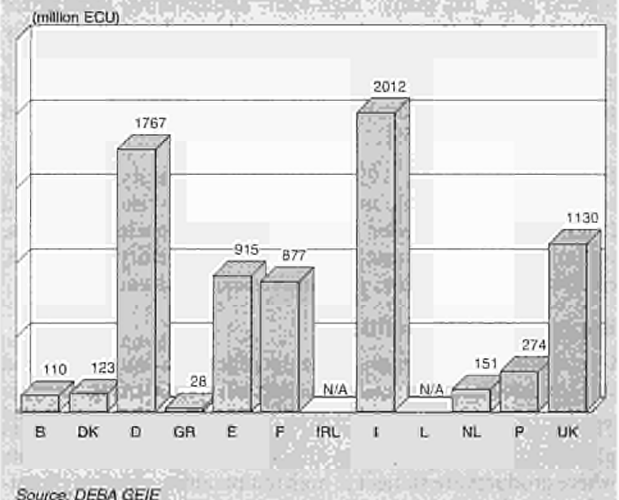
The international competitive position of the EU industry varies accordingly.

In the whiteware sub-sectors (tableware, ornamental ware, tiles and sanitary ware) the fastest growth recently has been recorded in Eastern Asia markets, most notably in China, which has been displaying considerable growth over the last few years. The USA saw its ceramic production decrease in the last decade and it has in fact developed into the most important third market for European tile and tableware producers.

For technical ceramics, Japan is the most important producer worldwide, followed by the USA, with the EU industry in third position. Here competition on what in fact has developed into a world market is very fierce.

The refractories industry is closely linked to basic manufacturing industries (steel, cement, glass, petrochemicals), which have a strong production basis in Europe. The EU refractories industry is the most important worldwide, but external trade in this sub-sector is rather limited.

Figure 2: Ceramic goods
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Ceramic goods
Main indicators in current prices (1)

(million ECU)	1985	1989	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	9 991	13 275	14 287	14 840	14 563	12 834	12 956	12 924	13 509	14 160	14 870	15 650
Production	11 776	15 572	16 530	16 882	16 588	15 196	15 767	16 107	16 504	17 410	18 390	19 470
Extra-EU exports	2 650	3 219	3 218	3 207	3 316	3 667	4 232	4 594	4 333	4 700	5 070	5 470
Trade balance	1 784	2 297	2 243	2 042	2 024	2 362	2 811	3 183	2 995	3 250	3 520	3 820
Employment (thousands)	258.4	256.2	264.2	257.9	245.3	222.6	211.3	210.1	215.2	210.0	210.0	210.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Ceramic goods
Breakdown by product and Member State, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports	Employment (thousands)
Wall/floor tiles	5 626	7 300	1 851	68
Sanitary ware	2 146	2 300	277	25
Table/ornamental ware	2 457	2 800	1 122	86
Technical ceramics	1 470	1 500	113	12
Refractories	1 608	2 200	760	20

(1) Apparent consumption and production have been estimated.
Source: Eurostat, Cérame-Unie

Table 3: Ceramic goods
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	4.7	-3.2	1.1	0.1
Production	3.8	-2.1	1.1	2.7
Extra-EU exports	-0.4	5.1	2.0	14.7
Extra-EU imports	0.9	6.8	3.5	9.0

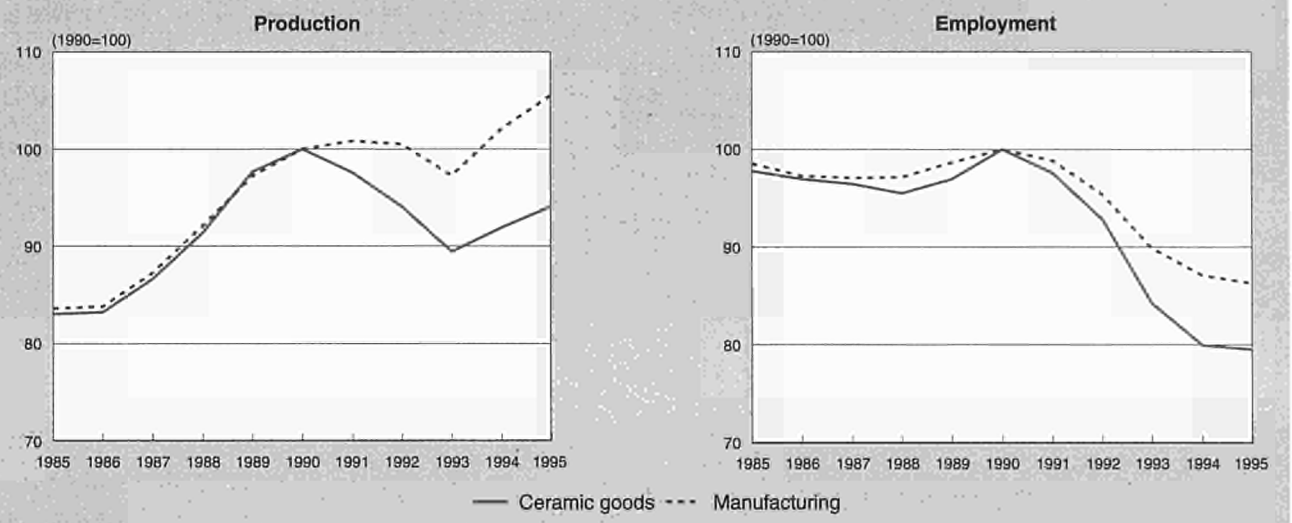
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Ceramic goods
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	2 650	2 458	2 467	2 792	3 219	3 218	3 207	3 316	3 667	4 232	4 594	4 333
Extra-EU imports	865	707	746	831	922	975	1 165	1 292	1 305	1 422	1 411	1 338
Trade balance	1 784	1 751	1 722	1 962	2 297	2 243	2 042	2 024	2 362	2 811	3 183	2 995
Ratio exports / imports	3.1	3.5	3.3	3.4	3.5	3.3	2.8	2.6	2.8	3.0	3.3	3.2
Terms of trade index	86.9	91.4	93.3	94.9	93.5	100.0	99.4	99.9	95.4	96.1	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Ceramic goods
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Foreign trade

The EU industry is an important exporter of ceramic goods. In 1994 total exports to third countries amounted to ECU 4.2 billion. Imports remained below this level with ECU 1.4 billion, but with its high labour-intensity the industry has to face growing competition from low-wage countries, which traditionally produce ceramics, mainly in Eastern Asia and Central Europe.

In the tableware and ornamental ware sub-sector the main export markets outside the EU are the USA, Japan and Switzerland; imports mainly stem from China (taking a share of 35% of total imports), Taiwan, Poland and the Czech Republic. The EU managed to obtain a growing surplus in tableware trade, as exports to third markets in 1994 amounted to ECU 706 million, while imports reached a level of ECU 409 million. For ornamental ware the situation was less positive, with exports of ECU 296 million against imports of ECU 299 million. This reflects the high labour cost problem, which the EU industry has to face.

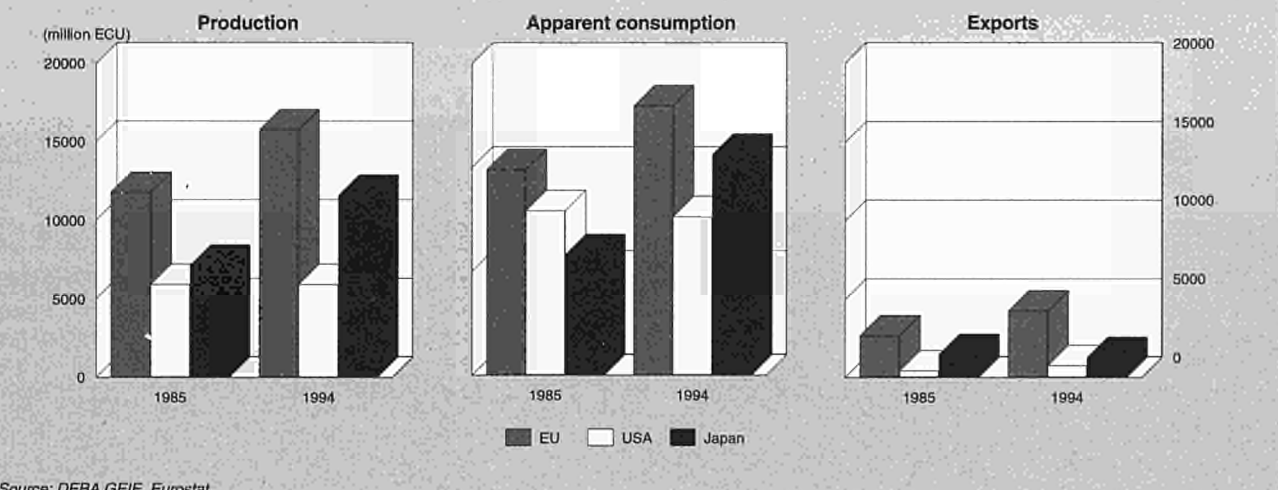
In the wall and floor tiles sub-sector trade data show a healthy surplus, with EU exports at ECU 1.851 billion, and imports at ECU 177 million. Here main export markets are the USA, Switzerland, Australia and Hong Kong. Turkey, Switzerland, Brazil and the Czech Republic are the most important suppliers outside the EU. However, as some Eastern Asian countries (China) are building up an enormous production capacity, there is no reason for the EU industry to be complacent.

For the sanitary ware industry external trade is of limited importance, with EU exports at around 10% of total sales in 1994.

The refractories sub-sector has an important surplus in external trade, with EU exports at ECU 760 million, and imports at ECU 168 million. Main external markets are the USA, Taiwan and South Africa; Austria remains the most important supplier of refractories to the EU. The traditional EU steel producing countries have the strongest export positions.

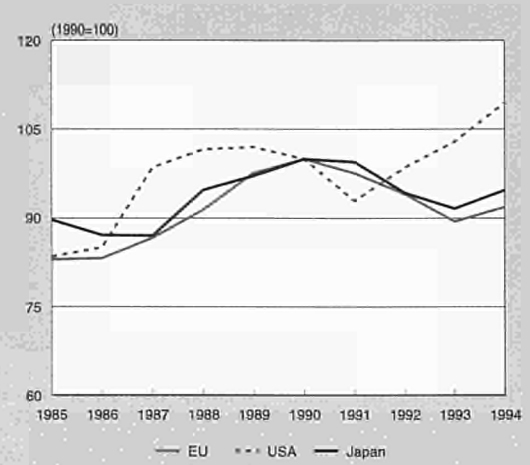
For insulating materials and other technical ceramics the EU trade balance is positive; in both cases the main trade partners are the USA, Japan and the EFTA countries.

Figure 4: Ceramic goods
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Ceramic goods
International comparison of production in constant prices



Source: DEBA GEIE

MARKET FORCES

Demand

Building and construction is by far the most important user of ceramic wall and floor tiles and sanitary ware. Demand for these products is spread across a range of structures and buildings, from private dwellings to offices, industrial plants, swimming pools etc., and is not just limited by new building.

In fact the maintenance and renovation market for tiles and sanitary ware provides an extremely important market. The fact that both form a central element to interior design means that replacement is done on aesthetic grounds in addition to the usual reasons of wear and tear. This is especially true for bathrooms, which are increasingly considered as a relaxation place in the house.

Sales of wall tiles in particular take place on several levels, from large construction firms to the individual do-it-yourself enthusiast. Wall tiles find a growing market in facade decoration.

Tableware and ornamental ware producers take more than a passing interest in the growth of tourism, since hotels, restaurants and the like are all major buyers. Indeed, special requirements of the hotel and catering trade have given rise to the 'hotel ware' segment, with specially designed hard-wearing ceramics.

Private buyers tend towards some of the more upmarket products designed by artists, and made of the finest porcelain and bone china. On the other hand there is a noticeable move towards 'casual ware' with a less formal image, in which fashion plays a very strong role.

In the refractories industry technical advances continuously reduce the size of the market. Refractories are vital to high temperature processes required to produce steel, non-ferrous metals, glass, cement, ceramics and a range of other products.

However, the tonnage growth of these products has rarely been sufficient to counter the decrease of refractories consumption per unit, which is brought about by technical innovations in materials and processes.

The technical ceramics sub-sector has derived some of its techniques from the refractory industry. Certain products, such as electrical insulators made of alumina or steatite, have actually been around for some time. Some of the 'advanced' ceramics are becoming of increased importance in electronic, chemical, mechanical, medical and biological applications.

High growth rates are predicted for materials such as silicon carbide, silicon nitride, sialons and partially stabilised zirconia, but new markets are slow in developing.

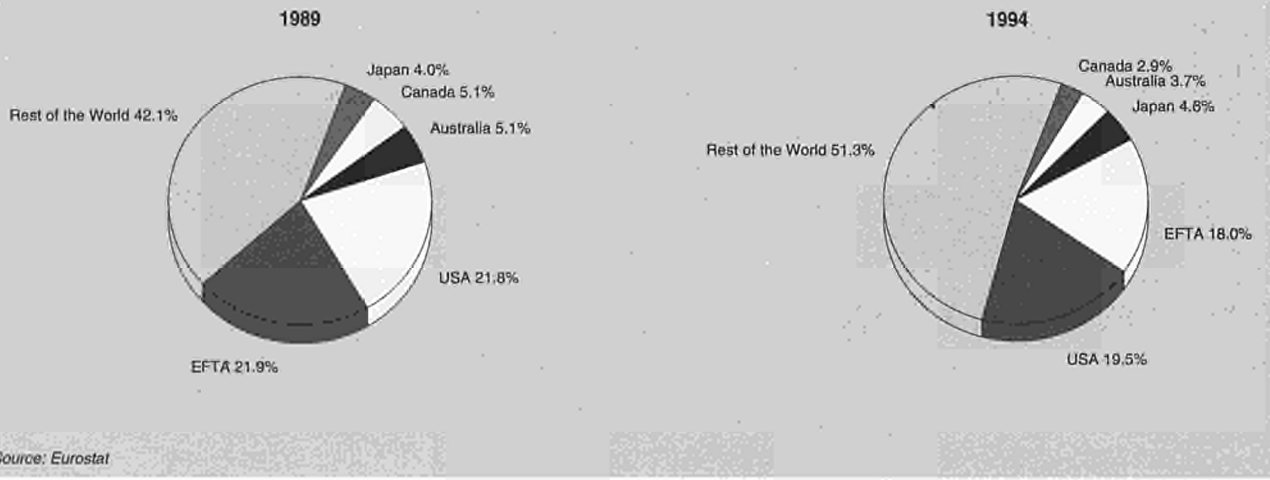
Supply and competition

The EU ceramics industry has centuries of tradition to draw on, ample supplies of high quality raw materials, a strong technical base and an excellent scientific infrastructure, in addition to an enormous home market. Yet, in some important sub-sectors it has proved vulnerable to competition from the geographically distant Eastern Asian industry. This has been due to a combination of the low operating costs in these countries (noticeable for labour and for the protection of the environment), and the rapid introduction of European processing technology, which has boosted production in Eastern Asia. Many have also embraced or counterfeited European designs.

A similar development is now taking place in Central Europe.

The growing competitiveness of these regions has exposed the high production costs and overcapacity, which exist in some EU sub-sectors, and especially in the tableware industry. The impact has been greatest at the lower quality end of the market, causing some EU producers to concentrate on more upmarket products, others to take major cost-cutting (and la-

Figure 6: Ceramic goods
Destination of EU exports



Source: Eurostat

Table 5: Ceramic goods
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	84.9	85.8	89.8	95.8	100.7	100.0	100.0	101.4	106.2	114.9
Unit labour costs index (3)	89.2	92.5	93.4	92.0	94.7	100.0	107.9	110.9	105.7	99.1
Total unit costs index (4)	87.0	87.0	87.6	89.3	95.7	100.0	105.8	108.0	103.7	101.7
Gross operating rate (%) (5)	11.1	12.8	13.4	14.3	13.5	12.3	11.4	11.0	11.2	13.4

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

bour saving) measures to remain compeitive, and yet others to wind down.

The persisting downturn in the tableware market has reduced operating margins for even the most efficient producers. Further efficiencies will no doubt be required in order to take advantage of the projected recovery.

In the tiles and refractories sub-sectors internal EU competition is so fierce, that selling price levels remain close to actual cost levels.

Production process

The modern ceramics industry has moved far from the potter's wheel, being an industry of large scale automated processes, close technical quality controls and a highly trained workforce. Among the new techniques introduced in the past 20 years are dry and isostatic pressing, pressure casting, fast and 'single' firing, the use of roller kilns, and the use of robotics in shaping, glazing and decorating.

INDUSTRY STRUCTURE

Companies

The EU ceramic goods sector has a total production of more than ECU 16 billion, and it employs around 210.000 people involving over 2.000 companies. Small and medium-sized companies predominate; many companies are family-owned. Some of the largest companies operate in the refractories sub-sector, where a high degree of concentration across Europe now exists. Four companies account for around two thirds of total EU production: Radex Heraklith (A/D), Hepworth Refractories (UK), SEPR (F) and Sanac (I). Other important producers include the Wuelfrath Group, Refratechnik and VGT-Dyko (D), Baker Refractories and DSF Refractories (UK), and AMR Refratarios (E). Specialist producers include Lafarge Refractaire (part of Lafarge Coppée (F), and a major monolithics producer), Vesuvius of the Cookson group (UK) (crucibles and concast refractories) and the Morgan group (UK) (crucibles, monolithics).

Companies active in the technical ceramics sub-sector include Hoechst CeramTech, Cerasiv, Wacker and Hutschenreuther (D); Saint Gobain (F); Morgan Matroc and Cookson (UK); and Samatec (I).

The table-and ornamental ware sub-sector contains a handful of large companies amongst a myriad of small ones. Major producers include Villeroy & Boch (D/L), Hutschenreuther and Rosenthal (D), Royal Doulton and Wedgwood (UK), which together account for more than a third of total EU output.

In the sanitary ware industry concentration across Europe is well advanced, with groups such as Ideal Standard (I) -a subsidiary of the American Standard group of the USA-, Sanitec (SF), Blue Circle (UK) and Sphinx-Gustavsberg (NL/S) having production plants in many European countries.

The European wall and floor tile industry is dominated by an impressive number of Italian and Spanish medium-sized producers with annual turnovers in the ECU 50-100 million range. The small number of larger companies includes the Marazzi and Cisa-Cerdisa Groups (I) and Porcelanosa (E). Companies in other countries include Villeroy & Boch and ABK (D), Keramik Laufen (CH/D) and H & R Johnson (UK).

Table 6: Ceramic goods
The thirteen largest companies in Europe, 1994 (1)

(million ECU)	Country	Turnover	Employment (thousands)
Radex-Heraklith	A	1 000	8.0
Villeroy & Boch	D	800	11.8
Keramische Ind. Laufen	CH	500	9.4
Marazzi	I	500	3.5
Sphinx Gustavsberg	NL/S	400	3.8
Cisa-Cerdisa	I	350	2.5
Royal Doulton	GBR	300	6.0
Wedgwood	GBR	250	7.0
Hutschenreuther	D	220	4.5
Hepworth Refractories	GBR	200	2.0
Ideal Standard	I	200	1.8
Rosenthal	D	180	2.8
ABK	D	170	1.5

(1) Estimates.
Source: Cérame-Unie

Table 7: Ceramic goods
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.4	0.4
Danmark	0.8	0.8
Deutschland	0.9	0.7
Ellada	1.5	0.9
España	1.5	1.9
France	0.6	0.6
Ireland	0.3	0.2
Italia	1.9	2.0
Luxembourg	N/A	N/A
Nederland	N/A	0.4
Portugal	1.6	2.8
United Kingdom	0.9	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Strategies

The sanitary ware industry has been most active on mergers and acquisitions, creating the groups with a European dimension mentioned previously. Take-over activities also include firms in Central Europe, mostly in the sanitary ware, tableware and tile sub-sectors. The continuous restructuring process in the refractories industry is illustrated by the recent merger of the Austrian Veitsch-Radex and the German Didier Werke, which created the world's largest refractory manufacturing group.

In the technical ceramics sub-sector an important merger between Cerasiv and Hoechst CeramTech (D) was announced at the start of 1996.

In the tile industry recent acquisitions by Marazzi of France Alfa, and by Cisa-Cerdisa of Ceramiche Ricchetti reinforced the leading position of both Italian groups.

Nevertheless, it is clear that the restructuring process is far from being completed, especially in the tableware and tile industries. It should, however, be noted that the smaller size of most industries in these two sub-sectors has enabled them, to react with flair and speed to new developments in taste and fashion.

REGIONAL DISTRIBUTION

A large number of manufacturers of ceramics continue to operate in regions, in which an ample supply of raw materials and energy exists. Thus, despite changing circumstances, areas such as Stoke-on-Trent in the UK, Northern Bavaria and the Westerwald in Germany, Sassuolo in Italy, Castellon in Spain and Limoges in France have maintained their status as major manufacturing centres. In these areas scientific institutes and equipment producers tend to be located as well. In this way a useful cross-fertilisation has developed, which certainly increases the cohesion of the industry.

Although the raw materials argument also applied to the location of refractories plants, more modern plants tend to be built close to major steel production centres such as the Ruhrgebiet and Sheffield.

ENVIRONMENT

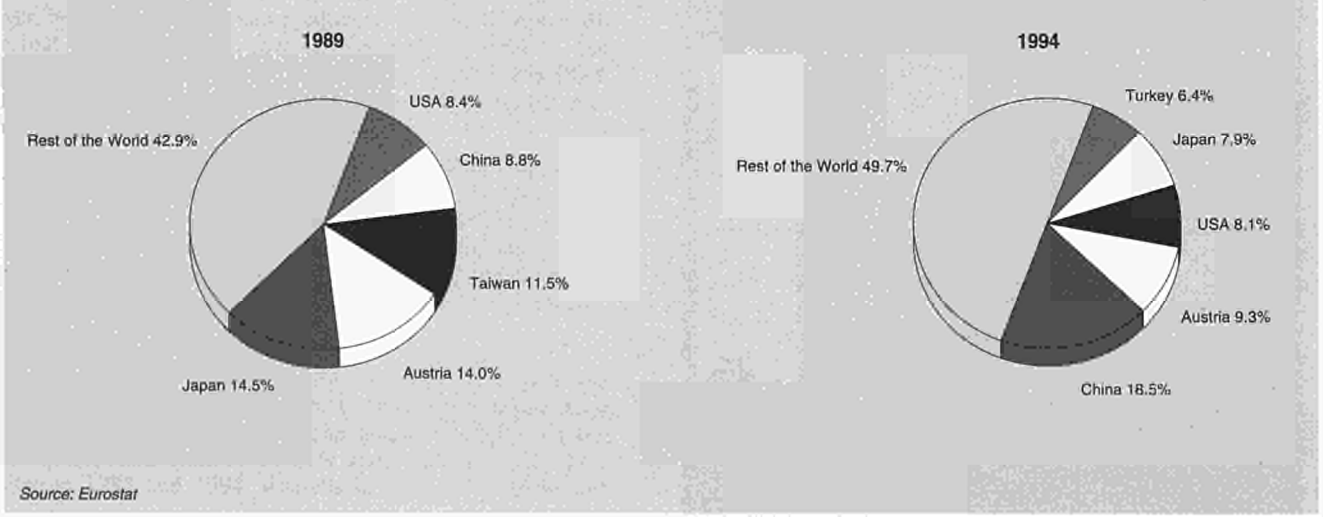
The ceramics industry is a relatively clean industry, however it is a major user of fuels (mainly natural gas). It thus shares concern about emissions with other non-metallic minerals producers. Modern units are well equipped to deal with existing compliance levels. As ceramic goods are inert, any waste problems are limited to some glazes and spent refractories.

Being an energy intensive industry, the ceramics industry has invested large amounts of money in energy saving production processes; over the last decade it has been able to reduce by a third the specific energy intensiveness of its production. Further progress would be seriously hampered by the imposition of a tax on carbon emissions, as this would reduce further investment possibilities in energy-saving technologies.

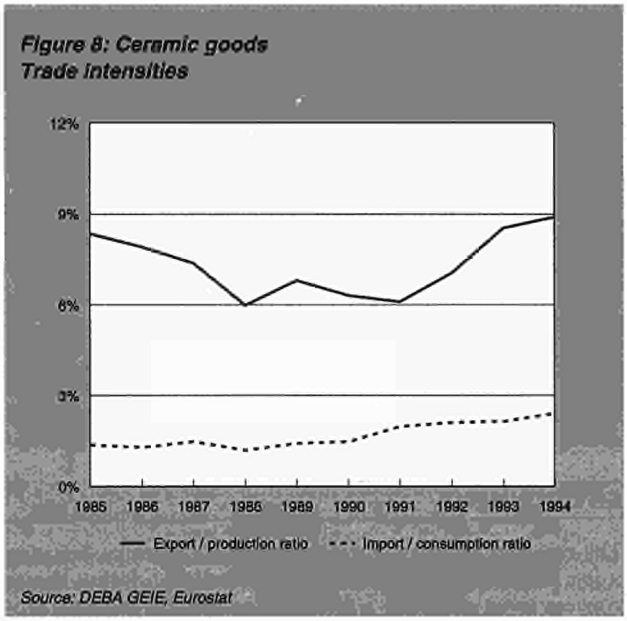
OUTLOOK

Consumption of ceramic goods is expected to resume former levels of growth as the EU economy is moving out of the recession and consumer confidence increases. Especially in the technical ceramics and tiles sub-sectors, expanding markets will bring stronger growth. Those companies which have already modernised and restructured can be expected to perform well in the second half of the 1990s. Some of the smaller companies will need to invest in new technology, or look for partners, in order remain competitive against third country producers, who will probably increase their penetration of the EU market. An answer should also be found in further

Figure 7: Ceramic goods
Origin of EU imports



Source: Eurostat



exploring markets with sufficient purchasing power in Eastern Europe and overseas.

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Clay products
NACE (Revision 1) 26.4

Clay brickmaking is one of the oldest crafts in the world and the Ancient Greeks, Romans, and Etruscans can lay claim to being the earliest EU producers. Despite competition from a wide range of products based on concrete, wood, metal, and plastics, the modern clay brick and tile industry continues to be a major supplier to the EU building industry.

INDUSTRY PROFILE

Description of the sector

The principal clay products for constructional purposes are masonary units (bricks) and rooftiles. Clay extraction and treatment and brickmaking tends to be carried out by the brickmaking company itself as a single integrated operation. Nevertheless there are certain cases where large tonnages of clays are bought in from outside sources, for instance, when low cost by-product fireclays from opencast coal mining operations are available or where particularly high grade clays are used for blending or increasing product ranges. The products of this sector are sold to the construction and civil engineering industries.

Bricks are available in a wide variety of types based on size, shape, colour, type of processing, end use, etc. They may be solid, perforated (i.e. with a large number of small holes), or hollow (e.g. horizontal core). Northern climes tend to use solid bricks whereas the Mediterranean regions tend to use more hollow bricks. Perforated bricks along with solid bricks are common in Germany, Belgium, and Denmark. Not surprisingly there are strong regional and national characteristics in brick types. Nevertheless, the industry has long history of international dialogue on both technical and commercial levels, and the European Tile & Brick Federation (TBE) has been in existence for over 40 years.

The principal producing countries in the EU are Italy, Germany, and Spain which together account for about 75% of total brick production and 65% of total rooftile output. The UK, France, and the Benelux countries are also significant producers. Of the new EU Member States, Austria is an important producer of both clay bricks and tiles, and Finland is a modest brick producer.

Recent trends

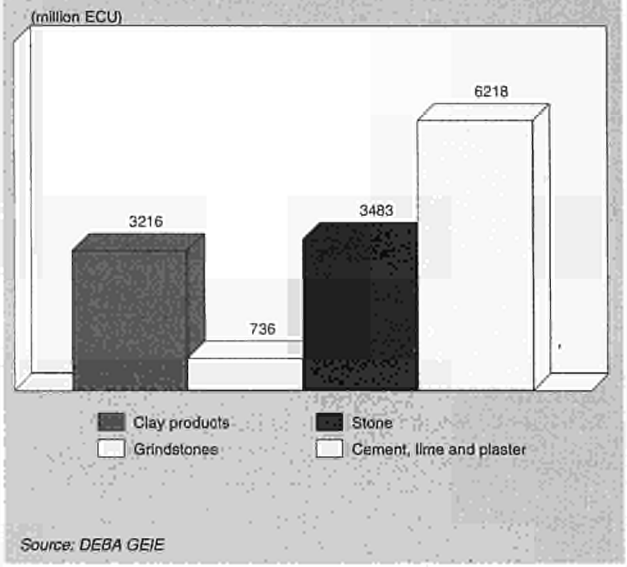
EU production and consumption of bricks and rooftiles grew almost continuously in value terms during the 1985-94 period, at an average of 1.6% and 1.8% per annum respectively. However, both consumption and production essentially stood still in real terms during the low activity years of 1990-93, but have since been boosted by high activity in 1994 and 1995. In volume terms, brick production grew by 7% and tile production by 9% between 1993 and 1994.

The production patterns have been different for individual countries with Italy, Germany, and Austria in particular showing strong volume growth since 1985. Meanwhile, a long period of decline in France and the UK was arrested in 1994 by increases over 1993 of 40% and 12% respectively. However, long term growth in the future is likely to remain uneven.

International comparison

The production of clay masonary units and rooftiles in the EU is much higher than either the USA or Japan, where other materials such as concrete, wood, and plastics are predominant. USA production declined by 21% and consumption by 27% between 1985 and 1994, whereas in Japan production and consumption both increased by 60% during the same period. It was notable, however, that production in the USA increased by 18% in 1994 over 1993 compared to a 3% decline in Japan.

Figure 1: Clay products
Value added in comparison with related industries, 1994



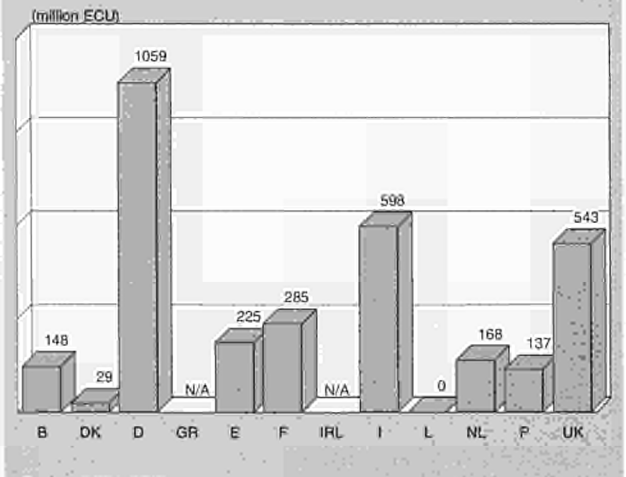
Source: DEBA GEIE

Foreign trade

Foreign trade in masonary units and rooftiles normally represents only a small part of overall consumption, since the products are relatively high-volume, and also since low-value products are best suited to serving nearby markets. The types of products are also designed to meet the particular building characteristics which tend to be of a regional or national nature.

Thus extra-EU imports represented only 1% of total consumption in 1994, whereas extra-EU exports were more substantial and reached 4.6% of production for the same period. The export trade can be divided into regular trade with neighbouring EFTA countries and more single-project-orientated shipments to destinations such as the Middle East and the Far East. In 1994 over 25% of exports were to EFTA countries, but with the inclusion of Austria, Sweden and Finland in the

Figure 2: Clay products
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Clay products
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)
Apparent consumption	4 284	5 456	5 883	5 980	5 821	6 189	6 243	N/A
Production	4 535	5 647	6 073	6 174	6 021	6 420	6 474	N/A
Extra-EU exports	268.0	206.7	216.9	232.2	253.4	295.1	298.9	279.6
Trade balance	250.9	191.3	190.5	193.8	199.9	231.6	230.9	207.9
Employment (thousands)	94.0	81.6	79.1	74.6	70.3	69.3	69.1	N/A

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Bricks
Deliveries by Member State in volume

(thousand cubic metres)	1985	1990	1991	1992	1993	1994
Belgique/België	1 435	2 440	2 322	2 410	2 497	2 640
Danmark	566	399	394	411	378	528
Deutschland	7 233	9 421	9 978	10 969	12 551	15 050
España	9 293	9 863	9 199	8 000	7 240	7 470
France	3 124	2 659	2 491	2 322	2 207	3 082
Italia	11 110	14 430	15 970	16 117	14 546	13 306
Nederland	1 542	1 721	1 539	1 614	1 568	1 615
Österreich	1 824	2 229	2 333	2 412	2 676	2 680
Suomi/Finland	344	389	391	358	305	284
United Kingdom	4 984	4 496	4 080	3 814	4 161	4 653
Total	41 455	48 047	48 697	48 427	48 129	51 308

Source: TBE

Table 3: Tiles
Deliveries by Member State in volume

(thousand square metres)	1985	1990	1991	1992	1993	1994
Danmark	N/A	1 861	1 696	1 492	1 480	2 266
Deutschland	21 149	27 525	29 680	34 674	36 427	36 564
España	12 500	18 900	18 300	18 100	18 000	19 000
France	1 738	40 376	40 363	39 477	40 598	46 239
Italia	26 300	32 700	30 200	34 928	37 023	37 807
Nederland	N/A	3 484	3 700	3 500	4 000	4 000
Österreich	514	1 033	1 790	2 213	1 950	2 048
United Kingdom	2 143	2 912	2 191	1 495	1 304	1 278
Total	64 344	128 791	127 920	135 879	140 782	149 202

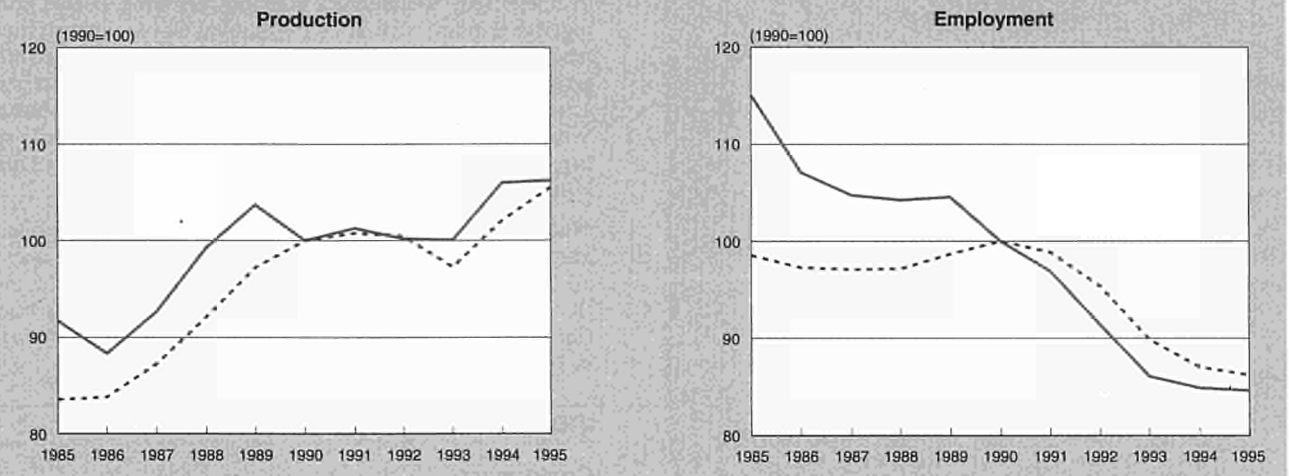
Source: TBE

Table 4: Clay products
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	2.2	1.4	1.8	5.5
Production	1.8	1.5	1.6	5.9
Extra-EU exports	-7.1	8.7	-0.4	17.8
Extra-EU imports	-8.8	40.7	10.6	21.2

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Figure 3: Clay products
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Union there will be a fall in extra-EU trade from 1995. By the same token imports will also fall in 1995 since Austria has been a major source for imports into the EU, second only to the Czech Republic which accounted for 42% of imports in 1994. Trade with the emerging economies of Eastern Europe is likely to increase as those economies develop closer ties with the EU. Meanwhile intra-EU trade has more than doubled during the past five years, reflecting the increase in cross-border shipments in the region of northern Germany, north-east France, and the Benelux countries.

MARKET FORCES

Demand

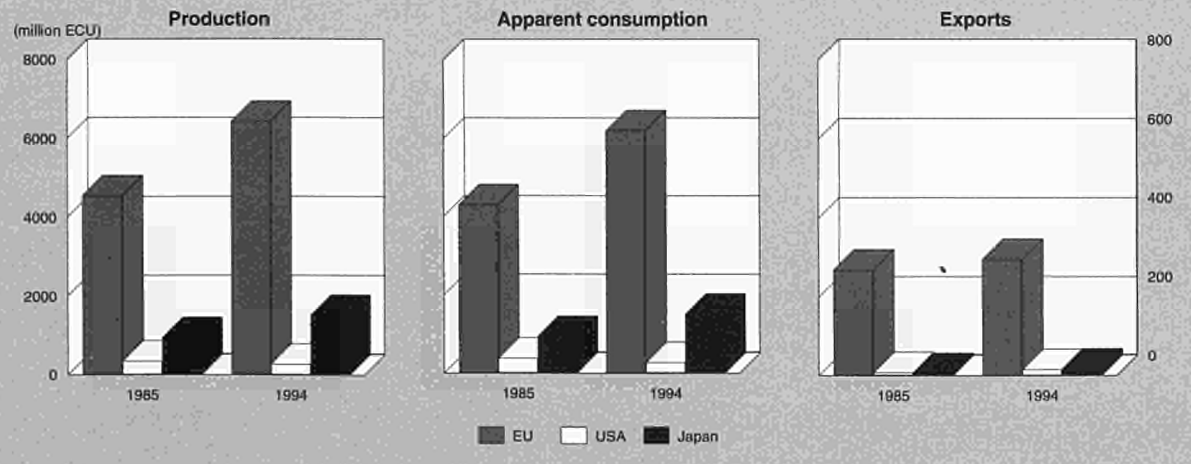
All masonary units and rooftiles are consumed in building and construction, and thus the construction industry is almost the sole customer. However, there is a small volume of sales to the builders' merchants and the DIY (do-it-yourself) sector. Within construction the main market for bricks and rooftiles is the new residential building sector. As bricks tend to be ordered at the beginning of the construction process, the level of new housing starts tends to be a better guide for demand than more general construction output figures. Bricks are also used in non-residential building, for exterior cladding as well as for walls, pavings, etc. The maintenance market for rooftiles tends to be more important than for bricks.

Other factors affecting brick and tile demand include climate, architecture, taste, and local availability and as suggested previously there are strong regional and national differences in demand patterns.

Supply and competition

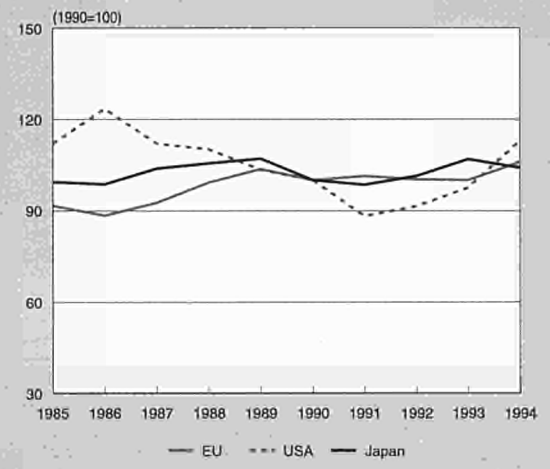
Overall there is more than adequate capacity to meet existing and expected future levels of demand for clay products in the EU, although once again there are regional variations. In some areas continuing overcapacity has led to the closure of older and less efficient brickworks.

Figure 4: Clay products
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Clay products
International comparison of production in constant prices



Source: DEBA GEIE

The EU industry meets very little competition from foreign suppliers for reasons already stated in the trade section to this chapter, but increasing intra-EU competition is a firm current and future trend. This has been helped not only by the process of standardisation now underway, but also by a greater awareness of building practices from one EU country to another and by the increasing international nature of the companies involved. Investments made by major producers in recent years have significantly brought down operating costs through savings in energy and labour costs and through the economies of scale. The quality and the range of products have both been extended.

The most important competition that clay bricks and rooftiles have to meet is from competing materials, ranging from bricks, blocks, and tiles made from concrete or other materials through to completely different building systems.

Production process

During the past decade the masorany unit and tile making process has undergone major technological improvements at virtually all stages of the process. A more precise understanding of the mineralogy of brick clays has enabled producers to improve properties and exercise greater control over product quality. In a modern plant, large scale mechanised extraction is followed by clay preparation which may now involve pre-treatment (e.g. weathering), blending, crushing, coarse grinding, fine grinding, and mixing. Additives may include plasticity modifiers (such as lignosulphonate to increase or crushed brick grog to decrease), wetting agents (soaps, etc.), colourants (such as manganese dioxide), deflocculants, water and last but not least, water. The prepared clay may then be extruded, surface-treated, cut (by wire), and dried before firing in a tunnel kiln.

Much effort has been directed in recent years to reducing energy consumption by applying best practice techniques at all stages of the process. Although extrusion offers the most flexible and economical method to produce high quality bricks (including hollow bricks), other methods are still employed in some factories.

INDUSTRY STRUCTURE

Companies

Throughout most of the EU, clay masonary unit and rooftile production is in the hands of small or medium sized companies, many of them still privately-owned. Many of these companies are based on highly efficient units with modern plants, and the relatively small size is a reflection of the localised nature of the market. Nevertheless the process of concentration is gaining momentum.

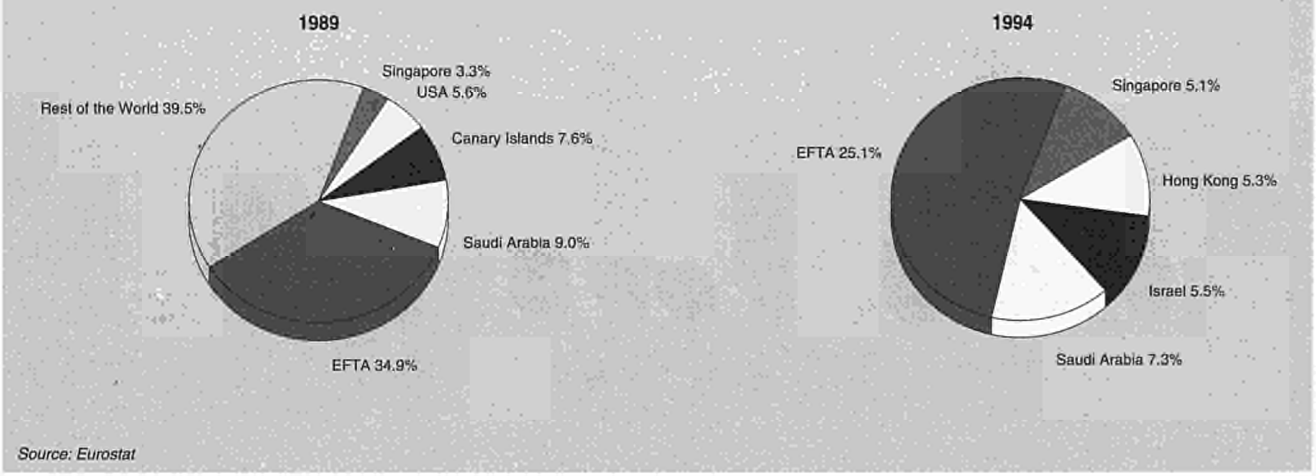
REGIONAL DISTRIBUTION

The location of masonary unit and rooftile manufacturing facilities is governed firstly by the location of suitable clay deposits, and secondly by proximity to major centres of building activity. Deposits of suitable clays are widespread throughout the EU wherever sedimentary rocks are in evidence. Thus most operations tend to be concentrated in low-lying regions rather than in upland or mountainous regions.

ENVIRONMENT

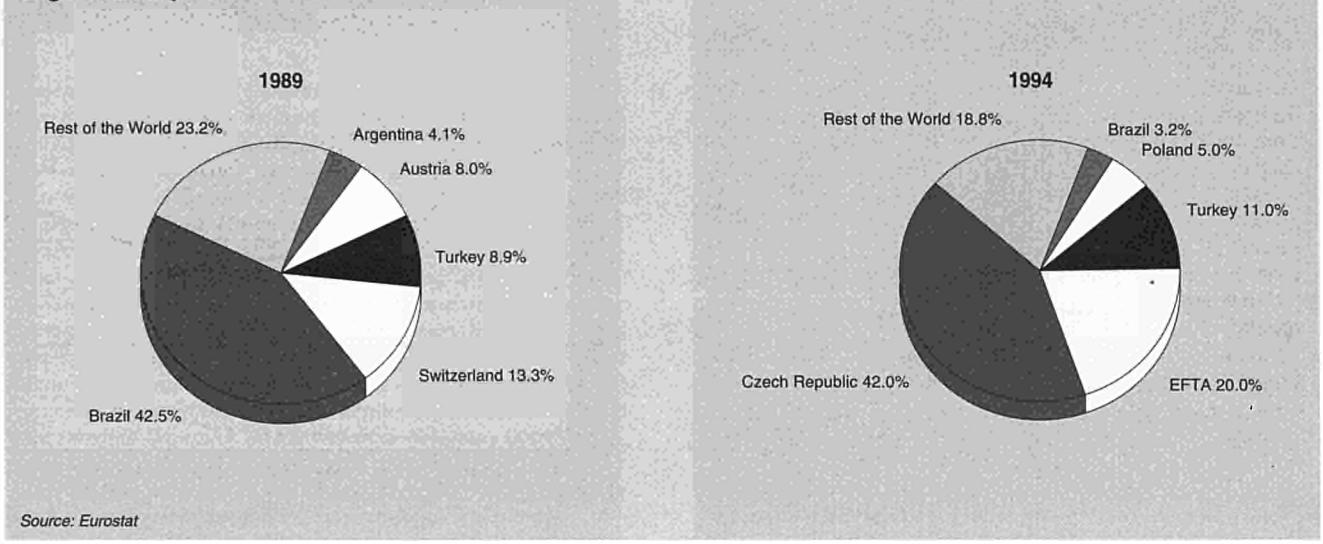
The principal environmental issues concerning the clay products industry involve the reparation of former clay workings and the various emissions from the firing process. Most modern brickworks tend to use gas as fuel if available, although coal, oil, and certain waste materials are also used where local conditions apply. Thus attention must be paid to both

Figure 6: Clay products
Destination of EU exports



Source: Eurostat

Figure 7: Clay products
Origin of EU imports



Source: Eurostat

gaseous and dust emissions. It should be noted that in recent years the clay products industry has successfully devoted much attention to energy saving techniques based on recycling of waste heat, insulation, and best practice operating methods.

OUTLOOK

The renewed growth in EU clay masonary unit and tile production and consumption during 1993-95 (which was particularly strong in the UK and France) are showing signs of slowing down for 1996-97. The arrest is likely to be temporary, however, since the brick and tile industry should enjoy strong demand in the latter part of the 1990s in accordance with a generally good performance by the construction industry.

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Table 5: Clay products
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	268.0	240.5	233.8	186.6	212.4	206.7	216.9	232.2	253.4	295.1	298.9	279.6
Extra-EU imports	17.1	6.8	8.9	12.4	16.8	15.5	26.3	38.4	53.5	63.5	68.0	71.6
Trade balance	250.9	233.7	224.9	174.2	195.5	191.3	190.5	193.8	199.9	231.6	230.9	207.9
Ratio exports / imports	15.6	35.3	26.4	15.0	12.6	13.4	8.2	6.0	4.7	4.6	4.4	3.9
Terms of trade index	128.6	118.6	102.1	99.1	97.2	100.0	106.3	104.4	96.6	97.5	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 6: Clay products
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	79.7	82.5	88.4	95.2	99.2	100.0	104.6	109.7	116.2	124.9
Unit labour costs index (3)	93.5	92.5	91.6	92.1	96.1	100.0	105.0	106.9	103.6	99.2
Total unit costs index (4)	95.2	90.1	88.3	88.9	95.2	100.0	108.2	111.5	108.3	106.2
Gross operating rate (%) (5)	14.9	18.8	21.1	24.1	23.2	21.2	20.2	19.8	20.6	22.4

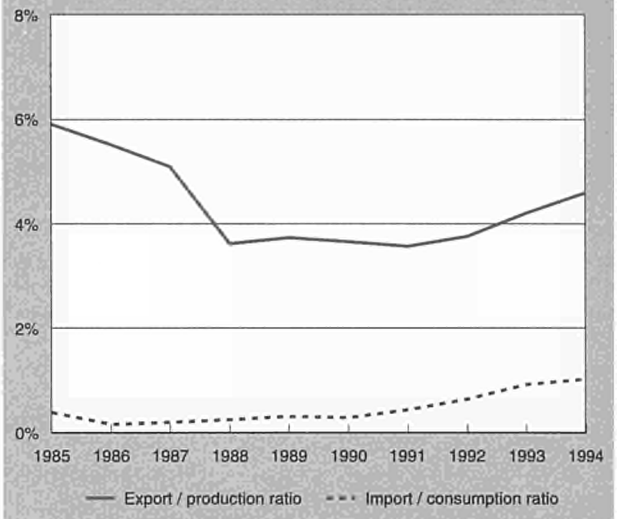
(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 7: Clay products
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.8	1.3
Danmark	1.0	0.5
Deutschland	0.7	1.0
Ellada	N/A	N/A
España	1.2	1.1
France	0.5	0.4
Ireland	N/A	N/A
Italia	1.7	1.4
Luxembourg	0.0	0.0
Nederland	0.8	1.0
Portugal	2.6	3.4
United Kingdom	1.3	1.0

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 8: Clay products
Trade intensities

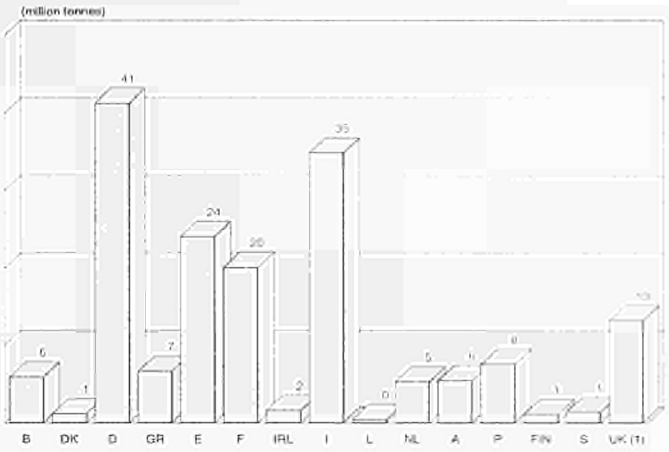


Source: DEBA GEIE, Eurostat

Cement
NACE (Revision 1) 26.51

Cement production in Cembureau countries (Western European countries, Turkey, Poland, Czech Republic, Slovakia and Hungary) has risen at a slightly higher rate in 1995 than in 1994 when a recovery was seen in the cement industry of these countries. Cement consumption stabilised, while in the enlarged European Union it decreased by 1.5%. However, trends in consumption and production showed marked differences between EU Member States. EU capacity is currently more than sufficient to cover internal demand. However, unfair competition from countries where environmental and social protection is non-existent could have a very damaging effect in the areas where their imports are concentrated. Thus, it is necessary to reinforce the legal resources for defence against concentrated dumping at the borders. Whereas overall economic harm to the EU may appear limited, the same does not hold true at the regional level where the border dumping leads to a "knock-on" effect.
The industry continues its efforts to reduce energy consumption by seeking cheaper energy (diversification of fuels) and rationalising the use of energy (new manufacturing processes, development of composite cements, heat recovery, etc.).
Construction forecasts for Cembureau countries are on a whole pessimistic for 1996, indicating difficulties for cement consumption, which is expected to decrease again by more than 3% in the European Union.

Figure 1: Cement
Consumption in volume by Member State, 1994



INDUSTRY PROFILE

Description of the sector

Activity of the cement industry is connected to construction activity, closely linked to the general economic situation. Cement is an important basic material for buildings and civil engineering works, representing major public and private investment.

Cement production consists of two essential phases:

- manufacture of a semi-finished product, so-called "clinker", obtained from the calcination in a high-temperature kiln (1 450°C) of raw materials (clay, limestone, etc.) previously prepared in paste or powder form depending on the production process used (i.e. wet or dry);
- manufacture of cement as a finished product, obtained by the homogeneous mixture of the ground clinker and calcium sulphate with or without - depending on the type of cement - one or more additional components: slag, fly ash, pozzolana, filler, etc..

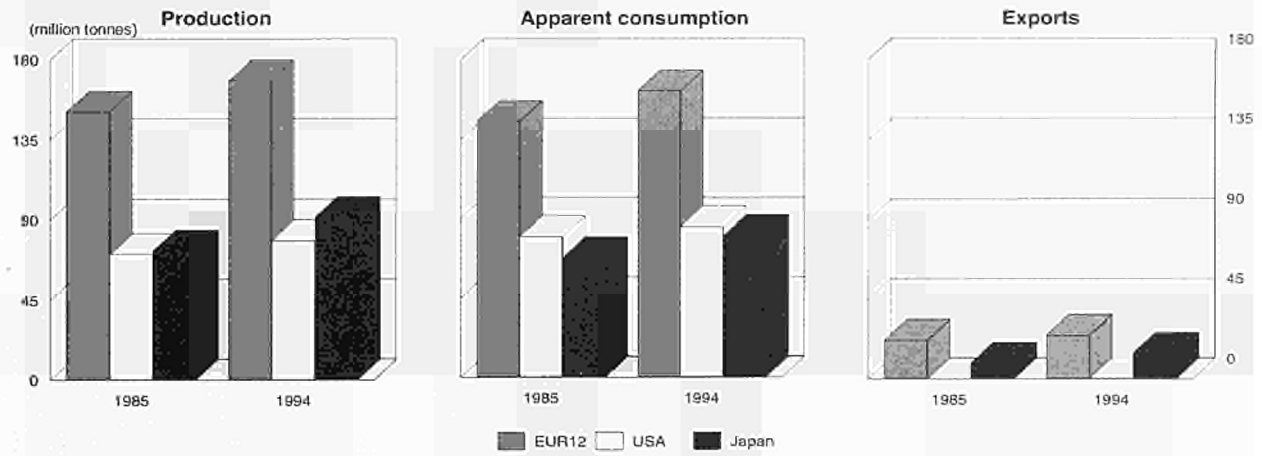
Recent trends

EU cement production amounted to 168 million tonnes in 1994. As regards consumption, the differences in countries trends are large: Italy decreased by 4.5%, while Belgium, Germany, Spain, Ireland and the United Kingdom increased by 10% -12%.

EU cement consumption amounted to 162 million tonnes in 1994, up 3.4% from 1994 and about 12% of the world production compared with 21% in 1980.

Following a high economic growth rate in Western Europe between 1987 and 1989, economic activity slowed dramatically in the second half of 1990 and growth virtually ceased in the first half of 1991. Consequently 1991, 1992 and 1993 marked a heavy downturn in cement consumption in a number of EU Member States. However, a slight recovery (3.2%) appeared in 1994.

Figure 2: Cement
International comparison of main indicators in volume



(1) Excluding intra-EU trade in clinker.
(2) Excluding exports of clinker.
Source: Cembureau

Table 1: Cement
Main indicators in volume

(million tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1994 (1)
Apparent consumption	145	148	154	167	175	176	172	170	157	162	170
Production (2)	151	151	152	162	169	178	174	170	159	168	176
Total exports	22	20	17	17	16	16	17	20	21	25	26
Trade balance	15	13	7	5	1	0	-1	-2	1	3	3

(1) EUR15.
(2) Excluding Intra-EU trade in clinker.
Source: Cembureau

Table 2: Cement
Average real annual growth rates

(%)	1985-90	1990-94	1985-94
Apparent consumption	3.9	-2.0	1.2
Production	3.4	-1.5	1.2
Total exports	-6.2	11.3	1.2
Total imports	18.0	7.5	13.2

Source: Cembureau

The strongest gains in cement consumption among EU Member States were Ireland (17.8%) and Denmark (12.6%), followed by Germany (11%), the United Kingdom (an estimated 10%), the Netherlands (9.3%), Belgium (7.3%) and Spain (5.7%).

The sharp decline in French consumption in recent years halted in 1994. Cement consumption was up 3.4% during 1993. In Italy, the recession continued unabated. Drops in the residential sector and public works contributed to an overall reduction of 7.4% in cement consumption. Consumption of cement in Greece was down 6.8% in 1994.

International comparison

World cement production represented 1 363 million tonnes in 1994 and the major cement producing countries were in order of importance: China (400 million tonnes), Japan (97.4 million tonnes), the USA (78.4 million tonnes), India (63.6 million tonnes), South Korea (54.8 million tonnes), Russian Federation (37.2 million tonnes), Germany (36.1 million tonnes), Italy (33.2 million tonnes), Thailand (33.0 million tonnes), Turkey (31.9 million tonnes) and Mexico (29.8 million tonnes).

In 1994 total world production of cement (excluding China) showed an increase of 3.4%, influenced mainly by the most dynamic countries of Asia. The overall market trend (including China) is increasing by about 5.5%. European countries excluding former USSR recovered the 1992 level of 251 million tonnes and Japan witnessed an increase of nearly 3%, while the USA showed a further increase of 6%.

Foreign trade

World cement trade still accounts for only about 6% -7% of production. The larger quantities are mainly distributed by sea.

Moreover, it is characterised by a very pronounced geographic polarisation. In 1994, 50% of the imports were recorded in 3 regions of the world - European Union (21 million tonnes), North America (12 million tonnes) and West Asia (11 million tonnes), while 47% of the world's exports came from Europe and 27% from East Asia.

As a result of the consumption increase in EU countries, imports increased slightly (to 21.5 million tonnes) in 1994. The share of imports from Eastern Europe still continues to increase. Large cement imports continued in Germany, Italy and Spain during 1994, as their shares with respect to domestic consumption amounted to 17.1% , 7%, and 9.4% respectively.

The community's main exporter was Greece, at the same level as the previous year, exporting about half of its production.

Japan with 14.8 million tonnes (an increase of 12.5% compared with 1993) was still the primary world exporter, followed by Greece with 7.7 million tonnes in 1994.

In 1994, the USA, the biggest importer in the world increased their imports by 60% to 11.3 million tonnes and German imports increased by 20% to 9 million tonnes (tonnages came mainly from Eastern Europe).

Table 3: Cement
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	652.0	508.0	436.2	331.4	328.9	298.8	305.1	299.4	342.0	462.3
Extra-EU imports	34.2	39.6	48.5	118.7	161.6	219.6	281.5	348.2	347.7	374.9
Trade balance	617.9	468.4	387.7	212.6	167.3	79.3	23.6	-48.8	-5.6	87.4
Ratio exports / imports	19.1	12.8	9.0	2.8	2.0	1.4	1.1	0.9	1.0	1.2
Terms of trade index (1)	116.6	101.0	95.4	97.4	103.2	100.0	100.4	107.6	106.8	107.7

(1) Nace 242: including lime and plaster.
Source: Eurostat

Figure 3: Cement
Destination of EU exports

Source: Eurostat

MARKET FORCES

Demand

As mentioned, consumption is linked directly to activity in the building sector and, more accurately, to investments made in residential and non-residential building and civil engineering works.

Supply and competition

EU capacity is currently more than sufficient to cover internal demand. However, unfair competition from countries where environmental and social protection is non-existent could have a very damaging effect in the areas where there imports are concentrated. Thus, it is necessary to reinforce the legal resources for defence against concentrated dumping at the borders. Whereas overall economic harm to the EU may appear limited, the same does not hold true at the regional level where the border dumping leads to a "knock-on" effect.

Production process

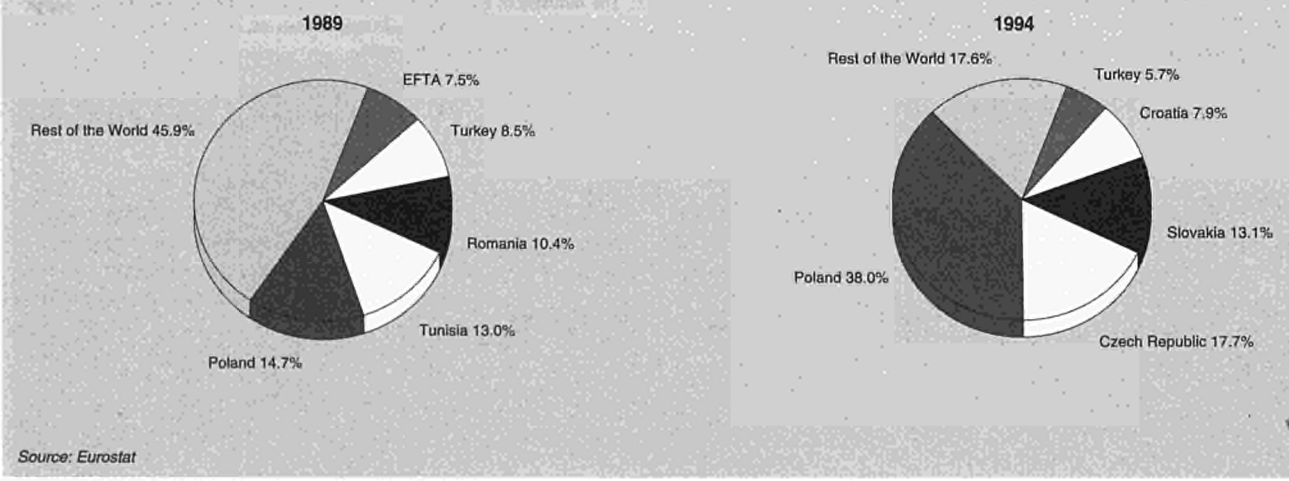
The productivity of the cement industry has risen by more than 30% over the last ten years, thanks to the introduction of more efficient and more sophisticated production tools, with very advanced automation of operations requiring higher qualifications from the staff. The number of employees in the European Union is now less than 60 000.

Cement production requires large quantities of energy. Significant advances have been made in recent decades in reducing the energy required to produce a tonne of cement. A recently published European Commission report concludes that only a 2.2% real energy saving potentiality currently exists within the cement sector. The average fuel consumption per tonne of clinker produced in the EU today amounts to under 900 kcal/kg. This value may vary widely from country to country, depending on the method of production applied. Energy consumption in relation to cement manufacture also depends on the policy pursued by the different national industries as regards investment and product development.

The industry continues its efforts to reduce energy consumption by:

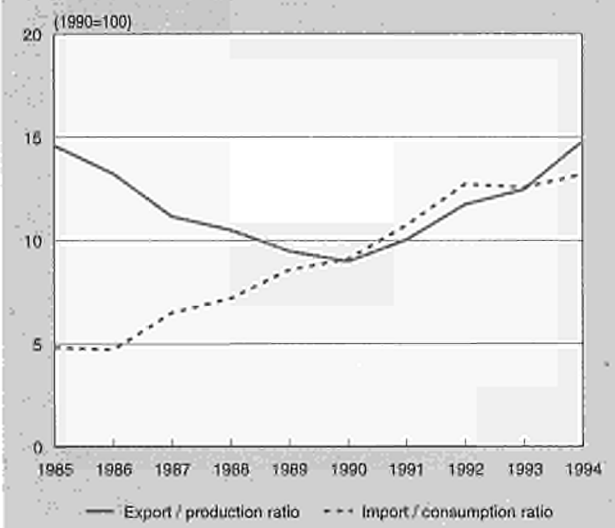
- seeking cheaper energy (diversification of fuels);
- rational use of energy (new manufacturing processes, development of composite cements, heat recovery, etc.).

Figure 4: Cement
Origin of EU imports



Source: Eurostat

Figure 5: Cement Trade Intensities



Source: Cembureau

INDUSTRY STRUCTURE

Companies and their strategies

There are nearly 300 plants in European Union, belonging to 123 companies.

Restructuring and market positioning of the leading companies is expected to continue.

Large investments have been recently carried out in Eastern European countries (Poland, Hungary, Slovakia, Czech Rep., Russia, Estonia) and Asia (China, Cambodia, Vietnam).

There are no generally accepted criteria for ranking cement companies or groups, as both turnover and capacity can be defined in different ways. Published turnover in consolidated accounts may include non-cement activities, and the existence of trading affiliates can lead to different quantities of cement being produced and distributed by the same company. The calculation of capacity in part-owned companies can be treated differently.

Taking into account the above reservations, the largest operating companies in the world having cement interests in the European Union are generally regarded to be (in alphabetical order), Blue Circle (United Kingdom) Cemex (Mexico), Dyckerhoff (Germany), Heidelberger (Germany), Holderbank (Switzerland), Italcementi (Italy), Lafarge (France) and Scancem AB (Sweden). Important investments made in China by Japanese companies such as Chichibu-Onoda will add, in the very near future, some Asian companies to the above list.

ENVIRONMENT

The industry has, at an operational level, invested heavily in measures of environmental protection and strategically continues to work with the relevant legislators to develop appropriate legislative instruments in environmental protection.

A significant body of legislation is being developed which has some impacts on the industry. Proposals for CO2 / Energy Taxes, Integrated Pollution Prevention and Control, Waste Classification, Incineration of waste and hazardous waste are particularly relevant.

REGULATIONS

An European Prestandard for common cements, ENV 197-1, was adopted in 1992 by CEN. This Prestandard is assisting convergence of national standards as a full EN (Euronorm) is prepared.

A further European Prestandard, ENV 197-2 "Cement Conformity Evaluation", which sets out an European scheme for cement certification, was adopted by CEN in 1995. Convergence of national certification schemes is now taking place in anticipation of a final decision on the matter by the European Commission.

OUTLOOK

Economic activities in Cembureau countries (Western European countries, Turkey, Poland, Czech Republic, Slovakia and Hungary) rose at a slightly higher rate in 1995 than in 1994 and the cement consumption stabilised while in the enlarged European Union (15 countries), it decreased by 1.5%. Construction forecasts for Cembureau countries are on a whole pessimistic for 1996, indicating difficulties for cement consumption which is expected to decrease again by more than 3% in the European Union.

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Precast concrete
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Ever since 1990, there has been a steady decline in the precast concrete activity in most of the EU countries. Precast concrete activity closely follows developments in the construction sector, which is virtually its only client. Drops in activity were strongest in France, Italy and the United Kingdom. Almost at the same time, a strong rise in precast concrete production was noted in Germany. Though the industry is mainly made up of small to medium-sized companies, some merger and acquisition activity has taken place. Stricter EU legislation on pollution control will have an influence on the precast concrete industry, while the limited expansion possibilities for mining and quarrying might pose supply problems for the industry.

INDUSTRY PROFILE

Description of the sector

The precast concrete industry is the collective name given to all enterprises that manufacture precast concrete products at specially equipped plants and which operate independently of weather conditions. Products are delivered to the construction sector ready to be put in place in building and road constructions, civil engineering works, etc.

Concrete is made from a mixture of sand, water, cement, gravel or other aggregates, and other possible additions. As an industrial sector, the precast concrete industry is situated between the suppliers (i.e. cement manufacturers and quarries) and the customers (i.e. the construction sector).

The precast concrete industry covers a wide range of products:

- products for road construction (paving flags, stones and blocks, kerbs, safety and sound barriers, sewerage and drainage pipes and accessories, etc.);
- elements for building construction (masonry units, cladding elements in architectural concrete, floor elements, beams and columns, wall elements for industrial, commercial and agricultural buildings, etc.);
- elements for civil engineering works (bridge girders, tunnel elements, etc.); and
- units for various other purposes such as flood protection, urban and garden landscaping, lighting poles, and agricultural installations.

Furthermore, the following general characteristics of the precast concrete industry can be highlighted:

- relatively low value-added content of certain mass-produced precast concrete units;
- strong dependence upon the efficiency of the business (i.e. the degree of mechanisation of the production process and the effectiveness of management); and
- a predominance of small and medium-sized businesses (in some countries the majority of the enterprises are still family-owned). Although some of these businesses have recently been bought up to form bigger concerns, the number of production sites remains largely unchanged (even after the inevitable rationalisation).

National and regional distribution in the EU precast concrete industry are very much interrelated and are influenced, to a large extent, by factors such as the demographic situation, climatic conditions and the traditional use of certain construction materials.

Recent trends

In 1994, it is estimated that turnover in the EU approximated 20 billion ECU and employment was estimated at about 175 000.

In the industrialised countries, activity in the precast concrete industry largely depends on the overall economic climate and on the activity in the construction sector in particular (99% of production goes to the construction sector). However, trend differences can be observed between residential building, non-residential building and road construction (these three subsectors represent approximately 50 %, 20 % and 30 %, respectively of total precast concrete production).

In the last five years, the general economic downturn has caused a considerable fall in the overall precast concrete production, estimated at some 20% (excluding Germany).

Employment in the precast concrete industry follows the overall production trends, but is more elastic, i.e. a given decrease in production does not necessarily lead to an equal drop in employment and, in correlation, a given increase in production is translated into employment growth with some delay and not necessarily to the same extent.

International comparison

Due to climatic conditions, prefabrication is generally more developed in the northern countries. This explains the relatively high level of precast concrete activity in the Nordic countries. However, the recent economic crisis has had severe consequences for activity in Sweden and, especially Finland, where production in current prices had declined more than 50 % from 1990 to 1995. In Turkey, the precast concrete industry is a nascent sector. Though, for that reason, figures are still at a low absolute level, they clearly show a positive upward trend.

Notwithstanding local competition from the neighbouring East European countries, production volume in Austria remains satisfactory. Switzerland is a typically local industry with a very closed market, which is probably due to the rather heavy

Table 1: Precast concrete
Main indicators by country, 1994

	B	DK	D	F	I	NL	FIN	S	UK	TUR
Turnover (million ECU)	760	340	6 753	1 822	N/A	1 210	220	221	1 876	N/A
Production (thousand tonnes)	9 500	2 660	N/A	28 000	20 420	N/A	1 700	1 550	N/A	1 218
Employment (thousands)	6	4	60	21	28	9	4	3	10	5
Number of precast concrete plants										
Total (units)	361	95	1 500	1 100	1 260	170	70	85	175	41
With 50 or more employees (units)	20	N/A	N/A	43	122	60	30	25	N/A	N/A

Source: BIBM

Table 2: Precast concrete
Production in current value by country

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1996 (2)
Belgique/België	249	297	347	378	457	501	516	600	592	639	600	580
Danmark	320	387	392	384	365	360	318	318	285	N/A	N/A	N/A
Deutschland	2 082	2 280	2 402	2 628	2 942	3 338	3 774	5 091	5 100	5 200	5 356	N/A
France	1 216	1 322	1 405	1 561	1 667	1 788	1 819	1 745	1 722	1 822	1 767	N/A
Italia	1 530	1 460	1 530	1 640	1 820	2 010	1 980	1 670	1 180	1 400	1 540	N/A
Nederland	475	523	550	633	680	680	660	660	963	1 210	1 300	1 300
Suomi/Finland	320	308	370	435	549	556	370	207	210	220	220	220
Sverige	N/A	N/A	N/A	349	420	516	478	362	224	221	263	250
United Kingdom	1 852	1 821	2 094	2 731	3 012	2 747	2 368	1 626	1 623	N/A	N/A	N/A

(1) BIBM estimates.
(2) BIBM forecasts.
Source: BIBM

weight of the product and the inherent transportation possibilities.

The level of activity in the North-American precast concrete industry varies according to the product branch. For instance, sustained urban development in the western states requires large structural elements for the construction of parking buildings, highway bridges, etc. Similarly, large-diameter pipes are in high demand due to the ever-increasing water consumption. The sewer network being less developed than in other industrialised countries is mainly due to the extensive sparsely populated areas, and the current stringent environmental regulations also create a need for smaller products for individual water treatment installations. Furthermore, paving blocks seem to be the most successful products of the last decade, whereas concrete masonry units have recently recovered some of the attraction lost in the early 1980s.

Foreign trade

Generally, precast concrete products are heavy and bulky in relation to their value. The average value of one metric tonne of precast concrete products is approximately 100 ECU (but for some standardised non-reinforced products manufactured on a large scale, this value can be as low as 40 ECU). Consequently, long-distance transportation of precast concrete products is unusual and trade is mostly limited to a single border crossing. However, there are exceptions, for example, technologically highly-advanced precast concrete products (i.e. sophisticated cladding elements in architectural concrete) and certain speciality products (i.e. high-quality decorative tiles).

MARKET FORCES

Demand

Activity in the precast concrete industry is strongly dependent on the activity in the construction sector, which in turn is dependent on the overall economic climate. As a consequence, periods of high activity in the precast concrete industry are succeeded by low-activity periods which leads to costly overcapacity.

Another factor causing variations in activity levels is the financial situation of the public authorities. Approximately one-third of construction activity covers public works (involving road construction, civil engineering works, etc.). Consequently, when public authorities experience financial difficulties, the construction sector is impacted which in turn influences demand for precast concrete.

In the German precast concrete industry it is evident that the high activity level is, essentially, a consequence of the immense reconstruction operations in the former East German states.

Supply and competition

Depending on their type, precast concrete products are either distributed by direct sale to building contractors, which accounts for at least 80 % of the total output, or through the sale to building material retailers, which accounts for the remaining 20 %.

The precast concrete industry faces competition from traditional construction procedures with an intensity that varies

Table 3: Precast concrete
Employment by country

(thousands)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1996 (2)
Belgique/België	5.3	5.0	5.1	5.3	5.7	5.9	6.3	6.4	6.4	6.3	6.1	6.0
Danmark	4.0	4.3	4.8	5.0	4.9	5.8	3.4	4.0	3.6	N/A	N/A	N/A
Deutschland	43.6	42.3	43.2	43.7	44.1	46.5	49.9	51.6	57.7	51.0	50.0	N/A
France	23.6	23.3	23.3	23.7	24.2	24.6	24.1	23.6	21.8	20.7	N/A	N/A
Italia	19.2	19.0	23.0	25.0	37.5	38.7	35.3	32.7	29.0	27.6	24.2	21.7
Nederland	7.9	7.7	7.6	7.6	8.0	8.0	8.2	8.5	8.5	8.5	8.5	8.5
Suomi/Finland	7.0	6.9	6.9	7.2	8.1	8.4	7.0	4.8	4.2	3.7	3.6	3.5
Sverige	N/A	N/A	N/A	N/A	5.7	6.5	5.3	4.2	3.6	3.2	3.3	N/A
United Kingdom	13.0	13.0	13.0	13.5	13.0	12.5	11.0	9.7	9.7	N/A	N/A	N/A
Turkey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.5	N/A	N/A

(1) BIBM estimates.
(2) BIBM forecasts.
Source: BIBM

Table 4: Precast concrete
Average hourly wage costs by country

(ECU)	1985	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1996 (2)
Belgique/België	13.0	14.4	14.7	15.1	16.3	17.2	19.0	19.5	20.9	21.3	N/A
Danmark	8.5	10.1	11.0	11.0	15.0	15.6	16.0	17.0	17.6	N/A	N/A
Deutschland	11.8	13.2	13.6	14.2	15.0	16.1	17.9	18.1	18.5	20.0	N/A
France	8.4	9.1	9.4	9.8	10.4	10.7	12.0	8.2	8.8	N/A	N/A
Italia	9.7	10.9	11.2	12.6	13.3	15.8	13.9	19.5	20.4	21.0	N/A
Nederland	15.4	16.4	16.7	17.0	17.0	17.9	18.5	19.0	19.2	19.3	19.8
Suomi/Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14.3	14.3	14.5	14.0
Sverige	N/A	N/A	14.0	15.7	15.3	17.8	16.1	14.3	15.0	15.4	N/A
United Kingdom	N/A	N/A	N/A	N/A	N/A	8.5	8.8	N/A	N/A	N/A	N/A

(1) BIBM estimates.
(2) BIBM forecasts.
Source: BIBM

from country to country and which is closely related to the marketing skills of the local industry. Indeed, a wide range of substitution products are offered ranging from classical materials, such as clay brick and timber, to newer materials, such as PVC and glass fibre reinforced plastics.

However, some precast concrete plants have considerably improved their competitiveness through an extensive mechanisation and automation process. These operations make it possible to significantly compress the cost per unit. As a consequence, these plants have become competitively operational over a much wider geographic area. Moreover, the price of precast concrete products could be kept down to a remarkably low level, thus securing precast concrete products a strong position against substitution products.

Nevertheless, there is a reverse side to increasing mechanisation and automation. Indeed, as a general rule new machinery and equipment often lead to an increased output in numbers or volume, thus disturbing the supply/demand balance.

Production process

As mentioned, mechanisation has changed the face of the precast concrete industry considerably over the last fifty years. Before and in the first years after World War II, the manufacturing of concrete was essentially a handicraft trade. Moreover, the material mainly used for non-structural applications was not reinforced.

Technological developments in the early 1960s in reinforced and prestressed concrete led to breakthroughs of various plant-manufactured structural elements for building construction and civil engineering. At the same time, lightweight concrete was applied in the precast concrete industry for the manufacturing of masonry units, and wall and floor elements.

The construction boom in the late 1960s and early 1970s, as well as the increase in building costs, led to a further industrialisation of the precast concrete industry. Profits were reinvested in to both plants and modern machinery, such as semi-and fully-automated batching and manufacturing equipment. In addition, handling, packaging and transporting techniques were revolutionised.

As mentioned, developments in the automation process (including the use of sophisticated soft-ware) have brought the industry to a new level of technical excellence which has further increased productivity.

The following particular technological advantages of the precast concrete manufacturing are maintained and are even gaining greater momentum:

- precast concrete products are manufactured at a plant with a permanent location in controlled conditions;
- production is based on a proper scientific concrete technology, such as the use of 0-slump concrete, hot concrete and pretensioning techniques, particular moulding and compaction techniques and accelerated hardening techniques;
- advanced quality control, which goes beyond the checking of the fresh concrete. Quality control includes the control of: dimensional accuracy, the properties of the hardened concrete, and the position of the reinforcements. Control is done before the product has been incorporated into construction. This important factor should be taken into account when comparing precast concrete with other, traditional building methods; and
- not only are manufacturing methods and plant highly automated, but production is also characterised by an ever increasing level of industrialisation and standardisation.

These specific and scientific approaches in concrete technology help to guarantee a high and consistent quality of precast concrete products.

Basically, most of the "new" products in the precast concrete industry are evolutions of existing elements. Nevertheless, the industry has also developed (and is successfully marketing) valuable solutions in areas relating to environmental problems. One such development is sound barrier walls to protect residents living near highways or railways from noise pollution.

This development has been spurred on by the construction of high speed train networks in France, Germany and Belgium, in which the precast concrete industry has quite an extensive input (among other things, by specially designed products for this application).

Notwithstanding evident and valuable environmental and sociological objections, a further extension of the highway network, especially in the neighbourhood of the bigger cities, seems inevitable in order to cope with the enormous problems arising from the growing traffic density in most industrialised countries. The use of precast concrete seems the logical and evident choice since it enables construction with a minimum of hindrance to the traffic.

However, this evolution depends in the first place on political decisions and availability of funding.

INDUSTRY STRUCTURE

Companies

As already mentioned, the precast concrete industry remains predominantly composed of small to medium-sized enterprises, in spite of a recent rationalisation movement. This movement has been spurred on by two concurrent factors.

Table 5: Precast concrete
Intra-EU trade

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1996 (2)
Belgique/België, Luxembourg												
Value (million ECU)	34	43	46	55	64	75	71	70	85	92	95	N/A
Quantity (thousand tonnes)	735	783	782	953	1 003	984	976	921	1 043	1 010	1 000	N/A
Deutschland												
Value (million ECU)	51	48	51	49	64	83	117	191	200	200	200	N/A
Quantity (thousand tonnes)	400	447	433	417	521	599	782	1 382	1 495	1 495	1 495	N/A
France												
Value (million ECU)	52	62	70	85	101	104	107	N/A	N/A	84	N/A	N/A
Quantity (thousand tonnes)	551	646	679	822	892	844	872	N/A	N/A	564	N/A	N/A
Nederland												
Value (million ECU)	N/A	N/A	N/A	N/A	N/A	N/A	85	92	90	95	98	100
Quantity (thousand tonnes)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Suomi/Finland (3)												
Value (million ECU)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	8	N/A
Quantity (thousand tonnes)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	30	N/A
United Kingdom												
Value (million ECU)	N/A	13	16	26	31	46	33	25	N/A	N/A	N/A	N/A
Quantity (thousand tonnes)	N/A	48	51	93	123	93	64	58	N/A	N/A	N/A	N/A

(1) BIBM estimates.
(2) BIBM forecasts.
(3) Finland does not import from or export to EU countries, trade is limited to Norway, Russia and Sweden.
Source: BIBM

First, is the fragmentation of family-owned businesses (that had grown to considerable sizes since World War II) due to succession problems. And, second, in the context of the Single Market, is the trend towards concentration in view of allowing large construction companies to control supplies on the foreign market they enter, or creating concrete companies large enough to deal with the big construction companies on an internationalised market.

The rationalisation movement inevitably reduced the total number of enterprises, but not to the extent expected. Most production sites remained in business, mainly because of the rather heavy weight of many precast concrete products and the transportation costs involved.

Even though there is no complete information on EU employment in the precast concrete industry, a reasonable estimate is around 175 000 people. The number of employees is spread over more than 5 000 precast concrete plants, of which only approximately 600 employ more than 50 people.

Following years of growth up to 1990, employment has now come to a relative standstill in some countries. However, in some countries, such as the Nordic countries, the United Kingdom and Italy, it is declining as a consequence of the economic situation. The decline in employment has also been affected by the introduction of new manufacturing plant and equipment which enable enterprises to produce more with less people. However, it is affected only to a certain extent, since there are obviously lower limits to employment levels (depending upon the types of production which for particular products remains more labour intensive).

On the labour market, wage costs have risen steeply in recent years, as a result of reduced working hours, as well as, a shortage of skilled labour. The overall average hourly wage cost in 1994 was approximately 20 ECU.

Parallel to the earlier mentioned downward trend in employment, a considerable demand for highly qualified labour skilled in the latest technologies is noted. Skilled manual workers constitute about 35 % of employment in the precast concrete industry. These workers are involved in special production procedures such as, reinforcement steel bending and netting, and the finishing of architectural concrete (e.g. polishing). In several Western European countries the limited number of these labourers are in high demand, since younger school graduates do not appear to be strongly attracted towards this occupation. To cope with the problem, the industry has set up specific programmes ranging from training courses for young adults and/or unemployed people, the publication of manuals, and campaigns designed to improve both the image of the industry and the attractiveness of jobs in precasting.

Strategies

As mentioned, some degree of concentration has occurred in the industry in recent years. Besides mergers and acquisitions, the industry also aims to increase productivity (estimated to have risen by roughly 50 % over the last ten years). Towards these goals, the precast concrete industry has raised fixed investment considerably from 1985 to 1995. These investments reflect significant efforts towards innovation in the sector and replacement of older equipment and installations.

Precasters have also become aware of the market advantages of guaranteeing the adequate durability of products (implying both soundness and long-term appearance) and improved design. Hence, the active participation of the industry in the EU harmonisation, certification and standardisation work in view of the implementation of the Construction Products Directive: the CE quality label.

Moreover, sustainability of concrete is deemed to become a major feature for a "green" marketing of concrete, to be put on the same level as durability or low cost. Relevant techniques such as Life Cycle Analysis (LCA) are essential tools in dem-

Table 6: Precast concrete
Cement consumption by country (1)

(%)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (2)	1996 (3)
Belgique/België	17	18	19	21	21	22	22	24	24	23	24	24
Danmark	44	45	45	41	41	40	40	41	41	41	N/A	N/A
Deutschland	26	26	26	26	25	26	27	27	28	28	28	N/A
Ellada	3	N/A	1	2	2	2	N/A	N/A	N/A	N/A	N/A	N/A
España	N/A	11	16	20	21	22	N/A	N/A	N/A	N/A	N/A	N/A
France	18	17	17	17	17	17	17	17	17	17	17	N/A
Ireland	29	27	27	27	29	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italia	13	13	13	13	13	15	15	12	14	14	14	N/A
Luxembourg	12	14	16	19	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
Nederland	34	35	37	38	38	40	40	40	40	38	38	39
Portugal	11	11	11	11	11	11	N/A	N/A	N/A	N/A	N/A	N/A
Suomi/Finland	45	45	43	52	53	47	36	29	26	26	28	27
Sverige	N/A	N/A	N/A	N/A	N/A	N/A	24	N/A	N/A	28	28	N/A
United Kingdom	24	27	25	25	26	27	27	26	27	N/A	N/A	N/A

(1) Percentage share of cement consumption by the precast concrete industry in the total national cement consumption.
(2) BIBM estimates.
(3) BIBM forecasts.
Source: BIBM

onstrating the environmental performance of concrete, which generally compares more than favourably with competing materials and, hence, in developing marketing efforts at national and European level in view of gaining recognition for concrete as an environmentally sustainable material among regulators, specifiers, architects, contractors and the public at large.

Technological evolution also constitutes an influential factor. Indeed, the technical realisation of new types of beams or girders with, for instance, larger spans, would automatically create a higher demand for these structural elements. Furthermore, certain technological innovations that help avoid the carrying out of complex and difficult tasks on traditional building sites enable the precast concrete industry to offer attractive and efficient solutions to builders, e.g. elements for railway bridges with incorporated railway tracks.

Impact of the Single Market

The impact of the creation of the Single Market on the precast concrete industry had been expected to be significant with an added positive effect on the general economic activity in the construction sector. Indeed, trade between countries tends to be limited since most of the products are large and heavy, but some of the more specialist items do cross both intra-EU and extra-EU borders. Thus, the freedom of movement of goods, services and capital are all seen as relevant. Regrettably, this expectation has not yet been realised.

The Single Market should have the greatest effect in the area of technical harmonisation, standardisation, and certification. This is seen as particularly important to the future development of the industry in Europe. Since the industry is largely made up of small- to medium-sized enterprises (often family-owned companies) issues concerning SMEs (access to finance and a lowering of the administrative burden) are highly relevant.

REGIONAL DISTRIBUTION

National and regional distribution are narrowly intertwined. The precast concrete industry is particularly important in the Federal Republic of Germany, relatively important and advanced in the Netherlands and Belgium, and, to some extent, in France and northern Italy. In some countries, there is a higher concentration of the precast concrete industry in certain regions, e.g. the South West of the United Kingdom.

Geographical factors also play an influential role in the precast concrete industry. The more densely populated a region, the more important and developed the precast concrete industry tends to be, because these regions have a higher demand for building, water and road construction. Since precast concrete products are heavy and costly to transport, production takes place near the centre of demand. An example of this is the triangle of dense population in Belgium, the Netherlands and Germany, in contrast to more sparsely populated regions in central France and Spain.

Climatic conditions also play an important role. In general, the further north a country is situated, the more developed is its precast concrete industry. Traditional building activity in northern countries often has to be suspended during the winter due to bad weather conditions, while precast concrete products allow uninterrupted building activity.

Traditional use of certain construction materials has influenced the degree of development and strength of the precast concrete industry in the various Member States. In the Netherlands, for example, a boom began for precast concrete pavers when traditional clay pavers became too expensive. This secured the Dutch paving industry a strong position which allowed large-scale production at a favourable cost. Another result of this situation was that transportation beyond The Netherlands' borders became possible. By contrast, the British precast concrete flooring industry has encountered great difficulty in breaking into the traditional timber floor market for low-rise housing.

The percentage of the precast concrete industry in total national cement consumption illustrates the actual penetration of the precast concrete products on the construction market. In the long term, it shows a rather positive trend in most countries, especially in those countries where the industry has successfully commercialised its precast concrete solutions. Indeed, by producing certain construction materials at fixed plant sites, instead of at building sites, construction costs may be significantly reduced. Currently, however, a status quo (with no obvious explanation) is noted.

ENVIRONMENT

EU legislation on pollution control will have its influence on the precast concrete industry. National legislation concerning environmental protection is particularly aimed at reducing

emissions from the raw materials and manufacturing industries. Hence, considerable know-how and capital investments in environmental protection are required of these industries. By means of modern techniques (such as waste-water treatment installations) the pollution of air, water and soil may be controlled, notwithstanding a growing production. Modern techniques will thus help dissociate industrial production and economic growth from environmental exploitation.

In the precast concrete industry, a noise problem may occur as increasing urbanisation encroaches upon precast concrete plants. However, the industry has already recorded some success in reducing noise levels. Unfortunately, machine manufacturers are not sufficiently aware of the problem and generally only take action when pressed by their clients, the precast concrete manufacturers.

Increased restrictions on gravel extraction, anticipated in a number of Member States, could affect the concrete industry by rendering raw material supplies more difficult to obtain in the long term. Raw material shortages might arise in some countries. In addition, the quarries supplying the precast concrete industry with sand and aggregates are either forbidden to extend further, or are threatened with closure. Since about 80 % of concrete is made up of sand and aggregates (1 m3 concrete requires two tonnes of these raw materials), this may cause serious short-term problems for the precast concrete industry which needs high-quality ingredients for its production.

Research programmes are being conducted with the aim of recycling concrete debris, crushed concrete and waste concrete, but requirements for high-quality inputs gives the precast concrete industry only limited opportunities for using such recycled materials. Furthermore, it should be pointed out that the quality of the ingredients plays an important role in one of the major advantages of precast concrete, i.e. smaller dimensions of the components which reduce their weight, improving transportation costs.

As already mentioned, relevant (LCA) studies have demonstrated that precast concrete is one of the most "green" construction materials: it not only requires a low energy input, but also causes very limited environmental hindrances, which, in most cases, are easy to control.

REGULATIONS

The Single European Market and the coming into effect of the Construction Products Directive (CPD) have emphasised the urgency of the work on harmonisation, standardisation and certification.

Adoption of common standards and quality certification systems at the EU level are essential for the precast concrete industry. Consequently, the industry has a preference for the most stringent level of attestation of conformity involving product certification by an approved third party. Such certification would help to maintain client confidence in the high quality of the products, improve the quality image of the concrete products, and reduce the chances of having regulatory attestation exist next to a voluntary certification system.

Unfortunately, compétent EU bodies do not share this view, but instead opt for a low-cost conformity attestation. This attitude is regrettable since it could impede the development of high-quality products.

OUTLOOK

In general, 1995 and 1996 are expected to show a mixture of results in the various Member States. Steady growth is foreseen in Germany, but at a somewhat lower level, a near status quo in Belgium and the Netherlands, while France and Italy are expected to recover slowly from a deep recession. This situation also applies to other Mediterranean countries due to an overall unfavourable economic climate which is discouraging investment in industrial buildings and, to a large extent, in private housing. As mentioned, activity in the precast concrete industry is largely dependent on construction activity. Thus, any improvement in the construction activity will have a favourable impact on the economic situation in the precast concrete sector. The specific advantages of using precast concrete products for construction will, in the medium to long term, inevitably result in a larger share of the sector in overall construction volume.

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Ready mixed concrete
NACE (Revision 1) 26.63

Production in the EU rose by 5.5% in 1994. It is thought prospects for the succeeding years will show slight overall increases.
The industry continues to work hard to ensure that current and prospective EU regulations will be those that the industry can recognise and meet in the normal course of business.

INDUSTRY PROFILE

Description of the sector

Concrete, the fundamental building material, is basically a mixture of cement, aggregates (gravel or crushed stone with sand) and water. The ready mixed concrete industry manufactures concrete off-site and transports it in a fresh, unhardened condition to the location where it is required for placing. The short (a few hours only) shelf-life of fresh concrete means that ready mixed concrete is very much a parochial industry as it can only be transported seldom more than a few tens of kilometres. There is, therefore, little potential for trade within the EU except for a small amount of local cross-border business.

Although concrete has been used for some 2000 years, the production of ready mixed concrete from an exclusively designed plant probably started at the beginning of the present century. Today, there are few countries in the world which do not have a ready mixed concrete industry contributing substantially to the modernisation and efficiency of the building construction industry in their country.

Over the past three decades, the industry has been concerned with improving the quality of their product, ensuring that it is designed for the purpose specified, and seeking the means of improving its marketing against its main competitors of wood, bricks and steel. Currently, much activity has been concerned with the drafting of EU directives covering construction products' certification and testing, and of Eurocodes and CEN standards for concrete. Emphasis is placed on quality and this should enable the standards already achieved by the industry to be fully recognised.

Recent trends

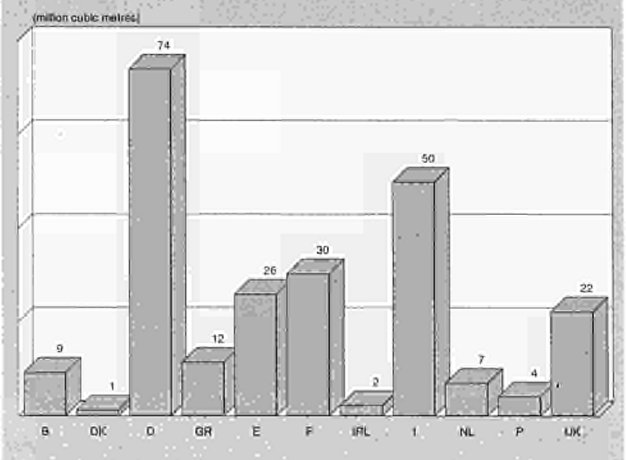
Production of EU members of ERMCO in the calendar year 1994 totalled 238.11 million cubic metres, an increase of 5.5% over the previous year, thus going some way to recovery of falls in production in earlier years.

Consumer confidence throughout Europe remains fragile and the more hopeful and optimistic spirit which was seen in 1993 still needs careful cultivation. However production is ready to meet increased demand which will only reach the industry through increased construction investment.

Throughout Europe, a common problem to the ready mixed concrete industry are late payments of accounts by both public authorities and main contractors: in 1993, complaints were reported of up to 200 days delay and more in the payment of invoices.

ERMCO has put forward proposals to form the basis of an agreement between the European suppliers of ready mixed concrete and their customers in the ready mixed concrete industry and in support of a European legal framework applicable to the field of payments. The Commission has published the final document: "CEC Commission Recommendation on Payment Periods in Commercial Transactions" and has requested Member States to take the necessary

Figure 1: Ready mixed concrete
Production volume by Member State, 1994



Source: ERMCO

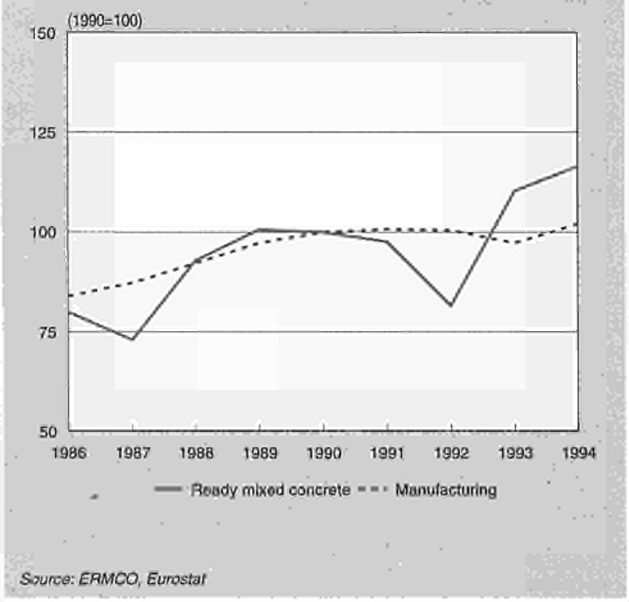
legal and practical steps to ensure adherence to contractual periods in commercial transactions and to improve payment periods for public procurement contracts. These steps together should help to reduce this problem in the future.

ENVIRONMENT

Great importance is attached to the EU regulations on health and safety and environmental matters. A special Task Group established some few years ago meets regularly and is currently concerned with detailed proposals for:

- Health and Safety Aspects for Employees and Customers;
- Recommended Environmental Management Practices Document;
- Within the first named, the various aspects covered include:
- Classification and Labelling of Fresh Concrete as a Preparation;
- Compilation of a Safety Data Sheet for Fresh Concrete;

Figure 2: Ready mixed concrete
Production compared to EU total manufacturing industry



Source: ERMCO, Eurostat

Table 1: Ready mixed concrete
Production by Member State

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EUR12 (1)	N/A	6 719	6 141	7 808	8 454	8 407	8 198	6 850	9 278	11 322
Belgique/België	N/A	199	230	259	274	309	344	358	468	601
Deutschland	2 072	2 072	1 988	2 248	2 386	2 413	2 441	2 350	3 723	5 061
Ellada	N/A	405	339	456	527	367	206	150	176	196
España	N/A	517	434	580	580	672	765	N/A	N/A	N/A
France	1 132	1 155	1 041	1 422	1 510	1 623	1 737	1 731	2 159	2 290
Ireland	85	86	87	97	114	71	28	68	76	104
Italia	1 350	1 256	1 064	1 437	1 724	1 429	1 133	900	987	1 122
Portugal	N/A	N/A	N/A	N/A	N/A	180	197	182	204	251
United Kingdom	1 122	1 029	958	1 309	1 339	1 343	1 347	1 111	1 485	1 697

(1) Excluding those countries where no data is available.
Source: ERMCO

- Small Customer Advice Sheets;
- Protection of workers.
- Further advanced are two environmental documents:
- Guide-lines for Preparing an Environmental Audit;
- Check List for Ready Mixed Concrete Plants.

The aim of these documents is to encourage ready mixed concrete producers to make their own assessments of potential environmental emissions from their plants.

The Check List has been widely circulated and accepted within the industry. Some companies have adopted these guide-lines to meet the regulations in their own country, thus showing a responsible attitude toward environmental matters.

Companies have indicated that they use a wide range of abatement techniques and with varying permitted emission limits. This information has been used to establish a data base.

Major European and US companies now publish their policies on this topic in their company Annual Reports ensuring that their shareholders are fully aware of company policy. Manuals give advice to staff on policy, legal requirements, details of good practice, the company's management system and the responsibilities of individual staff.

A guide-line document is being developed to illustrate reasonable and economic environmental practices. It will be flexible in application and would acknowledge the type and age of plants, their location and life expectancy in countries of various stages of economic development and with varying climatic conditions.

These documents will describe how the ready mixed concrete industry works and the potential emissions from its operating. They would proceed to describe techniques and technologies which are reasonable, economic, and proven in practice for the limiting of impacts from dust, noise and waste materials. The recommendations should be considered voluntary and the industry would be encouraged to be self-regulatory. It has been agreed that all such documents should be aimed at the ready mixed concrete producer. Hopefully, they will play an important public role in achieving common standards of auditing by third parties, in helping to ensure that contractors mixing concrete on site had to achieve the same standards, thus convincing the public and investor that the ready mixed industry was environmentally responsible.

REGULATIONS

The same standards must apply to all types of concrete, including ready mixed, site mixed and precast, and ideally these should be expressed in performance terms. Technical Policy decisions developed and agreed by ERMCO over the past three years have been summarised and circulated to enable better co-ordination of the views expressed by national industry experts in their national committees.

Table 2: Ready mixed concrete
Startup, production and consumption per head by country

(units)	Start of production	Number of plants		Production (million cubic metres)		Consumption per head (cubic metres)	
		1993	1994	1993	1994	1993	1994
EUR12 (1)		9 754	9 829	225.6	238.1	0.88	0.93
Belgique/België	1956	240	242	8.8	9.3	0.27	0.37
Danmark	1926	95	95	1.5	1.2	0.81	0.91
Deutschland	1903	2 527	2 600	65.8	74.1	0.74	0.74
Ellada	1968	430	430	11.5	11.5	0.50	0.55
España	1942	803	803	26.0	26.0	1.15	1.15
France	1933	1 570	1 566	28.2	30.4	0.58	0.63
Ireland	1961	142	145	2.1	2.3	0.88	0.88
Italia	1962	2 500	2 500	50.0	50.0	0.50	0.4
Nederland	1948	194	190	7.2	7.0	0.40	0.4
Portugal	1966	128	133	3.6	4.1	0.35	0.39
United Kingdom	1930	1 125	1 125	21.0	22.3	N/A	N/A
USA	1913	4 500	N/A	184.1	N/A	0.71	N/A
Japan	1950	5 354	N/A	162.9	N/A	1.58	N/A

(1) Excluding Luxembourg.
Source: ERMCO

The proposed timetable for EN 206 aims at providing a draft for voting by August 1997. However, CEN has also agreed a policy by which national standards used should not be withdrawn until an identified package of European standards is complete. A major concern in EN 206 is the method by which durability requirements for concrete are to be specified. Two methods are currently under consideration.

The Technical Task Group has been asked to complete the revision of the 1990 ERMCO Recommendations for the Certification of Fresh Concrete and to identify the options which may be considered for a Certification Scheme covering the different national traditions and also the separate modules which may be adopted progressively in different countries moving from no certification towards full certification of product conformity. Detailed appraisals have been made of the current situation in this field. Meanwhile, the CEN Task Group CEN/TC 104 SC1 TG10 has been preparing the final proposals on Concrete Categories, Production Control and Evaluation of Conformity to be included in EN 206. In due course, these Recommendations will define limits on the work of approved bodies and include guidance to ensure the quality (and equality) of inspections by different inspectors and different approved bodies.

OUTLOOK

The outlook for the industry relies mainly on increased European economic growth. Only then will sufficient construction investment be made to ensure an appreciable increase in the production of the ready mixed concrete industry. Meanwhile companies are playing a significant role in establishing realistic standards for concrete manufacture, quality control, and environment protection, which will ensure more efficient and responsible production in the future.

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Stone
NACE (Revision 1) 26.7

The European Stone industry is one of the oldest and today still one of the most important in the world. Europe produces, transforms, trades and consumes all kinds of stone materials including marble, granite, travertine and other similar stone. These products are destined for various uses, although the largest consumer is the building industry, particularly the upper end of the industry. Here, though, there is strong competition from alternative materials such as ceramics and glass which have greater investment capacities for research, development and marketing.

INDUSTRY PROFILE

Description of the sector

The ornamental stone industry is divided into two main functions: the excavation of raw materials and their subsequent transformation into various finished products. In the 1980s the industry experienced a real boom. From 1981 to 1994, world quarry production rates rose from around 20 million to over 40 million metric tonnes, and this was accompanied by an equally significant increase in the number of producer countries. At present only 11 countries exceed an annual production of one million metric tonnes, and 5 of these belong to the European Union. Until 1994 the EU ornamental stone industry accounted for over 40% of world production and around 50% of exports from the 40 most important stone producing countries in terms of volume. The products traded within and outside the European Union include rough blocks and a wide variety of finished articles.

The processed materials are mainly calcareous (e.g. marble and travertine) or siliceous (e.g. granite, sandstone, porphyry, slate, etc.) and their relative uses differ. Granites are principally employed for exteriors or wherever greater resistance is required to withstand wear and tear and atmospheric pollution; marbles are principally used for interiors or where there is greater protection from external elements.

The development of processing technology has increased the use of stone, especially in the building and furnishing industries, and this development has been accompanied by improvements in stone laying and maintenance techniques. The new uses have emerged mainly thanks to techniques for obtaining and applying a minimal thickness which have enabled stone products to penetrate the avant-garde markets such as the removable floorings market for electronic processing centres and the light vertical claddings market. Marble and granite can therefore be used inside lifts, in ships, on skyscraper facades, in areas subject to typhoons and in other locations where traditional methods could not be used.

Alongside these avant-garde uses, there are of course the more traditional, well-established areas of usage, such as funeral art, furnishings, monuments, and decorative architecture. Production processes for these applications have also undergone a radical technological transformation. For some of the traditional uses, the processing of stone is part of the production in other industrial sectors. Particularly in the case of furniture production, marble and granite cutting and polishing workshops for vanity tops, kitchen table tops and bathroom furniture coverings, work as an integral part of the production line of finished furniture. However, the most interesting market in terms of the quantity of material sold and the value added is still the traditional building industry, which includes new buildings, restoration and maintenance work.

Recent trends

Present production figures amount to an average of around 45 million metric tonnes per annum with a recent, constant upward trend mainly due to the entry of new producer countries into the world market. Since the early 1980s, at least ten significant new producers have emerged and become self-sufficient. This phenomenon has also led to an increase in machine production for the quarrying, sawing and processing of stone. This stone industry sector which has been flourishing, is mainly based in EU countries (primarily Italy, followed by Germany and France). EU countries in the Mediterranean basin continue to form the heart of the sector at both European and world levels, despite the development in other areas in the world.

International comparison

In 1994, the greatest producer country of blocks for ornamental use was Italy (the figures officially given by China are in fact slightly higher than those for Italy, but they need to be verified). Italy has always held the leading position in the market, followed in the EU by Spain, Greece, Portugal and France. Trade in volume mainly involves raw and semi-processed materials. The leading importer was Japan, which alternates with Italy on a yearly basis for that distinction. Both these countries import mainly blocks of raw granite for many uses.

Apart from Italy, important exporters include Spain, Greece, China and South Korea. China and South Korea are the only countries to have recently (1988-89) penetrated the market as producers, transformers and consumers. China is in fact the most important newcomer to the industry over the past two or three years. EU exports mainly consist of finished products which are principally destined for the building industry. They are intended for fellow EU countries and non-European countries, mainly North America and the Far East.

Until 1982/83, there was also a strong demand from the Middle East. Subsequently, external factors led to an abrupt decline in demand to a mere 35% of its peak. The effects of the international crisis in the Persian Gulf are mostly responsible for the 1990-91 figures, although there have been a few positive changes over the past two years. Nevertheless, the strongest market is still the EU, primarily Italy and Germany, followed by Spain, France and other countries.

MARKET FORCES

Demand

The demand for stone materials is varied. It ranges from the large importers of blocks which amount to only a few dozen firms throughout the world, concentrated in Italy and the EU in general, to the large building firms throughout the world and the final consumers for all the other sections of the market.

The greatest problems for the sector arise from the extreme fragmentation of the consumer market together with the very limited average size of companies. Moreover, the lack of capital to invest in research, development, promotion and marketing makes it difficult to exploit this dispersed consumer market which is often regional rather than national.

On the other hand, the factors which sustain the demand are above all the intrinsic factors regarding the products themselves such as their reputation, response to technical problems, aesthetic variety and image, rather than the few sporadic promotional campaigns run by marble and granite companies.

Supply and competition

Stone constitutes a natural resource which almost all the EU and non-EU countries possess to varying degrees, and many LDC countries have already begun or are beginning to exploit this natural resource by quarrying the raw material. Quarrying

Table 1: Stone
Rough production

(thousand metric tonnes)	1988	1992	1993	1994
EUR15 (1)	14 653	16 509	16 821	18 071
EUR12 (1)	14 214	15 965	16 285	17 200
Belgique/België	467	364	340	350
Danmark	N/A	N/A	N/A	N/A
Deutschland	137	200	210	170
Ellada	1 700	2 250	2 400	2 500
España	2 155	2 980	2 800	3 000
France	920	1 058	1 140	1 260
Ireland	N/A	N/A	N/A	N/A
Italia	7 480	7 300	7 750	8 370
Luxembourg	N/A	N/A	N/A	N/A
Nederland	N/A	N/A	N/A	N/A
Österreich	40	30	22	21
Portugal	640	1 163	1 145	1 100
Suomi/Finland	257	417	414	550
Sverige	143	97	100	300
United Kingdom	715	650	500	450
Ukraine	N/A	N/A	N/A	900
Russian Federation	N/A	675	700	1 100
Bulgaria	N/A	133	132	135
Norway	100	150	160	180
Turkey	485	850	850	750
USA	1 062	1 019	1 020	901
Canada	N/A	241	N/A	250
Brazil	970	1 673	1 821	1 977
Mexico	263	750	712	1 086
Argentina	N/A	91	106	185
South Africa	700	720	554	653
Saudi Arabia	N/A	552	544	534
India	700	3 050	3 578	4 424
China	N/A	2 545	8 500	9 000
Philippines	N/A	712	N/A	N/A
Indonesia	N/A	223	239	284
Japan	N/A	253	232	237
South Korea	687	1 445	2 000	2 130
Taiwan	N/A	280	334	322
Thailand	N/A	179	170	170
Australia	N/A	N/A	36	33
World	25 020	35 549	41 209	46 422

(1) Excluding countries where data is not available.
Source: National Statistical Institutes

Table 2: Stone
Imports of blocks and slabs in volume

(thousand metric tonnes)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	1 955.2	2 685.3	2 922.0	2 964.5	2 403.8	2 904.8	3 468.7	2 990.7
Belgique/België, Luxembourg	121.9	170.5	511.6	241.2	58.0	93.8	108.6	122.6
Danmark	9.5	13.2	5.4	11.0	263.0	367.0	603.0	188.1
Deutschland	271.3	355.3	161.3	160.7	370.5	408.8	867.1	632.6
Ellada	0.5	3.1	4.3	7.2	0.6	5.4	3.7	10.0
España	70.5	191.3	115.7	110.9	102.9	182.4	201.0	232.0
France	109.5	139.6	103.4	212.5	193.4	182.3	163.1	159.6
Ireland	2.5	5.6	10.5	6.0	3.6	2.5	1.8	3.6
Italia	406.0	432.9	354.7	358.6	1 066.5	1 138.1	1 201.9	1 342.6
Nederland	774.4	1 287.9	1 187.5	1 632.9	42.9	61.2	57.0	84.7
Portugal	5.6	17.0	14.7	10.6	8.1	29.0	25.4	28.0
United Kingdom	183.5	68.8	453.0	213.0	294.3	434.3	236.0	187.0

Source: Various sources

Table 3: Stone
Imports of blocks and slabs in current prices

(million ECU)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	143 497	242 966	209 935	219 535	329 301	413 624	446 186	491 870
Belgique/België, Luxembourg	11 125	19 046	25 948	21 853	11 753	20 524	25 165	28 758
Danmark	1 230	1 732	1 305	2 490	4 944	8 067	9 445	6 155
Deutschland	29 491	44 922	28 941	28 633	42 399	50 925	62 293	62 044
Ellada	282	741	1 430	1 848	148	964	637	1 263
España	9 409	42 267	28 359	23 934	20 681	37 777	37 537	49 041
France	18 428	26 771	28 942	26 248	36 535	37 907	34 847	33 146
Ireland	964	1 935	1·233	2 027	991	822	562	1 082
Italia	48 124	72 041	52 598	52 977	191 899	227 678	252 176	281 973
Nederland	15 201	24 058	28 891	34 388	6 884	9 856	8 097	13 158
Portugal	797	2 273	2 036	1 416	1 661	4 925	4 333	4 789
United Kingdom	8 446	7 180	10 252	23 721	11 406	14 179	11 094	10 461

Source: Various sources

technology is relatively simple and more often than not problems that arise stem from a lack of infrastructure. However, very few countries are capable of offering technologically advanced finished articles at competitive prices. With the exception of Italy, Spain, Greece and the other EU countries, all the other significant stone consumers are still far from being self-sufficient even within their own home markets.

Japan is a good example. Since 1985 Japan has been a very significant importer, mainly of granites which are primarily destined for funeral art. It prefers to procure lower range semi-processed or finished articles from China, Taiwan and South Korea, but obtains stone from Italy for complex work which requires the expert use of sophisticated production techniques and a wide range of different products.

The same applies to the USA, even though it has good national production rates. Since 1988, however, the USA has witnessed a gradual reduction in demand for finished products, especially in granite, due to the slump in the relevant market (i.e. the high-rise non-residential buildings market). The great decline in this sector, which has been compensated to some extent by housing and local public buildings in many areas of the country, has influenced international trade in terms of sales and volumes.

Compared with the other building activities in North America, the European stone industry has felt the decline less than the ceramics industry and other competitors. Moreover, the US market, like the Far East market, generally remains a privileged market as regards the average unit value of the product it absorbs.

Already in Southeast Asia there is a tendency towards self-sufficiency in the stone industry. The great buying power of the Japanese market, the extensive building activities in some of the newly industrialised countries, the availability of low-cost labour, and the proximity of areas with high raw material production rates such as India, South Africa and more recently China, all create a shorter distribution chain for products which excludes all, save a few very privileged, limited niches in the market. The EU industry occupies a strong position as far as the latter are concerned.

The main market for the sector on a world level and especially on a European level is the EU area itself. The traditional usage, the extensive and intensive production, the ability to transform raw materials and a building industry very much oriented towards maintenance and restoration all favour the use of stone in all its aspects. It is often considered a material which adds prestige to buildings where it is used, be they residential or non-residential. The difficulties of the sector, which is not in a position to invest sufficient capital in promotional and marketing activities, may affect its development over the next few years. Sections of the market which are likely to expand beyond the year 2000 are still faced with the strong penetration of the market by competitors such as glass and ceramics.

Table 4: Stone
Imports of finished products in volume

(thousand metric tonnes)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	1 840.7	2 087.6	1 740.9	1 816.4	204.7	478.2	573.6	760.6
Belgique/België, Luxembourg	141.6	173.7	207.6	226.9	7.7	17.3	13.6	22.1
Danmark	46.7	47.9	41.4	49.6	12.7	9.7	14.1	20.9
Deutschland	973.2	1 080.5	878.3	796.2	148.4	390.0	465.6	576.8
Ellada	0.4	2.9	5.9	5.5	0.0	0.8	1.0	0.6
España	37.3	106.9	58.3	54.4	0.5	2.0	3.7	3.4
France	416.6	434.1	333.6	403.3	4.8	4.2	7.7	7.5
Ireland	8.0	6.9	10.1	10.0	0.2	0.5	0.8	1.5
Italia	10.5	19.3	30.4	40.4	5.4	13.4	18.0	24.7
Nederland	81.1	117.8	116.9	139.2	7.9	30.8	31.8	78.7
Portugal	0.6	1.9	2.8	9.2	0.1	0.3	0.3	0.9
United Kingdom	124.6	95.8	55.8	81.7	17.1	9.2	17.1	23.5

Source: Various sources

Table 5: Stone
Imports of finished products in current prices

(million ECU)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	670.9	822.8	713.1	740.5	67.7	83.4	127.6	156.5
Belgique/België, Luxembourg	58.6	74.7	77.6	77.7	2.1	4.5	6.1	7.0
Danmark	13.2	11.5	10.0	12.1	3.6	2.3	3.4	5.4
Deutschland	311.5	392.6	377.6	357.8	31.4	52.0	79.1	91.7
Ellada	0.6	2.3	4.1	4.1	0.1	0.3	0.2	0.3
España	15.1	45.3	24.9	21.6	0.6	1.3	1.5	1.2
France	149.4	186.8	127.4	144.3	3.5	3.0	4.9	5.5
Ireland	5.2	4.2	4.4	7.4	0.1	0.2	0.6	1.1
Italia	6.8	12.4	14.4	17.2	4.3	6.6	8.7	9.5
Nederland	36.4	40.4	35.8	42.6	4.4	6.9	9.6	15.7
Portugal	0.8	2.1	2.5	3.2	0.1	0.1	0.4	0.5
United Kingdom	73.3	50.4	34.3	52.3	17.4	6.1	13.0	18.6

Source: Various sources

Indeed, over the past few years the increased competitiveness of all markets has adversely affected prices which have had to decrease in real value for products to retain a hold in the major markets.

INDUSTRY STRUCTURE

Companies

The average size of companies in the sector is generally very limited. In Italy, for example, the average company has no more than 10 employees, although there are various groups of companies which have joined forces to develop market strategy and pool resources. Recent and reliable statistics are not available for all the EU countries but it is calculated that there are now around 500 000 employees overall, at least half of whom work in the quarries.

There have been great changes in production methods, speed and costs in recent times due to the mass introduction of diamonds in the quarrying and processing of marble at the beginning of the 1980s. The greatest concentration of productive firms is in Italy, where stone materials are available in nearly all its regions. It is calculated that in all there are over 70 000 quarry workers in Italy, plus those working in industries connected to quarrying, transformation and commerce. The same complex situation as regards the complexity of the sector can be seen in Spain, France, Portugal, Greece and Belgium.

Strategies

A problem which affects almost all the EU countries, however, is the ageing labour force. The turnover of the generations of workers is very slow and this is a problem which may become very serious in the future for a sector which often requires a long period of complete professional training. The biggest question mark in the sector remains the economic and commercial prospects. In view of its close links with the building industry in all countries, the sector is inevitably dependent on the building industry, and especially the upper end (e.g. residential, non-residential, urban landscape, restoration of old town centres and renovation in general).

The tendency towards self-sufficiency, be it even partial, of certain productionand consumption areas could even reduce the overall market of the European stone industry and limit it more and more to the market within the EU itself. As far as stone companies are concerned, all this could lead to even more problems for smaller companies, which would be forced to specialise still further or opt for subcontracting, leaving the larger companies to deal with the more complicated contracts and the more distant markets.

The major companies and groups are already working as corner-stones on the international market. They are directly present on distant markets, have local associates and among other things co-ordinate complex projects. In other words, they have already partly reorganised their presence on the market.

Table 6: Stone
Exports of blocks and slabs in volume

(thousand metric tonnes)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	1 765.3	2 720.1	5 028.7	3 395.0	709.1	989.2	1 100.6	1 330.7
Belgique/België, Luxembourg	335.2	464.7	190.2	132.0	0.7	1.9	2.2	4.6
Danmark	76.1	68.6	245.2	164.8	0.2	0.6	0.3	3.0
Deutschland	432.8	1 006.9	594.3	315.2	82.9	113.0	103.8	125.1
Ellada	152.3	154.2	177.8	406.6	301.6	297.3	219.5	264.8
España	382.6	357.1	290.6	312.2	71.0	150.6	200.7	313.6
France	121.7	246.1	86.8	93.5	33.6	28.6	18.6	25.1
Ireland	28.6	12.4	13.5	77.3	0.0	0.0	0.0	0.0
Italia	125.6	171.6	193.6	174.3	142.0	328.7	487.2	519.8
Nederland	25.6	24.8	230.3	74.6	4.8	4.9	6.9	10.8
Portugal	80.1	206.6	123.8	133.8	68.2	62.1	60.1	59.5
United Kingdom	4.6	7.2	2 882.6	1 510.8	4.0	1.5	1.3	4.5

Source: Various sources

Table 7: Stone
Exports of blocks and slabs in current prices

(million ECU)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	116.3	207.4	205.1	189.0	80.9	168.9	193.6	219.4
Belgique/België, Luxembourg	11.4	16.9	21.8	20.9	0.3	1.1	1.4	2.1
Danmark	1.0	0.9	1.9	1.8	0.1	0.1	0.1	0.5
Deutschland	9.4	15.4	9.0	6.4	4.0	4.2	4.7	5.3
Ellada	3.7	14.0	16.8	14.5	3.6	12.0	10.1	14.2
España	29.8	39.1	29.8	31.6	8.1	18.0	22.8	38.8
France	12.9	20.6	18.0	16.4	5.1	8.0	5.1	7.2
Ireland	0.5	0.5	0.7	1.6	0.1	0.0	0.0	0.0
Italia	34.4	57.3	57.4	50.4	47.1	108.7	133.3	134.9
Nederland	3.6	4.1	8.7	7.8	1.5	1.6	2.1	2.1
Portugal	8.3	35.6	25.8	25.8	10.2	13.5	12.6	12.0
United Kingdom	1.4	2.8	15.2	11.8	1.0	1.5	1.5	2.2

Source: Various sources

ENVIRONMENT

Important environmental issues involve the stone industry in both its production divisions (i.e. quarries and workshops). There are serious problems regarding respect for and the restoration of the structure of the mountains where quarrying activities are carried out. Various countries and regions do actually impose a programme of temporary management of the quarry dumps and at least partial reconstruction of the natural habitat to be included in the quarrying plans. This is not always feasible and sometimes leads to an interruption of activities due to difficulties in complying with regulations in force.

The ecological issue goes hand in hand with the increasingly complex problems regarding safety in the quarries. Unfortunately, every year, in spite of both the workers and the employers' awareness of safety measures, accidents continue to occur and are sometimes fatal.

Respect for the environment must continue after the quarrying process. This requires compliance with the regulations regarding interior working environments (e.g. microclimates inside the workshops, noise levels, dust, mud, complete safety) and mutual respect between workers and inhabitants. Thus, the management of refluent slurry, the protection against noise, the protection of water courses from polluted waste and overloaded roadways are problems which concern technical researchers, machine manufacturers and environmentalists alike. Technical researchers are in fact working towards finding the best solutions (e.g. the reutilisation of marble rubble) while manufacturers are trying to produce machines with lower noise levels and less dust production (e.g. sound-proof machines or purified plants at the design stage) and environmentalists are involved in imposing respect for the environment and the regulations in force.

REGULATIONS

The industry in the EU countries is subject to the regulations which in general cover building material products. It resisted the dumping accusations made by North American firms at the end of the 1980s. Currently, it has two major restraints to face regarding: production, with respect to the environmental and workers' safety regulations both inside and outside the quarry and the workshops; and usage, with respect to special safety regulations regarding anchorage systems for vertical cladding and the development of a joint set of regulations for the EU with respect to certain production methods.

There are various technical committees, some of which began working in 1988 and 1989 and which have an internal subcommission which deals with processed stones. Among these, we can name the following:

- TC 125, which deals with masonry, and plans to set up a sub-commission for natural stone masonry;

Table 8: Stone
Exports of finished products in volume

(thousand metric tonnes)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	1 825.7	2 032.3	2 362.1	2 478.6	1 552.5	1 454.6	2 006.9	2 267.9
Belgique/België, Luxembourg	47.2	101.6	110.5	165.6	1.9	3.4	4.5	4.9
Danmark	12.4	7.9	17.5	20.6	3.4	2.6	3.5	2.9
Deutschland	31.6	40.4	47.7	44.1	35.4	29.7	32.5	42.8
Ellada	18.0	42.0	27.4	25.6	73.7	152.7	173.4	182.6
España	368.5	363.1	428.1	528.6	110.1	94.9	229.0	242.3
France	64.5	38.0	56.1	64.2	19.8	19.2	30.1	31.9
Ireland	6.1	12.2	8.0	12.4	2.3	0.1	0.3	0.0
Italia	786.6	720.7	955.6	948.0	1 178.4	1 029.6	1 340.2	1 571.9
Nederland	60.1	55.3	132.3	100.8	4.3	0.9	14.7	20.5
Portugal	426.9	646.2	571.9	555.2	118.9	118.4	170.3	163.0
United Kingdom	3.7	4.8	7.1	13.6	4.3	3.1	8.4	5.1

Source: Various sources

Table 9: Stone
Exports of finished products in current prices

(million ECU)	Intra-EU				Extra-EU			
	1988	1992	1993	1994	1988	1992	1993	1994
EUR12	652.8	767.9	995.2	1 048.5	942.2	888.6	1 047.2	1 201.2
Belgique/België, Luxembourg	14.6	21.4	38.6	47.9	1.4	2.8	3.9	3.7
Danmark	5.4	0.8	8.6	8.9	2.4	1.4	1.5	1.8
Deutschland	14.5	19.6	22.1	23.1	26.6	22.1	28.0	33.4
Ellada	10.0	24.7	17.8	16.5	29.5	61.9	72.1	67.1
España	128.3	170.7	185.0	224.6	76.8	101.4	108.4	126.7
France	37.4	21.8	49.4	55.7	22.9	20.0	33.0	35.6
Ireland	3.2	4.2	3.7	4.7	1.9	0.4	1.0	0.4
Italia	362.0	398.1	559.9	562.0	739.2	636.5	745.7	872.4
Nederland	13.2	8.1	18.1	16.7	1.8	0.6	2.8	4.1
Portugal	61.5	95.2	88.9	81.5	34.4	37.4	42.4	48.2
United Kingdom	2.8	3.3	3.0	7.0	5.3	4.1	8.3	7.8

Source: Various sources

- TC 128, which deals with building coverings, etc., and has a work group for slates as covering;
- TC 178, which deals with roadways and curbs, and has a sub-committee for natural stones; and
- TC 246, which deals with floorings in general in natural stone, interiors, stairs, terraces, balconies, etc., and exterior facings.

TC 246 is the most recent group (1990) and so it shares its tasks with more established groups. It is, however, already organised into three subgroups: one for terminology and classification, one for test methods, and one (the most important one) for the prerequisites and limits for specific products. During 1993 and 1994, much work has been done to give the stone products the necessary characteristics so as to be able to circulate freely within the EU and withstand competition from similar materials.

OUTLOOK

The stone industry is facing uncertain prospects and the slow recovery of the building industry alongside threats underway in Germany.

Although the world sector seems to be experiencing a lively period of overall expansion, the European sector's future is closely linked to the building industry in the consumer countries, especially the EU countries. Thus, the unification of the markets in this sense will not really affect the firms already operating outside their own region. At worst they will have to conform to the standardised regulations and the consequent quality certification prerequisites.

EU relations with more distant areas will prove to be more difficult as the latter are tending to form autonomous systems to face the European production system. It is predicted that it will be more complicated for individual firms, especially smaller ones, to gain a place in such markets without having privileged partnerships with local firms and the necessary support in the form of assistance, services and credit facilities.

On the other hand, the opening of new quarrying activities in third world countries and the consequent increase in familiarity in using natural stones since the late 1980s is gradually creating much better prospects for new markets. In order to expand up to the year 2000 and beyond, the European stone industry must fully use all of its capabilities.

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Overview

NACE (Revision 1) 27

The manufacture of ferrous metals and related products has recovered from the economic downturn in the early 1990s. Boosted by a growing demand from the major downstream markets, production in the various subsectors has started to increase in 1994, a trend which continued in 1995. Market conditions nevertheless remain difficult, partly due to increasing competition from Eastern European countries. The development of demand during the last decade reflects the cyclical character of the industry. Since economic growth is expected to be small in the near future, growth in the consumption of ferrous metals and related products will likewise be very moderate.

INDUSTRY PROFILE

Description of the sector

According to the new NACE Rev.1 classification the basic metals industry can be subdivided in the following sectors: basic iron and steel and ferro-alloys (NACE 27.1); the manufacture of tubes (NACE 27.2); other iron and steel and non-ECSC ferro-alloys (NACE 27.3) and basic precious metals (NACE 27.4).

It should be noted, though, that the tables and figures in this monograph only refer to the activities covered by the European Coal and Steel Community (ECSC) Treaty, i.e. the manufacture of iron and steel, the manufacture of steel tubes and the first processing of steel, and exclude some small segments of the basic metals industry.

The share of the iron and steel industry in the total industry of ferrous metals is approximately 70%, leaving 14% for the manufacture of steel tubes and about 16% for the other first processing of steel.

The EU production of ferrous metals is mainly concentrated in Germany, Italy, France and the United Kingdom. These four countries account for about 81% of total value added. With a share of about 35% of total value added Germany is the largest ferrous metals producing country within the EU, followed by Italy with a share of 17%. Employment in the EU ferrous metals industry has been declining over the years. In 1994, about 475 000 people were employed in this sector against 847 000 people in 1984.

Recent trends

In the early 1990s the EU production and consumption decreased as a result of the economic recession. During the 1990-1993 period consumption dropped by 25%. Production declined less than consumption as EU manufacturers were able to increase extra-EU exports.

In 1993, the world steel market was extremely depressed, due to weak demand in the industrialised countries. Despite low steel export prices extra-EU exports nevertheless increased, thereby enhancing the EU trade surplus. In the course of 1994, EU demand and production started to recover which has resulted in more favourable prospects for the coming years. At the same time, the rationalisation of the industry continued and led to a further decline of employment.

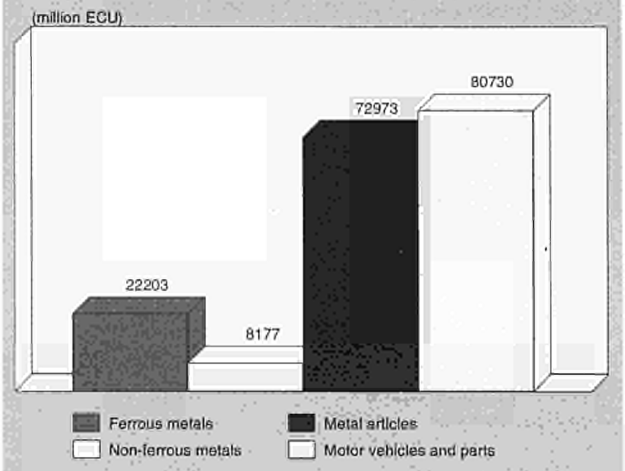
Steel tube consumption is almost flat. Since 1992, production has been reduced considerably in some EU countries as a consequence of smaller export opportunities and larger imports. In 1994 and 1995, production figures recovered again.

Like in primary steel and steel tubes, production in the first processing of steel sector has lagged behind the growth in the manufacturing industry as a whole in the early 1990s. Employment losses accelerated after 1990.

Consumption of ferro-alloys, which is closely dependent on iron and steel production, was estimated at 3.5 million tonnes in 1990. However the recession experienced by the European Union caused the consumption to decrease to 3.1 million tonnes in 1991. From 1993 onwards, economic recovery has pushed consumption up again to more than 4.1 million tonnes in 1995.

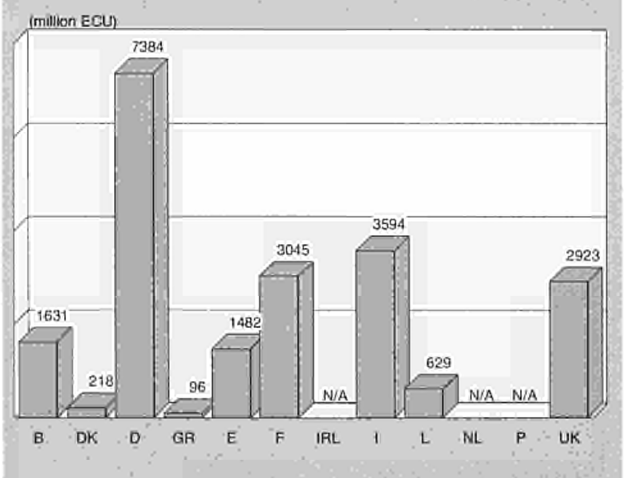
The fall in demand for cars and machinery in the early 1990s caused a sharp drop in foundry production, by as much as

Figure 1: Ferrous metals
Value added in comparison with related industries, 1994



Source: DEBA GEIE

Figure 2: Ferrous metals
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Ferrous metals
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	75 426.0	87 531.5	79 994.7	75 519.0	65 734.5	75 478.6	87 553.7	95 225.3	96 190	97 000	98 650
Production	90 417.3	93 730.7	86 634.3	80 825.3	74 610.7	83 003	92 643	103 406	104 040	104 690	106 150
Extra-EU exports	20 401.5	14 014.9	13 849.6	12 758.3	15 264.2	16 157.7	16 748.7	15 989.9	15 860	15 760	15 700
Trade balance	14 991.3	6 199.2	6 639.6	5 306.3	8 876.2	7 524.3	5 089.2	8 180.7	7 850	7 690	7 500
Employment (thousands)	800.3	626.0	597.1	565.9	510.0	474.8	453.2	491.2	470	450	430

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DEBA GEIE and Eurostat estimates.
(3) Eurostat estimates for EUR15.
(4) Rounded DRI forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Ferrous metals
Breakdown by sector, 1994 (1)

(million ECU)	Apparent consumption	Production	Extra-EU exports
Drawing, cold rolling and cold folding of steel	12 434.0	13 561.8	2 492.3
Iron and steel	53 419.9	57 857.8	10 252.8
Steel tubes	9 624.8	11 583.3	3 412.7

(1) Apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Ferrous metals
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	1.3	-1.9	-0.1	9.8
Production	-0.5	-1.1	-0.8	7.0
Extra-EU exports	-6.9	5.1	-1.8	3.4
Extra-EU imports	5.7	2.6	4.3	29.8

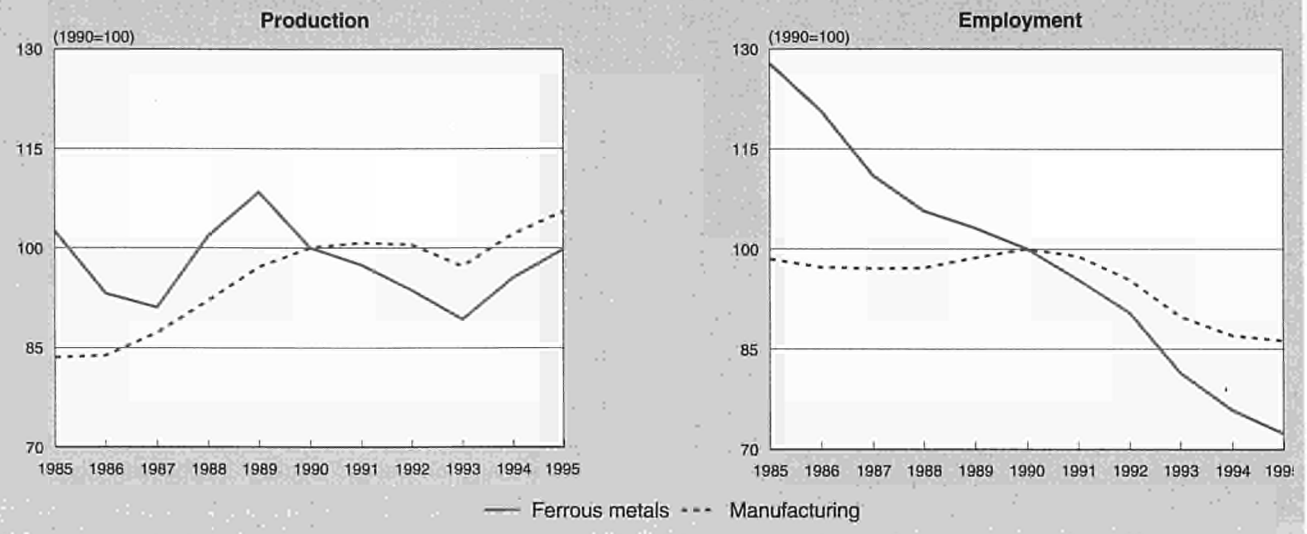
(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 4: Ferrous metals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	20 402	14 934	13 619	14 706	16 532	14 015	13 850	12 758	15 264	16 158	16 748	15 990
Extra-EU imports	5 410	5 816	5 368	6 405	8 070	7 816	7 210	7 452	6 388	8 633	11 660	7 809
Trade balance	14 991	9 119	8 251	8 301	8 462	6 199	6 640	5 306	8 876	7 524	5 089	8 181
Ratio exports / imports	3.8	2.6	2.5	2.3	2.0	1.8	1.9	1.7	2.4	1.9	1.4	2.0
Terms of trade index	111.3	101.9	102.1	97.4	95.3	100.0	95.6	93.0	94.6	93.3	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Ferrous metals
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

40% in some cases. Since 1994, production has been rising once again. This trend has continued in 1995, so that production reached levels not seen since 1989. The revival of business brought an end to redundancies, although there has been very little recruitment of new employees. Since 1989 the European foundry industry has shed 50 000 jobs, or about 20% of the workforce.

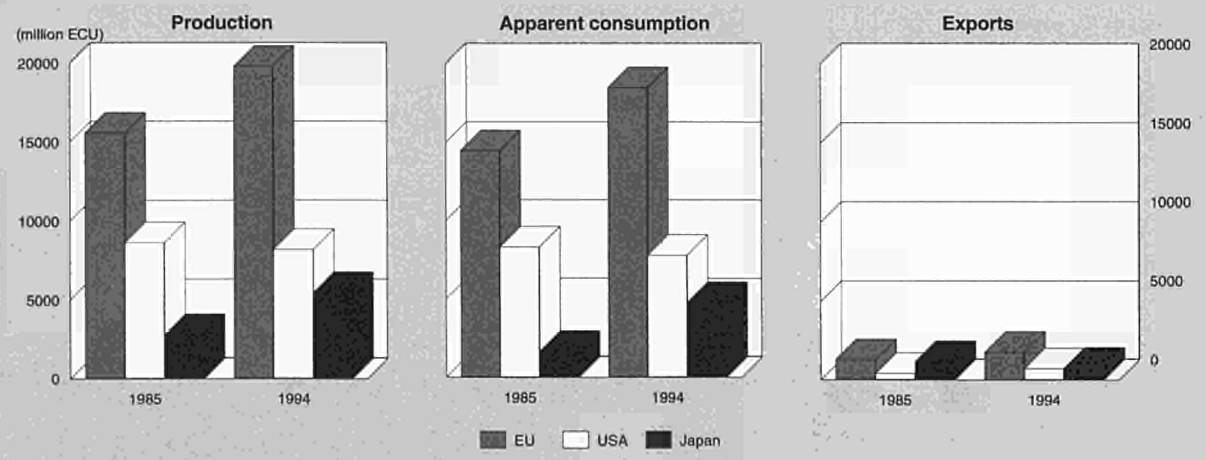
International comparison

In 1994 Japan was the largest manufacturing country of ferrous metals, with a production value surpassing 106 billion ECU. The EU and the USA followed at a distance with respective production values of 83 and 71 billion ECU. The latter two countries have seen production decline over the period 1985-1994, while Japan's output expanded by 14%. Production value in Japan, however, is inflated by the appreciation of the Japanese yen against the ECU. In terms of value added, the Japanese ferrous metals industry is also larger than those of the EU and the US. At the same time, the workforce in the Japanese ferrous metals industry (253 000) is 47% smaller than in the EU (475 000), and also smaller than in the US (374 000). As a result the labour productivity differs greatly among the three regions: in 1994 the Japanese production per employee amounted to 420 000 ECU, compared to only 175 000 ECU in the EU.

EU production of steel tubes in 1994 accounted for 20.9% of world production compared to a share of 20.3% in 1985. In the world's ranking, the EU is ahead of Japan and the US. The former Soviet Union has been at the top of the list until 1992. Japan and the EU are the most important steel tube exporters. Production there greatly exceeds domestic consumption, particularly in Japan.

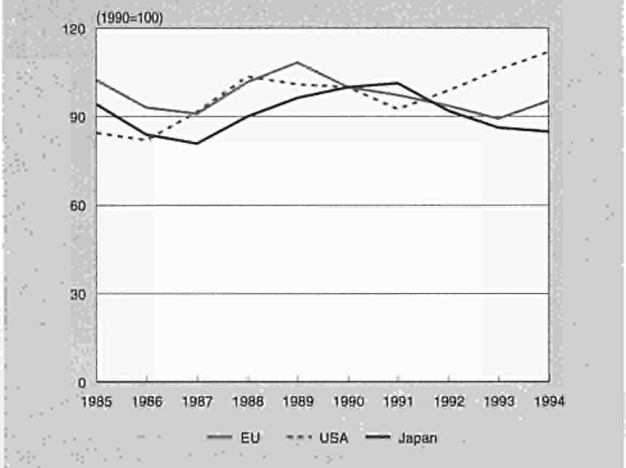
In the EU, the United States and Japan, the output of ferro-alloys, traditionally associated with the production of iron and steel, has tended to decline, while domestic consumption is increasingly provided for by imports. This movement has been more noticeable in the EU than in its trading partners,

Figure 4: Ferrous metals
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Ferrous metals
International comparison of production in constant prices



Source: DEBA GEIE

owing to the opening up of its markets and the geographical proximity of new competing countries (especially the CIS).

With the entry of Austria, Sweden and Finland, the EU's production of castings has reached the level in the CIS and the People's Republic of China. In the period from 1992 to 1994 the three new member states had a combined output representing only 5 to 6% of the total in EU-12. In 1995, however, they recorded growth rates well above the average of EU-12 countries. Finland led with a growth rate of over 30%.

Foreign trade

The EU is a net exporter of ferrous metals. Between 1984 and 1992, however, the trade surplus has been declining as extra-EU imports grew faster than extra-EU exports. In 1993, due to weak domestic markets, EU manufacturers of ferrous metals have increased efforts to sell their products in non-EU markets. As a consequence, extra-EU exports grew, while at the same time extra-EU imports suffered from weak EU demand. Both developments caused the trade surplus to grow by more than 65% in 1993. In 1994, the trade surplus fell again. Extra-EU imports increased by almost 30% to 8 633 million ECU, while extra-EU exports only expanded by 3%.

In 1994, the major suppliers of ferrous metals products for the EU market were the EFTA countries, especially Sweden and Austria. Their entry to the EU about halved extra-EU imports. The importance of Eastern European countries such as Russia, the Czech Republic, Poland and Slovakia is growing. Also noteworthy are the expanding imports from Libya. All these countries are expected to further increase their share in total extra-EU imports. Major export destinations for EU ferrous metals products are the USA, the EFTA-countries (before the entry of some among them to the EU), China, India and other Far Eastern countries. The most significant change was the reduction of exports to the former Soviet Union which in the past was a major export market. Lack of hard currency has considerably reduced the share of EU imports into this country.

MARKET FORCES

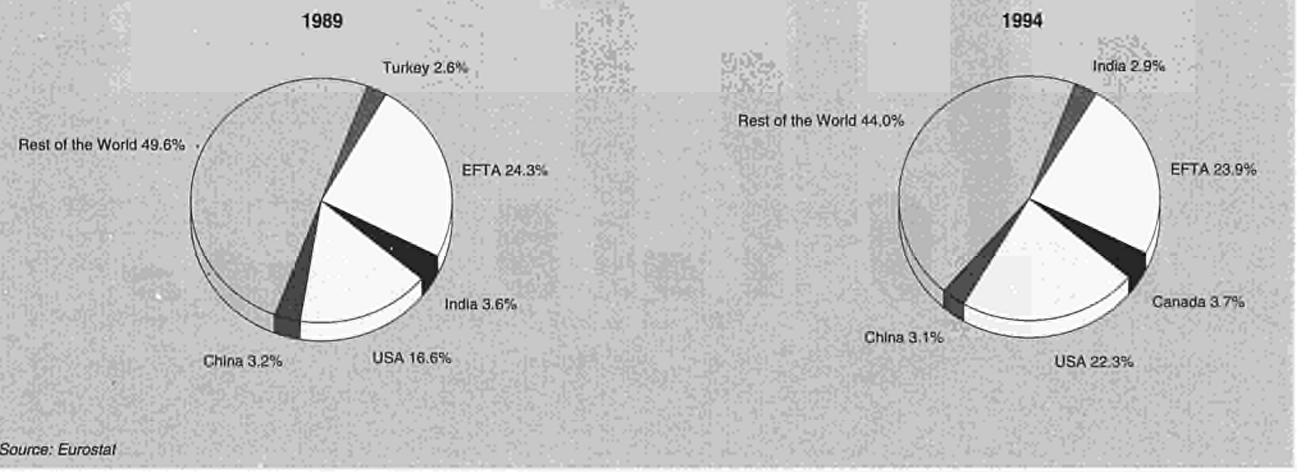
Demand

Important downstream industries are the following: machinery manufacturing; oil and gas industry; nuclear and other steam generation industries; mechanical engineering; automotive industry; and the building industry. Strong investment spending the major downstream industries boosted apparent consumption of steel tubes, castings and ferrous alloys in the late 1980s. In the early 1990s EU consumption declined continuously until 1993, due to an increasing use of substitutes for ferrous metals (other materials) and lower investment activity in downstream markets. In addition to these demand factors, the sales of the EU ferrous metals industry suffered from the emergence of new competitors, particularly the NICs, the DCs and the East European countries. From 1994, the automotive and the mechanical engineering industries have returned to growth, triggering a higher consumption of ferrous metals and related products. Further modest sales growth is expected in 1995. The development of demand during the last decade clearly reflects the cyclical character of the industry. Since economic growth is expected to be small in the near future, growth in the consumption of ferrous metals and related products will likewise be very moderate.

Supply and competition

In the early 1990s the EU ferrous metals industry suffered from world-wide overcapacity, despite continuous employment and production cutbacks. Other structural problems of the industry were high cost, strong international competition in the world market and competition from substitutes.

Figure 6: Ferrous metals
Destination of EU exports



Source: Eurostat

Figure 7: Ferrous metals
Origin of EU imports

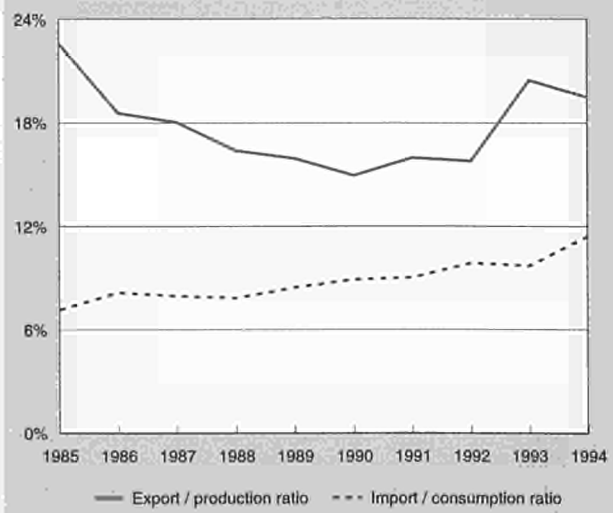
Source: Eurostat

In order to solve the structural problems of the industry, the European Commission came up with a new rescue plan for the EU steel industry in 1992. According to this plan total EU steel production should be cut by 19 to 26 million tonnes in three years time. At the end of 1994 the Commission's rescue plan collapsed, leaving the industry with an excess capacity of 30 million tonnes. In 1994 and 1995, however, growing demand has boosted EU production, thereby lowering the need for further capacity reduction.

Persisting world-wide overcapacity also affects the EU steel tube industry. The effects on profit margins for commodity steel tubes are considerable, and more particularly in export markets. Given the range of purchase possibilities world-wide and rising imports, customers are in a strong position to dictate price. EU competitiveness with respect to third countries is threatened when imported steel tubes are subsidised in their production and/or are produced under non-market economy conditions. Competition by low priced imports from Central and East European countries remains strong.

In order to adapt supply to market trends and competition, EU ferro-alloys producers have undertaken very thorough restructuring programmes. In the early 1990s, 25% of plants were closed to concentrate production on the most efficient ones and employment was drastically reduced. Flexible management systems, such as winter stoppages, have been adopted to adjust operations to the availability of competitively priced energy.

Figure 8: Ferrous metals
Trade intensities



Source: DEBA GEIE, Eurostat

Production process

Investment in research and development by EU producers ensures high quality products and processes. In most production facilities the quality assurance system is certified according to ISO 9001/9002. Continuous rationalisation efforts in production and employment have kept costs at competitive levels.

Looking at trade performance, the competitiveness of the EU industry seems to have improved in the recent past. The penetration rate of extra-EU imports shows slight increases in 1991 and 1992 and has stabilised in 1993. In 1994, however, penetration rose again, mainly due to the growing imports from Eastern Europe. Weak EU demand pushed producers to expand extra-EU exports in 1993, resulting in an increase of the export/production rate from 15.8% in 1992 to 20.5% in 1993. Part of this gain was reversed in 1994.

Improved production techniques together with a reduction of production capacity have enabled EU industry to reduce cost, and to increase efficiency and competitiveness. Over the last ten years EU labour productivity increased by more than 40%, while total unit costs remained stable.

In the processing of steel, there has been steady technological progress in the manufacture of bright steel bars, mainly by the introduction of computers in the production lines, in order to meet end-user demand for even higher quality finished products. New processes permit better control over gauge, mechanical properties and surface conditions.

Production of castings remains a highly labour intensive activity. Even when the production process is largely mechanised, as in mass production, the proportion of the prime cost accounted for by labour costs reaches 40%. With hand moulded castings, (e.g. in single piece production) this percentage can easily rise to 55%. A correspondingly large effort has been and is being devoted to increasing labour productivity, thereby reducing labour costs.

Table 5: Ferrous metals
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	75.5	71.2	72.6	90.5	107.3	100.0	96.9	95.4	97.7	116.8
Unit labour costs index (3)	100.4	111.2	115.9	98.9	88.9	100.0	109.6	116.6	116.2	100.4
Total unit costs index (4)	103.8	102.5	101.7	97.3	96.6	100.0	103.2	104.8	106.1	102.6
Gross operating rate (%) (5)	5.1	5.2	6.4	11.5	12.0	8.4	5.5	3.9	2.7	5.9

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

INDUSTRY STRUCTURE

Companies

The ferrous metals industry is a highly concentrated. In the iron and steel industry, for instance, the 10 major European steel producing companies account for about 80% of total production. Usinor Sacilor (F) is the largest company in crude steel production, followed by British Steel (UK) with 12.3 million tonnes and Thyssen (D). The importance of Germany in this sector is further emphasised by the appearance of three other German companies in the top ten; Krupp Hoesch, Preussag and HKM. Two firms ILVA (I) and Riva (I) represent Italy and the remaining two top ten firms originate from Belgium (Cockerill Sambre) and the Netherlands (Hoogovens).

In the steel tubes industry five countries (Germany, Italy, France, the United Kingdom and Spain) account for about 90% of total production. In some countries a single producer sometimes accounts for 50% or more of the national output. Other steel tube manufacturers, often small and medium sized, operate in niche, high value added markets. At the end of 1994 some 280 production units, owned by an estimated number of 245 enterprises, were involved in the EU steel tube industry.

Other ferrous metal or related industries are less concentrated. Thirty two firms are engaged in the production of ferro-alloys in the EU. Some firms are subsidiaries of major industrial groups, such as VIAG in Germany and PECHINEY in France, for which they only represent a small proportion of activity. Most, however, are small firms concentrating on the production of a range of ferro-alloys, or on a single, very specialised product. All these firms pay special attention to the quality of their products and to customer service. The foundry industry has preserved its small scale character up to the present day. Over half of all foundries employ fewer than 50 people and many are family owned. In some cases they work solely for other firms as jobbing foundries. Often, though, they are part of a larger company and produce castings for internal use, e.g. for use in machinery manufacturing and plant construction by other divisions of the group.

Strategies

Due to capacity reductions induced by the difficulties in the market since 1985, investments are directed towards improvements in productivity and quality rather than towards expanding capacity. The need to be flexible if demand fluctuates is a vital lesson most companies have learnt during the recession. Other strategies and actions to improve profitability include: paying more attention to customer service and commercial investment; diversifying into other areas; take-overs and mergers; specialising in high quality products; and more integrated production techniques. EU ferrous metals manufacturers will continue to merge or establish alliances in the course of the necessary modernisation and restructuring of the industry.

ENVIRONMENT

The ferrous metals industry intensively developed and generated techniques to reduce environmental pollution long before the protection of the environment was placed on the

Table 6: Ferrous metals
The 15 largest companies in Europe, 1994

(million ECU)	Country	Turnover	Net profit	Employment (thousands)
Thyssen	D	18 169	27.8	129.4
Usinor-Sacilor	F	12 080	268.5	69.1
Hoesch-Krupp	D	10 602	-4.7	66.1
Thyssen Handelsunion	D	8 060	38.0	27.7
Degussa	D	7 183	81.4	27.2
British Steel	GBR	6 258	612.2	39.8
Alcatel Cable	F	5 975	224.5	28.1
Arbed	L	5 192	9.2	43.0
Koninklijke Hoogovens	NL	3 679	169.8	19.0
Preussag Stahl	D	3 212	32.1	14.0
Union Miniere	B	3 102	-3.5	11.0
Johnson Matthey	GBR	2 842	83.4	5.9
Ugine	F	2 420	71.6	11.7
Sidmar	B	2 241	1.0	8.7
Europa Metalli-Imi	I	2 065	2.6	9.5

Source: DABLE

Table 7: Ferrous metals
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	1.9
Danmark	0.3	0.4
Deutschland	1.0	1.0
Ellada	1.2	1.2
España	1.2	1.1
France	0.8	0.8
Ireland	N/A	N/A
Italia	1.2	1.2
Luxembourg	11.4	13.4
Nederland	N/A	N/A
Portugal	0.5	N/A
United Kingdom	0.8	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

political agenda. Some examples are: low-pollution manufacture of steel products, steel recycling and the utilisation of waste material.

Together with the restructuring of the EU ferrous metals industry in the 1980s, attention was paid to reduce environmental pollution. Production processes were developed which eliminated the formation of toxic gases during the production process of steel and steel tube manufacturing and provisions were made for waste material to be recycled immediately and completely.

Recycling of scrap is presently at the base of 45% of total steel production. This is one of the highest rates of any industry. Furthermore, the steel industry's emissions have been lowered considerably by an overall reduction in energy inputs. Environmental protection measures increase costs considerably. These costs, in combination with the intensifying competition, are a large burden, especially for SMEs. A harmonisation of environmental protection legislation in Europe is therefore essential for avoiding distortion of competition.

In the steel tube sector, heat usage and water saving measures, treatment of process liquids, recycling of materials and maximising yields are just a few of the actions taken to implement the 'best available technologies' (BAT) to reduce pollution. Additional costs, at present impossible to estimated, arise from the introduction of measures to maintain and boost confidence in the environmental efforts of the industry. These measures are in line with the EU Eco Audit Regulation and with the principles of environmental management laid down in the Regulation. The production of ferro-alloys generally involves the use of open electrical furnaces into which natural products (quartz, lime, various ores, wood, etc.) with a relatively variable physical composition, are loaded. European producers have endeavoured to reduce emissions of dust, by installing filtration equipment in factories, and to recycle the by-products of what it produces to the greatest possible extent. The foundry industry has always placed a high value on recycling. This especially applies to the most important raw materials: sand and metals. Sand is reconditioned, and metals, in the form of returns, are re-melted. Used castings are returned to the production cycle through the trade as "cast scrap". However, the generation of waste can not be entirely prevented. Certain residues, especially thermally degenerated moulding sand, will always arise. The foundry industry is nevertheless working on financially justifiable methods of further reducing the quantities of residue or of facilitating their use in other industrial processes.

REGULATIONS

The European Coal and Steel Community (ECSC) was founded in 1951 by the ECSC Treaty. During the 1980-1988 period (e.g. the steel crisis) steel prices were fixed and investments were directed by the European Commission. At the same time ECSC institutions set quotas for the EU production and imports into the EU from non-ECSC countries.

The ECSC Treaty strictly forbids government subsidies (Article 4c), although this rule has not been consequently enforced until 1986. Since 1986 subsidies may only be granted for the encouragement of research and development, to safeguard the environment and to meet social costs incurred by total plant closure. However, the 'hard' line of the European Commission concerning the restructuring of the EU steel industry collapsed at the end of 1994. Since the Articles 92-93 of the EEC Treaty appear to be inadequate and too flexible for the steel sector, a new ECSC Treaty providing for strict and unambiguous rules on State might be taken into consideration.

The harmonisation of EU standards is well advanced; internal barriers have practically disappeared and do not impede the free circulation of goods within the EU. The EU ferrous metals market remains open for imports from third countries provided they enter under fair trade conditions. Unfair trade practices will be countered by antidumping and countervailing procedures. Future regulations for the steel market and steel policy of the EU are expected to be increasingly geared to liberalisation.

The total ban and restrictive measures enforced in Eastern Europe on exports of ferrous scrap raw material are favouring the increasing flow of finished steel products imported at dumping prices to the EU market. For this reason the EISA is seriously concerning the possibility of lodging an official complaint with the European Commission.

OUTLOOK

The apparent consumption of ferrous metals is forecast to increase slightly in the short and medium term. The recovery of demand from major downstream markets such as the automotive industry and mechanical engineering will especially sustain overall consumption.

EU production is expected to increase in the short and medium term, although increases may differ among the various subsectors. For the industry as a whole employment will be further cut. The trend in recent years of declining employment and stable or even increasing production implies that production growth can be established with less employees.

In the medium term, the development of the ferrous metals industry will be characterised by a number of risks and opportunities. The main risk is a continued increase of imports from Central and Eastern European countries which could lead to further plant closures in the EU. Continued weak demand in the US market and an increase in the export activities of subsidised producers in third countries will dampen the foreign demand for EU steel tubes. Opportunities may stem from the change of export flows into the US market, which are now prevented by actual or threatened anti dumping actions

Written by: Netherlands Economic Institute

Iron and steel
NACE (Revision 1) 27.1

In 1994 and 1995 the iron and steel industry recovered, but problems of a weak demand partly due to troubles faced by some of its major customer industries remained unresolved. Future developments are an increasing number of joint ventures, a tendency to optimise production scale, but also a further product differentiation. Regarding energy saving, net shape casting technologies are promising significant savings in material, energy and investment costs.

INDUSTRY PROFILE

Description of the sector

Iron is the fourth most common element in the Earth's crust, and is the cheapest metal per tonne to produce in large quantities. In volume terms, iron and steel accounts for over 95% of World metal production. Some of the products the industry produces are mainly used within the industry to make other products: steel is a vital material for the production of industrial and consumer products. Examples of these are iron ore briquettes, coke and pig iron.

According to the new NACE Rev. 1 the iron and steel industry is grouped as 27.1: manufacture of basic iron and steel and of ferro-alloys. The steel industry encompasses steel produciton from raw material processing to the production of finished and final products. Following the European Coal and Steel Community, productions of iron and steel includes:

- raw materials for iron and steel production;
- pig iron and ferro-alloys;
- crude and semi-finished products of iron, ordinary steel or special steel;
- hot finished products of iron, ordinary steel or special steel;
- certain end products of iron, ordinary steel or special steel (for example, tinplate and thin cold-rolled sheets).

On the other hand, steel tubes, cold-rolled narrow strip, wire and wire products, bright bars, iron castings, steel castings, forging and powder metallurgy products are not included, nor are any other products made from iron and steel.

Flat products such as hot-rolled wide strips, sheets and plates account for around 60% of sales of the European industry, with the rest mostly going in the form of long products such as rods, bars and heavy sections.

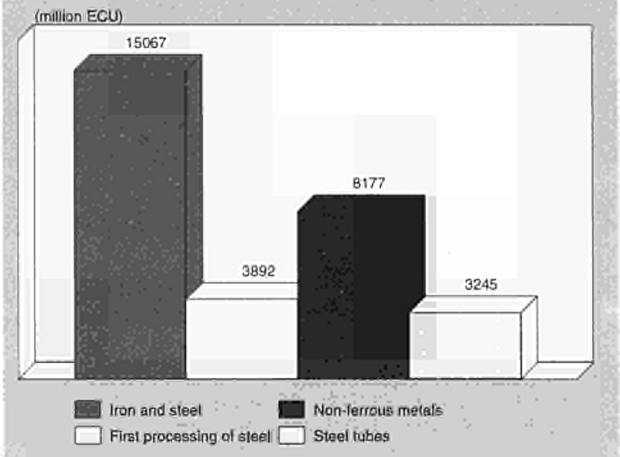
In 1995, the European iron and steel industry accounted for about 1.8% of the value added and 1.5% of employment in EU manufacturing. It is the largest of the basic metals industries, with a value added around double that of non-ferrous metals. The industry is one where economies of scale can be exploited, and so it is fairly concentrated, with the biggest enterprises accounting for a significant proportion of industry output.

Germany has the largest steel industry in Europe, with crude steel production of 42 million tonnes, 27% of EU 15 production in 1995, followed by Italy with 18% of EU production. The six largest EU producers (Germany, Italy, France, the UK, Spain and Belgium) accounted for 84% of EU production. Steel was also Luxembourg's largest manufacturing industry.

Recent trends

The iron and steel industry is subject to cyclical phases. In fact, the clear slowdown of the European economy since mid 1995 is still influencing the situation of the steel market,

Figure 1: Iron and steel
Value added in comparison with related industries, 1994

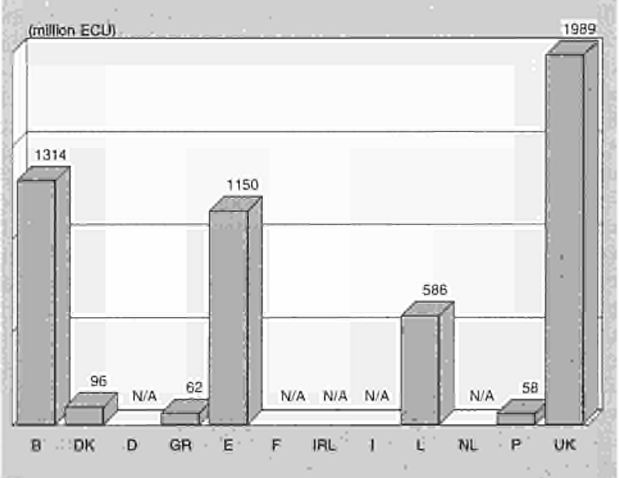


Source: DEBA GEIE

which after the first quarter 1996 is still affected by a very poor demand and low prices. Imports of steel products from all sources (CEECs, Turkey) spectacularly increased during 1995 by more than 51% in comparison with 1994. This has been responsible to a great extent for the build-up of excess stocks.

European consumption of ECSC iron and steel products grew on average by 1.5% per annum between 1986 and 1994 in crude steel equivalent volume terms. However the growth pattern has been uneven, with 4.3% per annum growth between 1986 and 1989, a plateau in EU demand up to 1991, a sharp recession in 1992 and 1993, followed by a recovery in 1994 and 1995. Thus the European iron and steel industry had to contend with a much weaker growth in home demand than most other industries. This was partly due to troubles faced by some of its major customer industries, such as steel tubes and construction, and partly due to structural shifts in demand, such as the long-term move by the car industry towards producing lighter cars.

Figure 2: Iron and steel
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Iron and steel
Main indicators in crude steel equivalent (1)

(million tonnes)	1986	1991	1992	1993	1994	1995	1995 (2)	1996 (3)	1997 (3)	1998 (3)
Apparent consumption	111.7	26.5	124.8	111.4	126.0	140.1	150.4	142.0	142.0	143.0
Production	125.6	137.6	131.9	132.2	139.0	142.6	155.8	151.0	151.0	152.0
Extra-EU exports	26.1	22.5	22.8	33.6	29.4	24.4	22.9	25.0	25.0	25.0
Trade balance	15.5	10.9	9.3	22.2	13.2	2.9	5.8	10.0	10.0	10.0
Employment (thousands)	474	396	369	336	302	286	330	310	290	280

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) Eurostat estimates for EUR15.
(3) Rounded DRI forecasts for EUR15.
Source: Eurostat

Table 2: Iron and steel
Average real annual growth rates in volume terms (1)

(%)	1986-90	1990-94	1986-90	1993-94
Apparent consumption	3.0	0.0	1.5	13.1
Production	2.2	0.4	1.3	5.1
Extra-EU exports	-4.3	7.6	1.5	-12.5
Extra-EU imports	4.0	6.9	5.4	42.1

(1) Some country data for apparent consumption and production have been estimated.
Source: Eurostat

Table 3: Iron and steel
External trade in current prices

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	13 532.3	8 456.3	8 085.4	7 696.9	10 265.2	10 252.8	9 342.8	8 789.9
Extra-EU imports	4 388.4	5 154.3	4 608.1	4 835.0	4 071.5	5 814.9	7 564.9	6 040.5
Trade balance	9 144.0	3 302.0	3 477.3	2 861.9	6 193.7	4 437.9	1 777.9	2 749.4
Ratio exports / imports	3.1	1.6	1.8	1.6	2.5	1.8	1.2	1.5
Terms of trade index	112.4	100.0	96.6	97.1	101.6	98.9	95.8	N/A

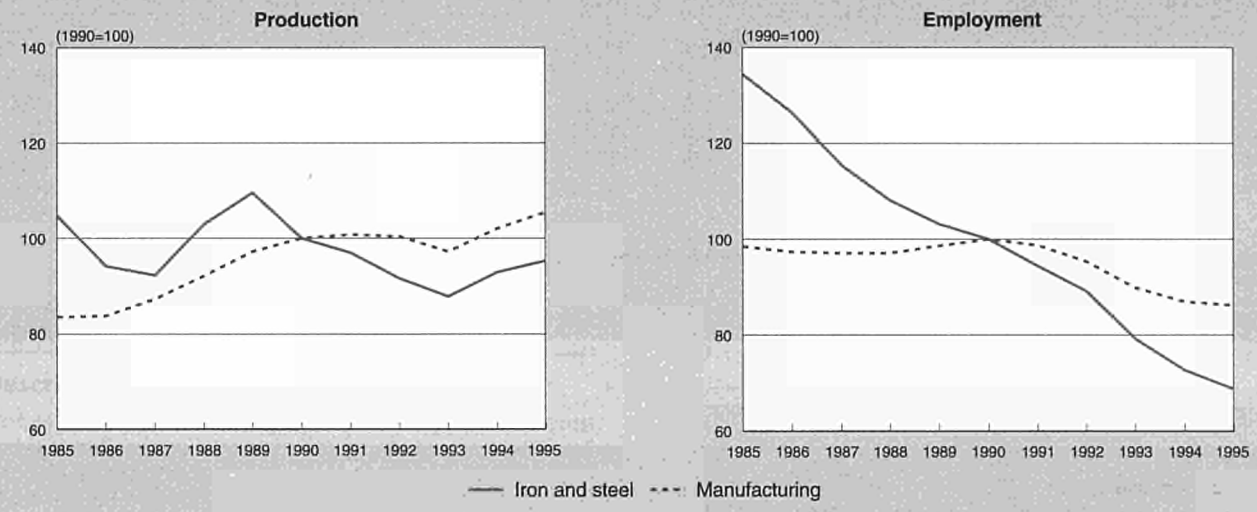
(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Table 4: Iron and steel
Labour prcductivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	77.9	74.5	79.9	95.2	106.3	100.0	102.6	102.7	110.7	127.7
Unit labour costs index (3)	95.3	103.7	103.3	93.2	89.8	100.0	103.4	107.8	102.5	91.8
Total unit costs index (4)	100.3	96.0	90.8	91.5	98.2	100.0	98.1	96.7	94.9	96.0
Gross operating rate (%) (5)	4.7	5.7	6.7	12.3	13.5	8.9	5.4	3.2	2.2	5.6

(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Figure 3: Iron and steel
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Production of crude steel grew at 1.2% annually between 1986 and 1994 in volume terms. Growth was more rapid in the three years to 1989 at 3.7% per annum. Since then EU 12 production has declined from 140 million tonnes to 132 million tonnes in 1992 and 1993, before recovering to 139 million tonnes in 1994 and 143 million tonnes in 1995. Production turned down again in the closing months of 1995 following a decline in new orders which started in the second quarter of 1995.

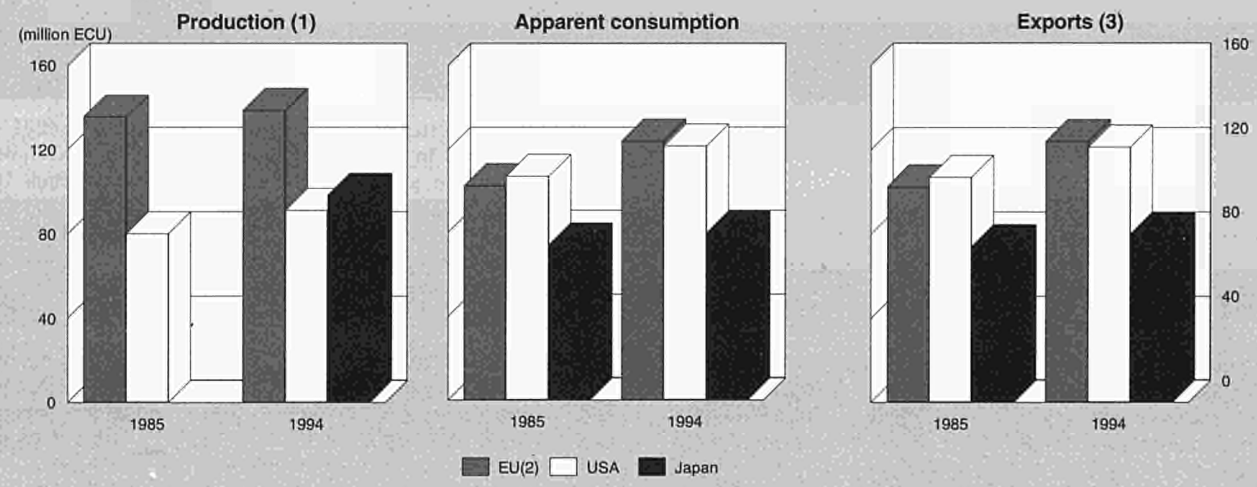
Employment has declined steadily over the last decade due to static levels of production, and the introduction of new technologies and working practices. As a result, labour productivity rose by 64% between 1985 and 1994. In 1995, around 330 thousand people were employed in the EU 15 iron and steel industry.

International comparison

The entry of the three new Member States brought EU production of crude steel up to 156 million tonnes in 1995, 21% of world production. This compares with Eastern European production of 112 million tonnes (Russia's share was 51 million tonnes), and production of Japan, the USA and China of 102, 94 and 93 million tonnes, respectively.

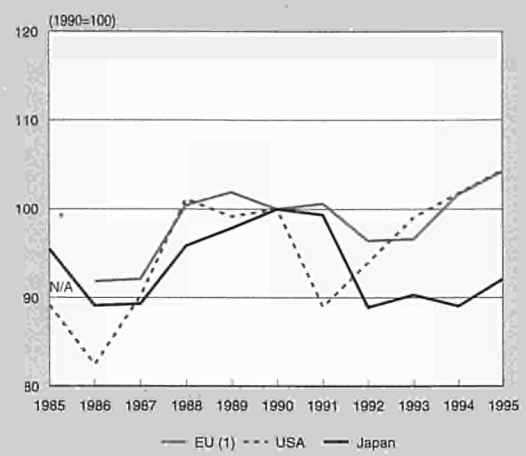
There has been a rapid growth in steel production in the third world. Countries which previously imported most of the steel they used have now become significant producers. In par-

Figure 4: Iron and steel
International comparison of main indicators in volume



(1) Crude steel.
(2) 1985 EC12; 1995 EU15, including East Germany.
(3) ECSC and non-ECSC products in crude steel equivalent.
Source: Eurostat, IISI, American Iron and Steel Institute, Japanese Iron and Steel Federation

Figure 5: Iron and steel
International comparison of crude steel production in volume



(1) From 1991 including East Germany.
Source: Eurostat

ticular, China could overtake Japan as the World's largest steel producer early in the next century, whilst South Korea (37 million tonnes), India (20 million tonnes), and Mexico (12 million tonnes) have recorded large production increases in the nineties. On the other hand, the EU and the USA have only had slow growth since 1989. Japanese production actually declined between 1989 and 1995 by about 6%. The Russian industry saw a major contraction in its home market, and production fell by 45% over this period.

Foreign trade

The EU has traditionally had a large trade surplus in iron and steel, which has declined considerably in the last decade. In 1985 it was 9.1 billion ECU. However by 1989 it had declined to 4.4 billion ECU, and it reached a low point of 2.9 billion ECU in 1992. However in 1993 the trade surplus rose to 6.2 billion ECU, mainly due to a high level of orders from the USA and from China, which had a temporary shortage of capacity. It fell back to 4.4 billion ECU in 1994, due to a 43% rise in imports and static exports. The decline in the trade surplus continued in 1995 with again sharply higher imports, and lower exports. Imports as a share of EU iron and steel consumption have risen over the last decade from 7.5% in 1985 to around 9% in 1992 and 1993, with a further rise in 1994 of 10.9%.

One factor contributing to the decline in trade surpluses in the 1990s was the reduction in production capacity in the context of the EU's restructuring policy. Another factor was the greatly increased pressure from Eastern European steel-makers, following the collapse of the Soviet Union, and the subsequent disorder in costs and prices in the Eastern European market. The latter have not only competed in third markets with EU producers, where they have severely squeezed EU suppliers of some products like hot-rolled coils, but have also taken an enlarged share of the EU market. In 1994, imports from Eastern Europe accounted for 32% of EU 12 imports from third countries in value terms, the three largest suppliers from the region being Russia (7.9%), Poland (5.0%) and the Czech Republic (5.0%).

There was an upward trend in EU exports to the USA between 1991 and 1994, the USA being the EU's largest export market. In 1994, it took 27.3% of EU 12 exports to third countries. However exports to the USA fell in 1995. Other important markets for the EU were Switzerland, Norway, Canada, India, China, and Hong Kong.

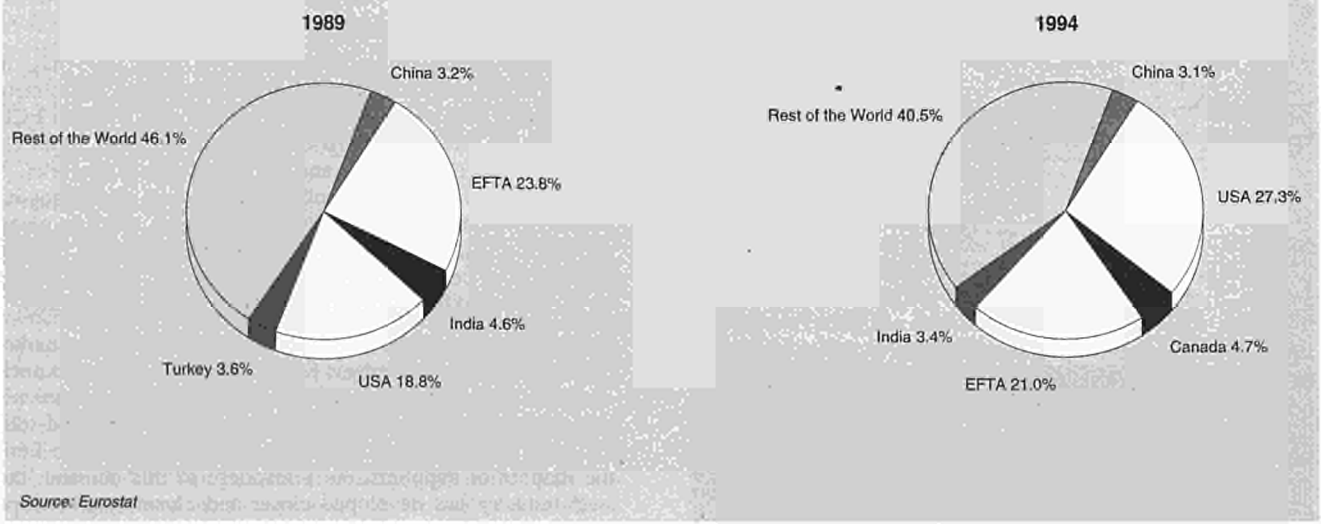
MARKET FORCES

Demand

The products delivered by the steel industry are basic goods that may pass through several stages of further processing before reaching the final consumer. The primary processing of steel products comprises the production of tubes, wire and bright drawing and cold rolling and cold forming. Although there has been a gradual decline of the share of these branches in the total use of steel in the EU, they still count for more than 33% in volume against about 40% in the early 1980s. The main reason for this development has been the decline in the production of steel tubes which have suffered from loss of export markets.

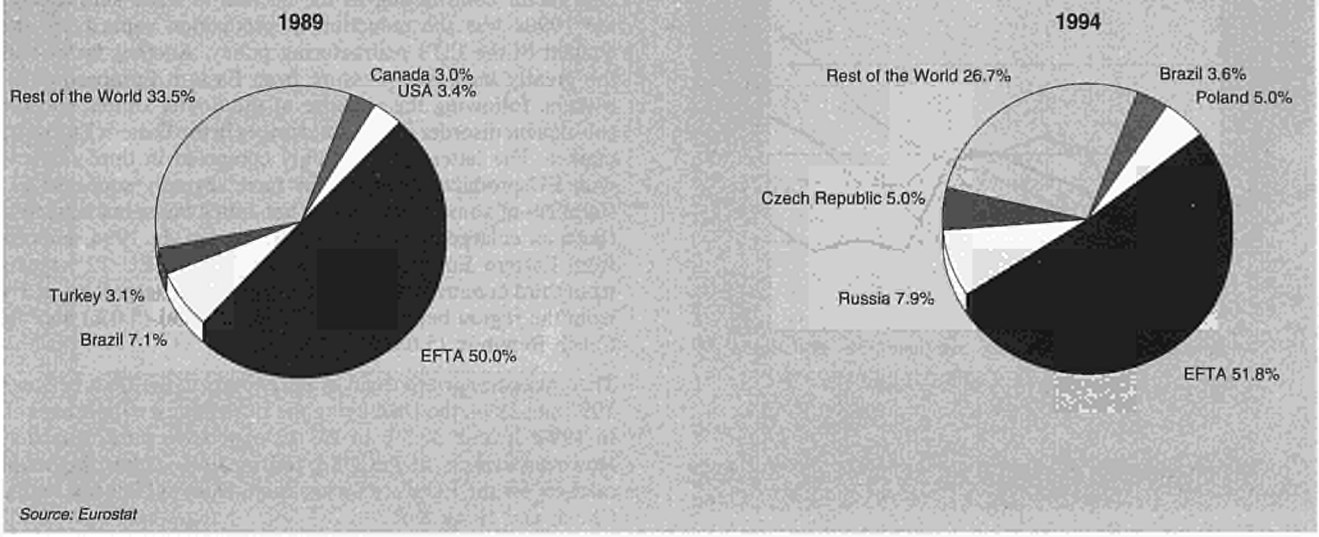
In terms of final demand for steel products, including the products of the primary processing of steel, the building industry was by far the most important user of steel with about 20% of demand, followed by the production of vehicles (16%) and the production of metal goods (15%). Further important

Figure 6: Iron and steel
Destination of EU exports



Source: Eurostat

Figure 7: Iron and steel
Origin of EU imports



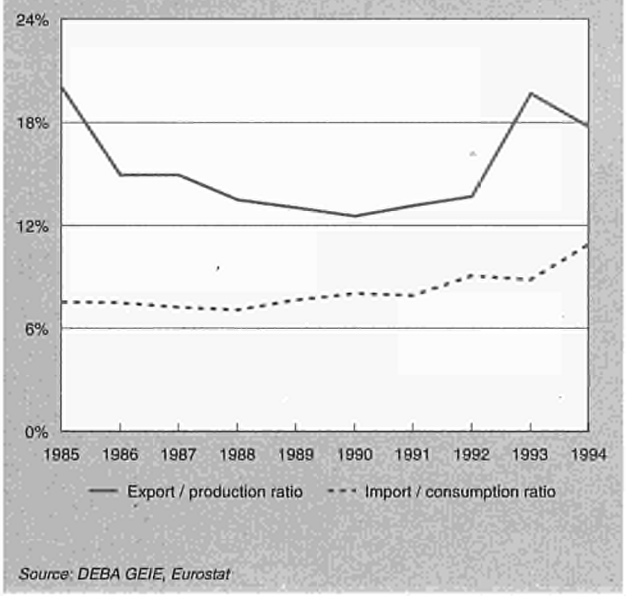
Source: Eurostat

steel users were the mechanical engineering industry (13%) and the production of structural steelwork (11%). The building industry and the production of structural steelwork have increased their shares in the demand for steel since 1980, whereas the shares of the production of vehicles, shipbuilding and the canning industry have decreased.

The slight decrease of the share of the canning industry in total demand was also reflected in a decrease in the share of tinplate and electro-chromium coated steel in the production of steel products. Also the share of plates over 3 mm. has decreased. On the other hand, the share of coated sheets, included tinplate, has increased considerably, partly reflecting strong demand from the car industry.

In spite of the sharp increase in steel consumption in the EU in 1994 and 1995 with 13% and 11% respectively, the longer term growth rate in steel consumption has been rather slow.

Figure 8:: Iron and steel
Trade intensities



Source: DEBA GEIE, Eurostat

The main reason for this has been the slower development of the traditional steel using branches, most of them being producers of investment goods. Even in a good year such as 1994, the share of gross fixed capital formation in GDP in the EU decreased slightly.

Substitution between steel and other materials like aluminium and plastics was very important in some markets. However it did not always work in one direction as was shown by the recent reversal in the competition between tinplate and aluminium. In general the effect of substitution on total steel demand was rather limited. The share of steel in the weight of the total production of the steel using branches like cars, bridges, cans, metal furniture etc. over the last 15 years has not markedly changed. However the high recyclability of steel and its high energy saving value will lead to an increase in its use.

More important for the development of steel demand was the constant improvement in the qualities of basic steel products. The shift from the plates to sheets reflected the lowering of the weight of the steel used for the same purposes. With the same amount of tinplate in weight, 15% to 20% more cans can now be made compared with a decade ago. The effect of this continued technological development on steel consumption can be estimated at more than 1% a year.

Supply and competition

The improvement in market conditions since 1993 has, in general, led to satisfactory capacity operating rates. Investment expenditure at the EU 15 industry level was 2.7 billion ECU in 1994. Of this, around 16% was spent on blast furnaces, 16% on electric steelworks and 4% on oxygen steelworks. A further 40% was spent on rolling mills, with significant investments being made in continuous casting, coating plant, and light mills. The bias of new investment towards electric steelworks is because they enable small more flexible plants to be set up taking advantage of the availability of scrap.

The globalization of the world economy has affected the market demands the steel industry is facing. World wide players such as the motor car industry have strongly raised their demands with respect to uniformity of world wide standards and reliability of supply. There was also a marked tendency to limit the number of suppliers. As a response to this demand, the steel industry has developed closer and closer relationships

Table 5: Iron and steel
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	N/A	2.1
Danmark	0.2	0.2
Deutschland	1.0	0.9
Ellada	1.2	1.3
España	1.4	1.2
France	0.8	0.8
Ireland	N/A	N/A
Italia	1.1	1.2
Luxembourg	14.5	18.2
Nederland	N/A	N/A
Portugal	0.6	0.5
United Kingdom	0.8	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

with its customers. One example of this cooperation was a combined effort to design a super light car made from steel.

Imports have been rising rapidly since 1993. The main sources of these increased imports were the countries of Eastern Europe. After a number of years with domestic decreases in steel consumption and production, production in 1995 rose by 5% in the Eastern European countries and by 1% in the CIS. Most of that additional production was used for exports. Even though it is handicapped by outdated technologies, Eastern Europe is a low cost producer. However this is partly due to an artificial cost structure with no depreciation and no past anti-pollution investment. The modernisation currently going on will give Eastern European industry a good chance to remain competitive, but because of the high investment costs needed, will remove the artificial advantages.

The improved market situation has been reflected in an increase of the steel prices that began in 1993. In 1994, average prices of steel imports increased by about 14%, and export prices increased slightly more than this. From the evidence of export price quotations, the price increases of exports seemed to have continued into early 1995 peaking in May 1995 at a level that was even higher than the previous peak in 1988-1989. Since then, price quotations have fallen sharply, especially for hot-rolled coils and cold reduced sheets, but only by a small margin for coated sheets. This sharp reduction in prices has been triggered by the increased exports from Eastern Europe on the world market.

Direct deliveries by domestic steelworks to final users on national markets accounts for about 45% of steel consumption. A further 30% of steel consumption is supplied by local steel merchants, of which around 20% of steel consumption originally comes from domestic steelworks. The remaining 25% of steel consumption is covered by direct imports by final users from other EU countries and, for a growing share, by imports from third countries.

Production process

Continuous casting had a dramatic effect on the economics of the steel industry in the 1970s and 1980s. The last decade, however, has not been marked by the mass introduction of radical new technologies in the EU. Rather, the classical methods of production have been refined at various stages (blast furnaces, steelworks, mills) and rendered much more efficient by improvements all along the production chain. These have allowed major reductions in the use of energy, and in pollution, whilst increasing product quality. For example, the technique of controlled rolling has contributed considerably to the increased quality of the steel products and to higher reliabilities and smaller tolerances. Currently, the excellent state of modernity of the steel industry's capital stock is not conducive to the introduction in the Community of new technologies which, although often developed by EU enterprises, find a situation favourable to their introduction in newly industrialised countries needing a local steel industry.

In the future, near net shape casting technologies, promising significant savings in material, energy and investment costs, may offer major benefits. Thin slab casting is, so far, the most developed of these technologies. The development and the success of these new technologies will be inflenced by the availability of ferrous scrap arisings and development of recycling activities of this material.

INDUSTRY STRUCTURE

Companies

The iron and steel industry's structure is of two types: firstly, there are a limited number of big companies, running mainly integrated steel plants based on the blast furnace - oxygen steel converter process Secondly, there are a great number of small and medium sized companies, for instance those specialising in the production of special steels, which use electric arc furnaces. The smaller companies tend to specialise in long products.

In the EU in 1995 there were 17 enterprise groups with a production of over 2 million tons of steel, as against 18 in 1994, due to the take-overs of the state owned Italian Ilva group by the Riva group (now the fourth largest in Europe), and Stahlwerke Bremen by the Arbed group. By taking over SAM, the ASW group in the UK for the first time passed the 2 million tonne mark. Cockerill-Sambre took over the East German Eko-Stahl. The three largest EU companies accounted for slightly less than 30% of total steel production, and the seven largest over 50%.

Strategies

With the privatisation of the parts of the industry which up until recently had remained in public ownership, and the winding down of the ECSC Treaty, the policy accent is moving towards treating the iron and steel industry like any other industrial sector as regards promoting competitiveness. There have been a large number of joint ventures between steel companies. Joint ventures within the EU are aimed at special products or special markets. The large number of international joint ventures show the increasing internationalisation of the steel industry.

Table 6: Iron and steel
International comparison of electric arc process (EAP) in crude steel production, 1995

	EUR15	USA	Japan
Crude steel production (million tonnes)	150.4	93.6	101.6
Oxygen (%)	65.1	60.6	67.7
EAP (%)	34.9	39.4	32.3

Source: IISI, Eurostat

Joint ventures are part of the general tendency to optimise the production scale but can also be a consequence of the search for more flexible production structures. This will be achieved also by further product differentiation and by the increase in the average value added of steel products.

REGIONAL DISTRIBUTION

The regional distribution of steel production changed in the fifties and sixties away from being located in the proximity of raw material deposits towards locations close to coastal areas because of the possibility of profiting from cheaper imports of bulky raw materials. The few brand new steelworks have been based on electric arc furnaces, all of which were located near the existing industrial centres with a sufficient supply of good quality scrap.

ENVIRONMENT

The industry achieves a very high long-term recycling rate compared with other industries, with 66 million tonnes of iron and steel scrap consumed by it in EU 12 in 1994. The main environmental problems of the steel industry are of two kinds. Firstly, there is the old picture of the "smoke stack" industry. This picture now belongs completely to history, except for the old coke oven batteries. Here there are severe difficulties to meet the regular environmental standards. The steel industry is very active in developing new technologies which either reduce the need for coke or can replace coke ovens. By substituting coke by other forms of energy like coal injection, the coke rate has been halved in 20 years and will be reduced further by the use of new technologies such as COREX

The emission of CO_2 is the other serious environmental problem for the steel industry. The traditional process of smelting iron ore with coke or coal produces CO_2 as part of the chemical reaction. Other processes have been proved to produce much less CO_2. At this point, the steel industry has achieved considerable progress, mainly by the overall reduction of the energy needed. The technological development in the direction of near net shape casting again will mean a considerable step, but there will be a physical limit to the reduction in energy consumption that can be attained.

In the near future, the implementation of environmental legislation concerning scrap and its classification as waste will negatively impact the steel industry and its recycling.

REGULATIONS

The industry is regulated by the Treaty of Paris signed in April 1951. This set up the European Coal and Steel Community in 1952 to create a common market for coal and steel products. It proved a successful prototype for the wider common market set up by the 1957 Treaty of Rome, whose institutions were merged with those of the ECSC in 1968. With the end of the ECSC Treaty in July 2002, there has been considerable discussion about the way to maintain the positive influence that the Treaty has had on the industry. The Commission has said that it will let the Treaty expire without seeking renewal, but certain aspects may be continued by means of new EU legislation.

OUTLOOK

Crude steel production fell in the last quarter of 1995 and the first half of 1996, but production a recovery was expected for the second half of the year. Production is expected to be a static over the next few years as steelmakers adopt strategies for increasing quality levels and value added to counter low cost foreign imports.

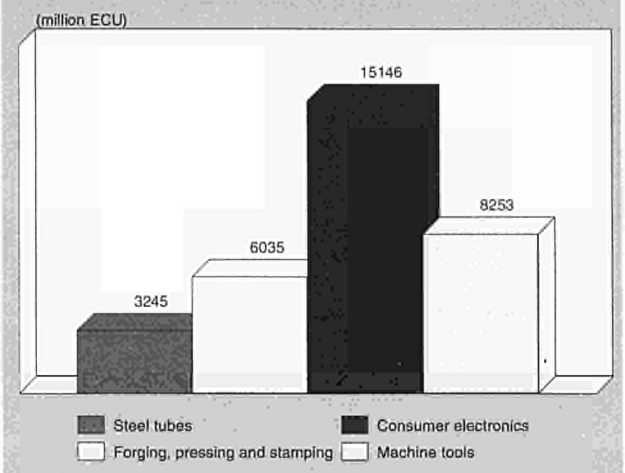
Written by: Eurostat
The industry is represented at the EU level by: European Confederation of Iron and Steel Industries (EUROFER). Address: Rue du Noyer 211, B-1040 Brussels; tel (32 2) 736 0100; fax (32 2) 736 3001; and European Independent Steelworks Association (EISA). Address: Rue Belliard 205, B-1040 Brussels; tel (32 2) 230 7962; fax: (32 2) 230 0136.

Steel tubes
NACE (Revision 1) 27.22

The steel tube industry has faced a severe volume and financial downturn since the mid-1980s due to worldwide low demand and over capacity. The EU market was deeply influenced by the slowdown of investments in several steel tube consuming sectors. Export possibilities have been reduced by growing self-sufficiency in former export markets, by increasing capacities of international competitors, by the threat of trade cases in the US and by the low international value of the dollar. Furthermore, the collapse of the former Soviet Union and other East European markets and the reduction of orders from China are of great concern to EU manufacturers. As from 1994, US dumping allegations against several Latin American producers, but also against EU and other producers have fundamentally altered export flows in the world market of steel tubes.

The EU has maintained its leading position in the world market, ahead of the US and Japan, due to continuous productivity gains achieved over recent years through industry restructuring. Nevertheless, foreign trade has been steadily deteriorating. Despite its improved competitiveness, the EU steel tube industry is under the strongest pressure from low priced imports from Central and Eastern Europe. More recently, massive exports from Turkey, Russia and the Ukraine have also emerged, which are leading to significant forced reductions of output, capacities and workforce.

Figure 1: Steel tubes
Value added in comparison with related industries, 1994



Source: DEBA GEIE

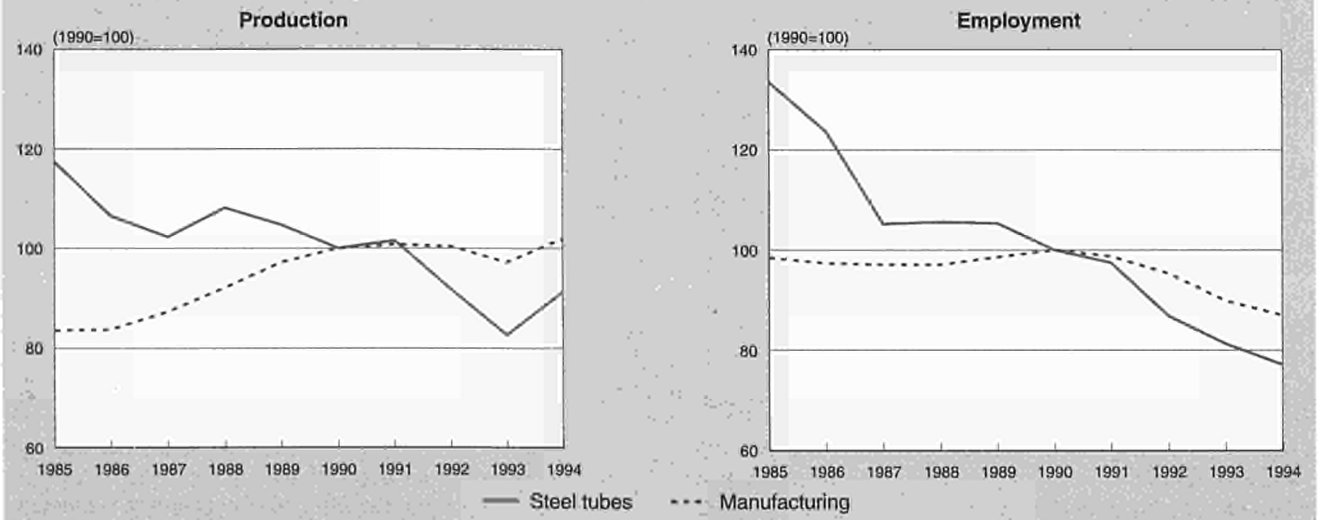
INDUSTRY PROFILE

Description of the sector

The activity of NACE (Rev. 1) 27.22 encompasses the manufacture of steel tubes and of steel tube fittings. Formerly, NACE 1970 classification 222 covered also compressed gas cylinders. This monograph deals only with the manufacture of steel tubes. Data is based on production figures compiled from surveys conducted by the national organisation of the producers located in each EU Member State. Export and import figures are provided by Eurostat. Steel tubes cover three product categories which differ considerably in their manufacturing processes, raw materials, and investment requirements. These categories are classified as: seamless steel tubes, welded steel tubes of circular cross-section over 406.4 millimetres in outside diameter, welded steel tubes of circular cross-section up to and including 406.4 millimetres in outside diameter together with welded steel tubes of non-circular cross-section of any perimeter.

The main consumers of steel tubes are the energy industries (e.g. oil, gas, nuclear, steam generating industries) and the petrochemical, automotive, mechanical engineering, mechanical services, and construction industries. Economic development in each of the product areas of the steel tube sector varies according to their different end markets. Calculated using a crude steel equivalent, EU steel tube production con-

Figure 2: Steel tubes
Production in volume and employment compared to EU total manufacturing industry



1994 are ESTA and Eurostat estimates.
Source: DEBA GEIE, ESTA

Table 1: Steel tubes
Main indicators

(thousand tonnes)	1985	1990	1991	1992	1993	1994	1995 (1)	1995 (2)	1996 (2)	1997 (2)	1998 (2)
Apparent consumption	8 406.2	10 565.7	9 811.1	9 795.2	8 830.0	9 420.0	9 450.0	10 350.0	10 100.0	10 200.0	10 300.0
Production	14 461.7	12 326.0	12 524.0	11 310.6	10 177.0	11 263.0	11 300.0	12 200.0	11 800.0	11 800.0	11 900.0
Extra-EU exports	6 754.0	3 164.8	4 134.4	3 002.2	2 558.0	3 362.0	3 200.0	3 400.0	3 300.0	3 200.0	3 200.0
Trade balance	6 055.5	1 760.3	2 712.9	1 516.0	1 347.0	1 843.0	1 450.0	1 550.0	1 300.0	1 200.0	1 200.0
Employment (thousands)	94.8	71.0	69.2	61.7	57.7	54.8	54.7	58.6	58.0	57.5	57.0
Extra-EU imports (3)	698.0	1 405.0	1 421.0	1 486.0	1 211.0	1 519.0	1 350.0	1 550.0	1 600.0	1 600.0	1 600.0
Extra-EU imports from Sweden, Finland and Austria	287	434	405	450	429	475	N/A	N/A	N/A	N/A	N/A
Extra-EU imports from all other countries	411	971	1016	1036	782	1044	N/A	N/A	N/A	N/A	N/A
Share of apparent consumption (%)	4.9	9.2	10.4	10.6	8.9	11.1	14.3	15.0	15.8	15.7	15.5

(1) ESTA estimates for EUR12. (2) ESTA estimates for EUR15. (3) Data from 1995 onwards refers to extra-EU15.
Source: ESTA, Eurostat

Table 2: Seamless tubes
Main indicators

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	2 272	1 896	1 903	2 331	2 417	2 453	2 440	2 210	1 741	2 095
Production	4 773	3 720	3 744	4 062	3 967	3 680	3 758	3 025	2 645	2 979
Extra-EU exports	2 774	2 092	2 170	2 126	2 023	1 685	1 810	1 390	1 247	1 320
Trade balance	2 501	1 824	1 841	1 731	1 550	1 227	1 318	815	904	884
Extra-EU imports	273	268	329	395	473	458	492	575	343	436

Source: ESTA, Eurostat

Table 3: Welded tubes OD 406.4mm
Main indicators

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	668	734	477	598	850	1 101	773	1 144	1 181	1 030
Production	3 449	3 344	2 551	2 297	2 013	1 553	2 021	1 941	1 748	2 137
Extra-EU exports	2 803	2 740	2 096	1 725	1 241	608	1 428	869	661	1 247
Trade balance	2 781	2 610	2 074	1 699	1 163	452	1 248	797	567	1 107
Extra-EU imports	22	130	22	26	78	156	180	72	94	140

Source: ESTA, Eurostat

Table 4: Welded tubes OD 406.4mm (1)
Main indicators

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	5 466	5 560	5 990	6 745	6 637	7 012	6 598	6 441	5 908	6 295
Production	6 240	6 068	6 329	6 970	6 928	7 093	6 745	6 345	5 784	6 147
Extra-EU exports	1 177	912	837	931	1 027	872	896	743	650	795
Trade balance	774	508	339	225	291	81	147	-96	-124	-148
Extra-EU imports	403	404	498	706	736	791	749	839	774	943

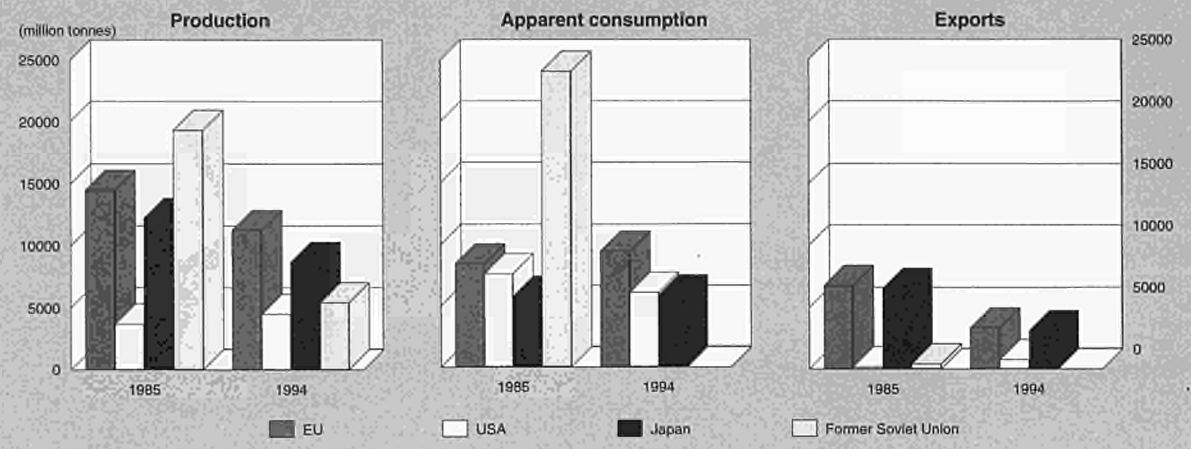
(1) Includes tubes of non-circular cross section.
Source: ESTA, Eurostat

Table 5: Steel tubes
Breakdown by major product line, 1994

(thousand tonnes)	Apparent consumption	Production	Extra-EU exports
Steel tubes	9 420	11 263	3 362
Seamless tubes	2 095	2 979	1 320
Welded tubes OD 406.4mm	1 030	2 137	1 247
Welded tubes OD 406.4mm (1)	6 295	6 147	795

(1) Includes tubes of non-circular cross section.
Source: ESTA, Eurostat

Figure 3: Steel tubes
International comparison of main indicators in volume



Source: ESTA, Eurostat

sumes 16-19% of ECSC steel output. Steel tubes are manufactured at varying levels in each EU country.

Recent trends

After a peak in 1990, a steep downturn in 1993 and a recovery in 1994 and 1995, the long-term trend of steel tube consumption can be seen as developing slowly. Since 1992, production has had to be reduced considerably in some EU countries as a consequence of lower export opportunities and heavy imports. In 1994 and 1995, the production figures showed some upturn. In 1995, real demand of steel tubes was lower than apparent consumption, resulting in increased stocks. In 1996, destocking will mean that demand will be lower than real consumption. For the medium-term future, no noticeable growth can be expected. The three new EU Member countries (Sweden, Austria and Finland) contribute almost one million tonnes to both the EU production and consumption of steel tubes. Their inclusion does not change, however, the long-term trend of the industry.

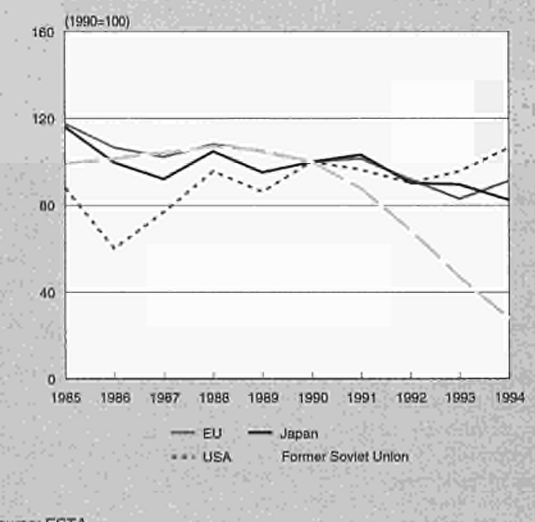
In 1994, apparent consumption of steel tubes in the EU increased by 6.7% from the low point reached in 1993. Apparent consumption in 1995 is estimated to have attained a level similar to that of 1994. A volume of one million tonnes can be added to the estimation for 1995 to consider the entry of the new Member countries. Production, reduced in 1992 by 10%, saw an additional reduction of 10% in 1993. However, the production level of 1992 was almost reached again in 1994 with a strong increase of 10.6% during that year. Production of steel tubes in 1995 may have reached the same volume, with an addition of 0.9 million tonnes accounted for by the new Member countries. Extra-EU exports, after a dramatic decrease of 27.4% in 1992, experienced a 15% downturn in 1993. In 1994, the export tonnage losses of 1992 and 1993 were partly compensated by an upturn of 31.4%, but export volumes were way below those reached in the late 1980s. In 1995, export volumes are estimated to have been similar to that of 1994. Another 200 000 tonnes may be added to account for the exports of the new Member countries. Imports of steel tubes have decreased in 1993 due to weaker consumption, but rose strongly in 1994.

Employment in the EU steel tube industry has suffered from the marked decline in production and exports and from the continuous necessity of rationalisation. From 1985 to 1994, employment has been reduced by 42%, which amounts to 40 000 job losses. In 1995, a level of employment similar to that of 1994 is expected, which may be increased by 4 000 jobs due to the entry of the new Member countries.

Although apparent consumption has increased steadily, or at least has remained stable, over the past decade, it has mostly been to the advantage of third country competitors. The share of EU consumption represented by imports from third countries, measured in terms of tonnes, has increased from 8.3% in 1985 to 13.7% in 1993. In 1994, the tonnage of extra-EU imports rose by 25.4% compared to 1993, and even by 33.5% if imports from Sweden, Finland and Austria are left out. In 1995, a further increase of 30% may have taken place. For the EU-15 in 1995, the share of imports from third countries is estimated to have represented 15% of the apparent consumption of steel tubes, measured in terms of tonnes.

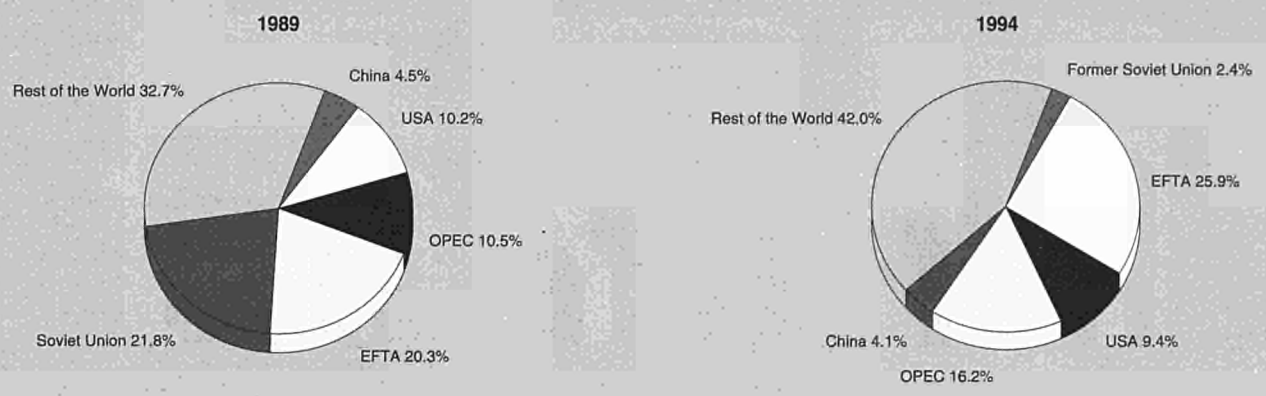
Growth in the steel tube sector has clearly lagged behind developments in manufacturing as a whole. Since 1985, general manufacturing has been characterised by steady growth in production until 1990, then by a certain stagnation and a revitalisation in 1994. Employment in overall manufacturing was rather stable until 1988, showed a slight upturn in 1989 and 1990 and then started to decrease in the early 1990s. For steel tubes, in comparison, the production in volume declined almost steadily until 1993, with an increase in 1994

Figure 4: Steel tubes
International comparison of production in volume



Source: ESTA

Figure 5: Steel tubes
Destination of EU exports



Source: Eurostat

identical to that of general manufacturing. Employment in the steel tube industry has constantly diminished over the whole period.

International comparison

EU production of steel tubes in 1994 accounted for 20.9% of world production compared to a share of 20.3% in 1985. In the world's ranking, the EU is ahead of Japan and the US. The former Soviet Union has been at the top of the list until 1992. Particularly in Japan, but also in the EU, steel tube production greatly exceeds domestic consumption which is reflected in their roles as the most important steel tube exporters.

Whilst the EU and Japan have suffered setbacks in their production volumes since the 1980s, the newly industrialised countries (NICs) and the developing countries (DCs) have been winners. The US has regained some of its former production level. Some of the NICs and DCs have considerably expanded their production capacity in recent years, often supported by heavy state aid. This group of countries includes Turkey, Mexico, Venezuela, Brazil, Argentina, Taiwan, the Republic of Korea and Thailand. Other winners since 1992 are steel tube producers of East European countries where, in most cases, raw materials, energy and labour costs are heavily subsidised.

Foreign trade

The EU share of estimated world exports of steel tubes amounted to about 39% in 1994 if intra-EU trade is included, or to roughly 23% if intra-EU trade is excluded. Extra-EU exports of steel tubes have decreased continuously since 1985, with an unusual exception in 1991 and a recovery in 1994. Extra-EU imports have increased steadily in volume, leading to a declining trade balance. 1993 was an exception as weak consumption of steel tubes led to an 18% decline in extra-EU imports. In 1994, extra-EU imports increased by 25.4%, and a further surge of 29% may have occurred in 1995.

The list of countries receiving EU exports has changed considerably between 1989 and 1994. Exports to EFTA and OPEC countries have significantly increased as well as the deliveries

Table 6: Steel tubes
Average real annual growth rates

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	5.1	-2.7	1.6	6.6
Production	2.6	-3.5	-0.2	6.3
Extra-EU exports	-5.8	-2.3	-4.3	22.3
Extra-EU imports	14.4	4.5	9.9	21.8

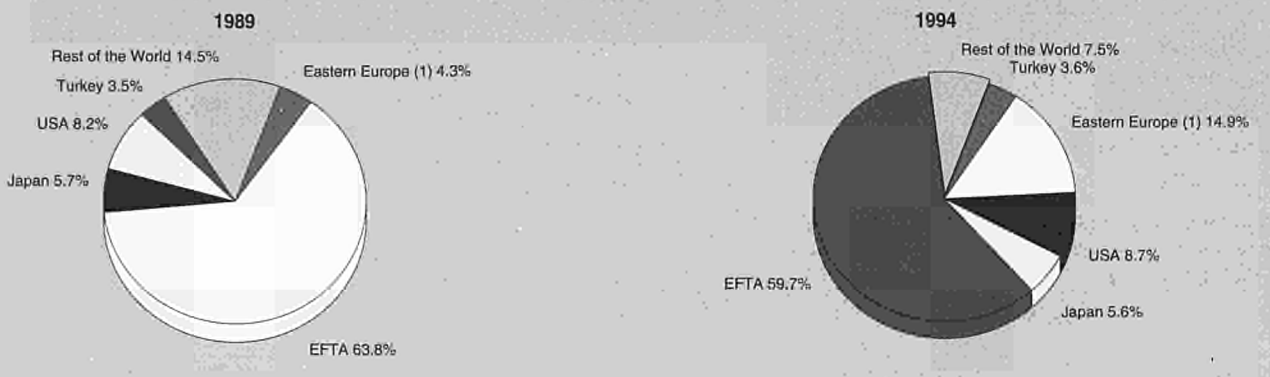
Source: ESTA, Eurostat

Table 7: Steel tubes
External trade at current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Extra-EU exports	4 788	3 550	2 970	3 293	3 575	2 677	3 092	2 496	2 152	2 705
Extra-EU imports	665	699	682	900	1 141	1 146	1 116	1 056	871	1 084
Trade balance	4 123	2 851	2 288	2 393	2 434	1 531	1 976	1 440	1 279	1 621
Ratio exports/imports	7.20	5.08	4.35	3.66	3.13	2.34	2.77	2.36	2.46	2.50
Share of intra-EU trade in total imports (%)	75.0	73.3	71.7	71.3	70.3	72.1	73.6	72.8	69.7	69.6
Terms of trade index	115.0	104.1	102.7	112.9	119.6	100.0	88.7	78.4	76.1	73.4

Source: ESTA, Eurostat

Figure 6: Steel tubes
Origin of EU imports



(1) Bulgaria, Czech Republik, Slovakia, Hungary, Poland, Romania and the former Soviet Union.
Source: Eurostat

to non-specified countries. The importance of China and the US as the destination of EU exports has been declining. The most significant change was the reduction of exports to the former Soviet Union which in the past was a major export market. The lack of hard currency has reduced its share of EU exports from 21.8% in 1989 to 2.4% in 1994. The EFTA countries remain dominant suppliers on the EU steel tube market, but the share of EU imports coming from EFTA countries has recently been decreasing. On the other hand, the deliveries from Central and East European countries have more than tripled their share of total EU imports, reaching 14.9% in 1994. The imports from Japan and the US remained more or less unchanged in terms of the percentage share they represent. Intra-EU trade is significant. In value terms, it amounted to almost 70% of total EU imports in 1994.

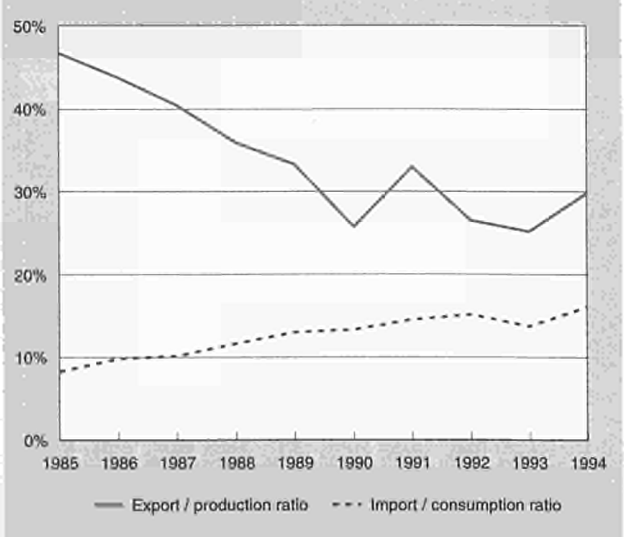
MARKET FORCES

Demand

The most important steel tube consuming sectors are: oil and gas exploration and extraction, transport of oil and gas by pipelines, nuclear and other steam generation industries, mechanical engineering, the automotive industry, structural steel work, the construction industry and other metal processing industries. Due to strong investment in these sectors, apparent consumption of steel tubes in the EU rose by 26% from 1985 to 1990, reaching 10.6 million tonnes. In the following years, however, consumption shrank due to lower investment activity in almost every steel tube consuming sector. As from 1994, the automotive and the mechanical engineering industries have registered growth which has led to a higher consumption of steel tubes in 1994 and allowed the expectation of a further slight increase in 1995. For 1996, however, a slowdown is to be feared.

At the same time though, EU export market shares in third countries have decreased. In 1985, 46.7% of the EU steel tube production was exported to third countries. The decline of this share to 30% in 1994 shows a serious fall in the sales opportunities for the industry. The main reason for the reduction in extra-EU exports is the dramatic fall in orders from the former Soviet Union and other East European countries, caused by their lack of purchasing power. Another reason is the shortfall of orders from China as a consequence of their growing self-sufficiency in ordinary steel tubes.

Figure 7: Steel tubes
Trade intensities in volume



Source: ESTA, Eurostat

Supply and competition

Despite continuous labour and production cutbacks, the EU steel tube industry still suffers from worldwide over capacity. The effects on profit margins for commodity steel tubes are considerable, and more particularly in export markets. Given the range of purchase possibilities worldwide and rising imports, customers are in a strong position to dictate price. Internal competition within the EU is high. In 1994, intra-EU trade amounted to 3.3 million tonnes or roughly 35% of the EU consumption of steel tubes. In value terms, intra-EU imports in 1994 totalled 2 483 million ECU, which represents about 31% of consumption. This is an indication that there are very few trade barriers in the steel tube sector. Thus, further impacts of the EU Single Market are expected to be low.

EU competitiveness with respect to third countries, however, is threatened when imported steel tubes are subsidised in their production and/or are produced under non-market economy conditions.

Competition by low priced imports from Central and East European countries continues to remain strong. After a temporary reduction in 1993, these imports increased again in 1994 and are estimated to have reached in 1995 a level never

Table 8: Steel tubes
Trade with Eastern Europe (1)

Exports to Eastern Europe	1990	1991	1992	1993	1994
In volume (thousand tonnes)	565	444	168	196	268
In value (million ECU)	430	334	162	175	235
ECU / tonne	761	752	964	893	877
Imports from Eastern Europe	1990	1991	1992	1993	1994
In volume (thousand tonnes)	210	288	434	294	444
In value (million ECU)	82	112	161	106	157
ECU / tonne	390	389	371	361	354
Share of total extra-EU imports (%)	1990	1991	1992	1993	1994
In volume (thousand tonnes)	15.0	20.3	29.2	24.3	29.0
In value (million ECU)	7.2	10.0	15.2	12.1	14.5

(1) Bulgaria, Czech Republik, Slovakia, Hungary, Poland, Romania and the former Soviet Union.
Source: ESTA, Eurostat

observed before. On the other hand, EU exports to East European countries, which were important to their economies in the 1980s, have dramatically declined up to 1993 and increased only marginally in 1994.

Not yet evident in the figures for 1994 are the growing imports from Turkey, Russia and the Ukraine. Imports from Turkey have displayed an extraordinary surge in 1995, while deliveries from Russia and the Ukraine constitute a major threat to the EU steel tube industry because of their extremely low prices.

Production process

Technically, the EU steel tube industry is at the leading edge. Continued investment in research and development ensures high quality steel production and rolling processes. In most of the EU steel tube production facilities, the quality assurance system is certified according to ISO 9001/9002. Ongoing rationalisation efforts, both in production and labour, have kept costs at a competitive level. From 1985 to 1994, the number of employees in the steel tube industry has fallen by 42%, but productivity increased by 35% during the same period.

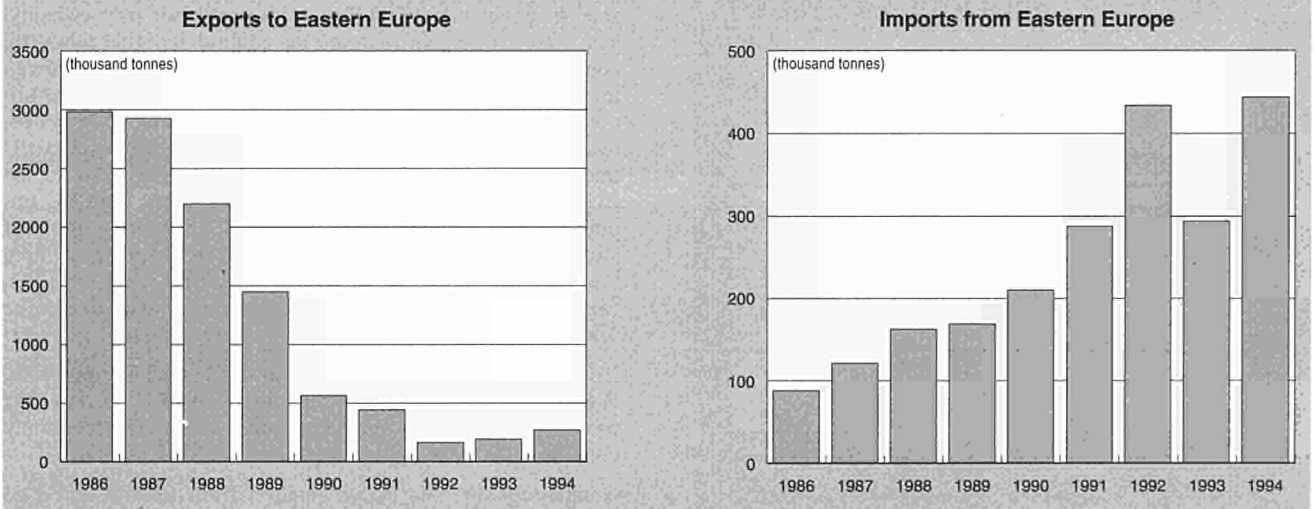
It should be noted that in many sectors of seamless and welded tubes, different product categories are manufactured in the same mill, i.e. tubes of commercial grade as well as tubes of highly sophisticated quality. This means that installations need to be filled with a substantial base load of commodity products along with high added value grades to obtain a cost level that is competitive on the world market.

INDUSTRY STRUCTURE

Companies

The steel tube industry is a primary steel processing industry with a highly concentrated structure. Five countries, Germany, Italy, France, the United Kingdom and Spain, account for roughly 90% of total EU production. In some countries, a single company can account for 50% or more of national output. In addition to the major integrated steel tube manu-

Figure 8: Steel tubes
Trade with Eastern Europe



1994 are Bulgaria, Czech Republik, Slovakia, Hungary, Poland, Romania and the former Soviet Union.
Source: ESTA

Table 9: Steel tubes
Labour productivity and unit costs (1)

(1990=100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Productivity (tonnes/employee)	152.5	149.6	169.0	178.0	172.6	173.6	181.0	183.3	176.4	205.5
Productivity index (2)	87.9	86.2	97.3	102.5	99.4	100.0	104.2	105.6	101.6	118.4
Unit labour costs index (3)	97.1	109.5	108.6	91.7	90.9	100.0	102.0	104.4	102.8	106.1
Total unit costs index (4)	89.8	91.9	88.6	90.0	97.7	100.0	96.7	95.3	90.5	95.1
Gross operating rate (%) (5)	6.8	1.4	3.1	9.5	8.8	7.5	6.1	5.1	3.4	6.7

(1) Some country data has been estimated.
(2) For the whole of Nace 2220; based on index of production / index of employment.
(3) For the whole of Nace 2220; based on labour costs / index of production.
(4) For the whole of Nace 2220; based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) For the whole of Nace 2220; based on (value added - labour costs) / turnover.
Source: ESTA, DEBA GEIE

facturers (mainly producing welded tubes), there are a relatively large number of small and medium-sized firms that are independent. Some manufacturers, often small in tonnage terms, operating in high value added markets, concentrate on the manufacture of special dimensions and grades of tubes according to particular customer specifications. At the end of 1994, there were 280 production units in the EU belonging to an estimated 245 enterprises. Of these, 67 are specialised in cold drawing of seamless or welded tubes.

Strategies

No significant investment has taken place in recent years due to capacity reductions imposed by the difficult market conditions existing since 1985. Contrary to the early 1980s when some investment was directed towards expanding capacities, current investments relate mainly to productivity and quality improvements.

In the past, companies and countries tended to either manufacture a full range of products or to specialise in niche markets. To strengthen the competitiveness of the industry, consideration is now being given to cross-border mergers and cooperation followed by capacity reductions.

Impact of the Single Market

As for many sectors, the customs duties for steel tubes were abolished on July 1st 1968. Starting slowly in the 1960s, then accelerating, the interpenetration between the EC countries grew from year to year. Exports and imports within the Community reached a share of 40-50% of the market consumption. The free movement of goods within the EU was thus realised at least twenty years before the inception of the "Single Market" on January 1st 1993.

The free movement of goods has been by far the most important element of European market integration. The other aspects have had less incidence on the sector. Some non-tariff barriers have been abolished. Beside some other positive effects, there was also a negative effect in that the system for gathering data on trade between Member States from businesses (Intrastat) has created a situation of incomplete and outdated statistics. This makes it difficult to monitor developments in the industry.

ENVIRONMENT

Costs arising from environmental protection legislation are considerable. To a large extent, costs of classical end-of-the-pipe measures, such as the treatment of emissions from raw material production units, reheating furnaces, noise control, and the treatment of waste water, can amount to as much as 50 ECU per tonne and average at least 1% of the turnover of EU firms. Waste reduction strategy is implemented more often in refurbishments or modifications of current production processes, procedures and feed stock than it is implemented in the input/output balance. Heat usage and water saving measures, treatment of process liquids, recycling of materials and maximising yields are just a few of the measures used that follow the needs of "best available technology" (BAT). Additional costs, which at present cannot be estimated, arise from the installation of measures to maintain and boost confidence in an environmentally friendly industry. These measures are in line with the EU Eco Audit Regulation and with the principles of environment management laid down in the Regulation. Steel tube manufacturing enjoys the advantage of an environmentally friendly production process. Another environmentally sound characteristic of steel tubes is that the product itself can be entirely recycled as stipulated along the new rules of "closed substance cycle and waste management".

REGULATIONS

Trade regulations are a key source of concern for EU steel tube producers. Trade barriers in several countries of the world hamper the penetration of EU exports. The reduction of non-tariff barriers was an important element in the framework of the GATT negotiations.

Harmonisation of EU standards in the sector is well-developed. Internal barriers have practically disappeared and do not impede the free circulation of goods among the Member States. The EU steel tube market remains open for imports from third countries provided they enter under fair trade conditions. However, they face strong competition from domestic suppliers and suppliers in other Member States, and unfair trade practices are countered by Antidumping and Countervailing procedures.

OUTLOOK

Following the recovery in 1994, consumption and production of steel tubes were more or less stable in 1995. For 1996, a slight downturn in production and consumption is to be expected. Those EU countries which are affected at the same time by heavy imports and a lack of export opportunities suffer the most from the production cutbacks, which amounted to as much as 25% in 1993, and continued to occur in 1994 and 1995.

In the medium term, the development of the EU steel tube industry will be characterised by a number of risks and opportunities. The main risk is a continued increase of imports from Central and East European countries which could lead to further plant closures in the EU. Continued weak demand in the US market and an increase in the export activities of subsidised producers in third countries will dampen the foreign demand for EU steel tubes. A new development is the change of export flows into the US market, which are now prevented by actual or threatened trade cases. These tonnages are now diverted to other markets in the world, including the EU.

There are promising opportunities for the future. Economic recovery in the former Soviet Union and Central and East Europe could occur more quickly, bringing larger export markets. An improvement in the world economic situation with related growth in demand from the energy industries will increase the orders of the steel tube mills. Finally, fair trade enforcement under confirmed GATT/WTO regulations will also support the industry's activity.

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First processing of steel

NACE (Revision 1) 27.31, 27.32, 27.33, 27.34

After a period of growth from 1988 up to 1990, first processing of steel production suffered a decline until 1994. Production was 11.8 millions tonnes in 1993 compared to 13.1 million tonnes in 1990. Production has increased in both 1994 and 1995, with respective tonnages of 13.2 and 13.5 million tonnes in 1995. Extra-EU exports have been decreasing from 1.5 million tonnes in 1988, 1989 and 1990 to 1.3 million tonnes in 1992. In 1993, they reached 1.4 million tonnes and rose to 1.6 million tonnes in 1994 and 1995.

The export/import rate fell from 1.9 in 1988 to 1.4 in 1994 and 1.0 in 1995. The deterioration of the trade balance has been constant, with the 1994 balance being 34.7% less than the 1988 trade balance and the 1995 balance hardly positive. This evolution is due mainly to the constant increase of imports, particularly from East Europe and since 1993 from Russia and the Ukraine.

As a consequence of these trends and of intensified rationalisation measures, there has been a drop in employment of 11.2 thousand workers during the period 1988 to 1995.

INDUSTRY PROFILE

Description of the sector

Sector 27.3 of NACE Rev.1 is a part of first processing of steel. The manufacture of steel tubes (subsector 27.22 of NACE) is also a first processing of steel activity but is considered separately in this publication.

Sector 27.3 of NACE Rev. 1 differs from sector 223 of NACE '70 on the following points:

- subsector 27.34 (223.4 in NACE 70) excludes wire products which have been transferred to subsector 28.73.
- subsector 27.35 has been added to classify "Other first processing of iron and steel and production of non ECSC ferro alloys" but these activities have nothing in common with the rest of sector 27.3.

The following monograph concerns the first four subsectors only:

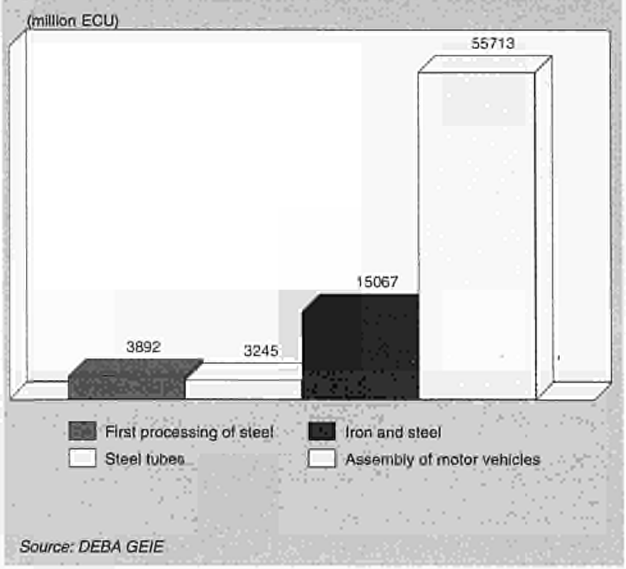
- NACE 27.31: Cold drawing of steel bars
- NACE 27.32: Cold rolling of narrow steel strip
- NACE 27.33: Cold forming or folding of steel flat products
- NACE 27.34: Cold drawing of steel wire

The manufacture of cold drawn wire is the largest activity of the sector with a share in 1995 of 35% of production and 33% of extra-EU exports.

Manufacturing process

Cold processing of hot rolled raw material is a common feature of the four subsectors: this processing method leads to more accuracy in size and mechanical properties, as well as improvement of the surface condition compared to products obtained on the hot mill. The products are mostly manufactured according to the requirements of each individual customer, something which is obviously not possible for the primary steel industry.

Figure 1: First processing of steel
Value added in comparison with related industries, 1994



Source: DEBA GEIE

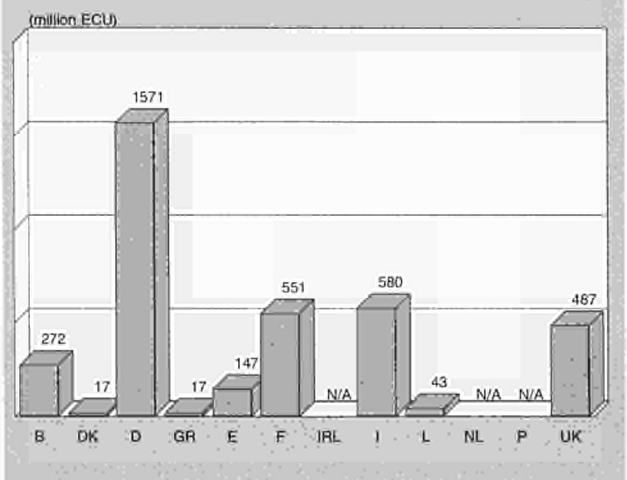
Period covered

In order to have homogenous external trade statistics, the period selected for the tables and figures begins in 1988, the year of enforcement of the C.N. based on the Harmonised System, which has replaced the previous Common Custom's Tariff and Nimexe nomenclatures. Accordingly, the period 1988 to 1995 has been set for all other statistical information.

Calculation of apparent consumption

Products manufactured by the different subsectors are relevant of chapter 72 of the Combined Nomenclature "C.N.". Except for cold rolled strip, external trade statistics can be used for the calculation of apparent consumption. The problem is that strip produced by the cold rolling industry in the C.N. is not classified separately from the cold rolled products obtained by slitting of cold rolled sheet manufactured by the primary steel industry. Consequently, apparent consumption is not mentioned in table 1 and table 7.

Figure 2: First processing of steel
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: First processing of steel
Main Indicators in volume

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Production	12 565	13 022	13 071	12 769	12 799	11 869	13 188	13 514
Extra-EU exports	1 451	1 511	1 462	1 275	1 295	1 434	1 587	1 609
Extra-EU imports	747	817	843	862	918	850	1 127	1 596
Trade balance	704	694	619	413	377	584	460	13
Ratio exports / imports	1.9	1.8	1.7	1.5	1.4	1.7	1.4	1.0
Employment (thousands)	78.6	77.2	77.0	74.5	72.0	69.6	68.6	67.4
Labour productivity (tonnes / worker)	159.9	168.7	169.8	171.4	177.8	170.5	192.2	200.5

(1) European Federations' estimates for external trade data.
Source: Eurostat, European Federations

Table 2: First processing of steel
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1988	1989	1990	1991	1992	1993	1994	1995
Labour productivity index (2)	94.2	99.4	100.0	101.0	104.7	100.5	113.2	118.1
Unit labour costs index (3)	93.0	95.1	100.0	108.6	106.7	107.6	98.4	N/A
Total unit costs index (4)	93.0	101.6	100.0	98.1	95.3	94.7	94.0	N/A
Gross operating rate (%) (5)	9.3	7.3	6.8	5.4	5.5	4.0	6.3	N/A

(1) Some country data has been estimated.
(2) Based on index of production in volume / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

Table 3: First processing of steel
Average annual growth rates in volume terms

(%)	1988-94	1990-94	1993-94	1994-95
Production	0.8	0.2	11.1	2.5
Extra-EU exports	1.5	2.1	10.7	1.4
Extra-EU imports	7.1	7.5	32.6	41.6

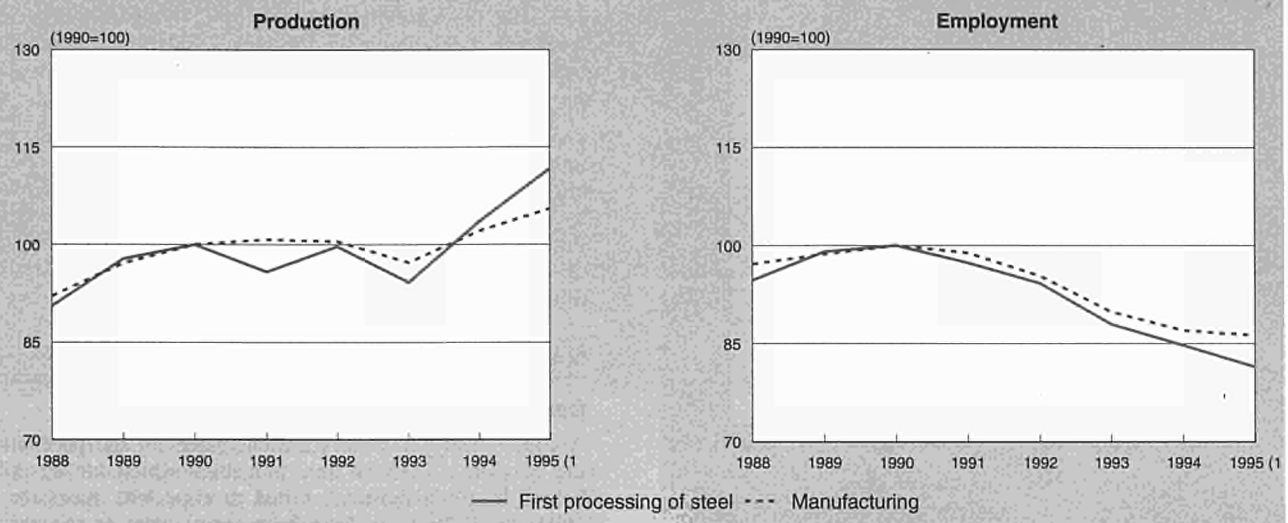
Source: Eurostat

Table 4: First processing of steel
Production specialisation (1)

(ratio)	1988	1994
Belgique/België	3.1	1.9
Danmark	0.2	0.1
Deutschland	1.1	1.2
Ellada	0.7	0.7
España	0.6	0.6
France	0.9	0.7
Ireland	N/A	N/A
Italia	0.9	1.2
Luxembourg	4.3	4.4
Nederland	N/A	N/A
Portugal	0.4	N/A
United Kingdom	1.0	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

Figure 3: First processing of steel
Production and employment compared to EU total manufacturing industry



1995 are Eurostat estimates.
Source: DEBA GEIE, Eurostat

Correspondence with Prodcom list

In order to be in accordance with the Prodcom list of products for each subsector of NACE Rev. 1, it has been necessary to modify the aggregates of C.N. positions used previously for each NACE 223 subsector, as follows:

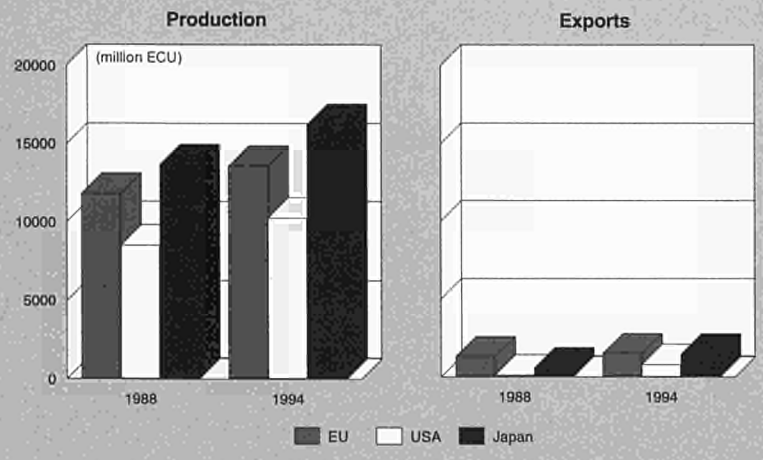
- sections other than those obtained by cold forming or bending of flat steel products have been added for subsector 27.31.
- cold rolled strip of a width above 500 mm, but under 600 mm, has been excluded from subsector 27.32, as it is an ECSC product and is relevant of sector 27.1 which concerns the primary steel industry.
- for long sections of subsector 27.33, sections not obtained from flat steel products have been transferred to subsector 27.31 as said above.
- for wide sections of subsector 27.33, profiled sheet and sandwich panels have been added. Corrugated sheet has been excluded as it is relevant of sector 27.1. Sandwich panels have been taken into account in spite of the fact that they are relevant to subsector 28.11, as they are manufactured by the profiled sections industry.
- for subsector 27.34 wire products have been excluded.

As the new aggregates have been used for calculating the external trade figures for the period covered, the statistics published in this 7th edition of the Panorama for First processing of steel differ from those published in the previous editions.

Recent trends

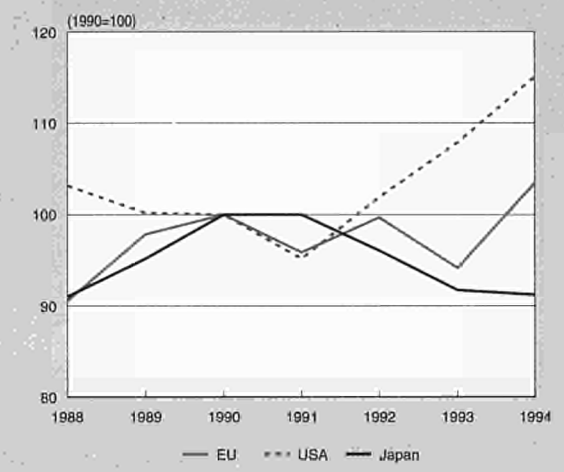
Production decreased from 1990 until 1993 but increased during the two following years. The trade balance has been decreasing year after year from 1988 to 1992. There were improvements in 1993 and 1994 but the level in 1994 was 34.7% under 1988. The very low trade balance figure for 1995 is due to strong imports.

Figure 4: First processing of steel
International comparison of production and exports in current prices



Source: Eurostat, DEBA GEIE

Figure 5: First processing of steel
International comparison of production in constant prices



Source: DEBA GEIE

Production in value in the first processing of steel sector has lagged until 1993 behind the growth in the manufacturing industry as a whole but was ahead in 1994 and 1995. For the steel and the steel tube industries, the evolution was the opposite. For employment, the decrease has been stronger since 1990 than for the manufacturing industry and similar to developments in the steel and steel tube industries.

Labour productivity has been improving since 1988, except for 1993, while unit labour costs have increased from 1988 until 1991 and decreased thereafter.

International comparison

The available statistics of production in current prices (see Figure 4) show that the levels for the EU, the USA and Japan were higher than in 1988 (EU 14.6%, USA 20.5%, Japan 19%)

EU production was 38.5% over that in the USA in 1988, against 31.9% in 1994. As for Japan, EU production was by 13.3% lower in 1988, against 16.5% in 1994.

Foreign trade

Extra-EU exports (see table 1) have been decreasing from 1989 up to 1992, while they increased by 10.7% in both 1993 and 1994, followed by only by 1.4% in 1995. The 1995 level was 10.9% above the 1988 level. Extra-EU imports have been increasing from 1988 to 1995, except in 1993.

Figure 6 shows some changes in the destination of extra-EU exports: the share of the former Soviet Union shrank by 6 times over the 1988-94 period. The share of East Europe has almost doubled, the share of OPEC countries has decreased by one third. As for extra-EU imports, figure 7 shows that the share of the former Soviet Union was 20 times the share of 1988 while the share of East Europe increased by one third.

MARKET FORCES

Demand

A wide variety of sectors are customers of the products of the first processing of steel industries which are described below. In 1993, most users had to cope with recession. In 1994 and 1995, there have been many signs of recovery in users sectors.

Supply and competition

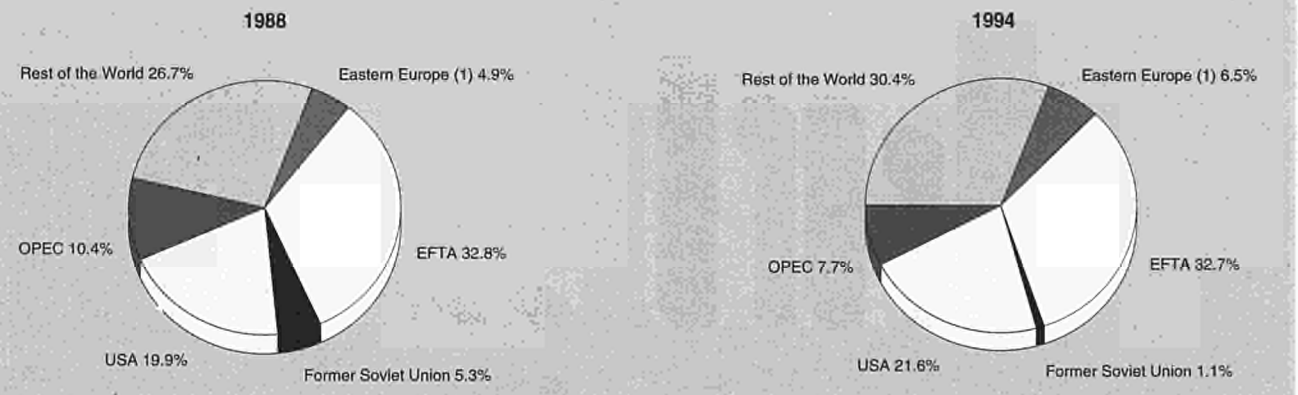
In order to improve its competitiveness, during recent years the first processing of steel sector has been forced to cut its work force. There has been a loss in employment of 11.2 thousand workers between 1988 and 1995.

With the slowdown of production, labour productivity has declined in 1993 but it increased by 13% in 1994 and by 4% in 1995. The situation of over-capacity is still persistent in most producing countries.

Competition within the EU remained keen in recent years. Intra-EU imports which were of 2.8 million tonnes in 1988, climbed up to 3.2 million tonnes in 1994 and to 3.5 million tonnes in 1995.

Extra-EU imports have been constantly increasing since 1988 except a drop of 7.5% in 1993. In 1994, the increase was 32.6% over 1993. Imports from East Europe were of 294 thousand tonnes in 1994, up from 145 thousand tonnes in 1988. Their share was of 25.8% of total extra-EU imports in 1994. The average prices of this sector of countries have been very low compared to the average prices of intra-EU imports and of third countries others than East European. In

Figure 6: First processing of steel
Destination of EU exports in volume



(1) Includes Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia.
Source: Eurostat

Table 5: Cold drawing of steel bars
Main indicators

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Apparent consumption	2 437	2 465	2 451	2 174	2 129	1 813	2 191	2 565
Production	2 598	2 627	2 607	2 310	2 272	2 049	2 424	2 636
Extra-EU exports	360	376	369	320	343	429	499	480
Extra-EU imports	199	214	213	184	200	193	266	409
Trade balance	161	162	156	136	143.	236	233	71
Ratio exports / imports	1.8	1.8	1.7	1.7	1.7	2.2	1.9	1.2
Employment (thousands)	9.0	8.9	8.4	8.2	8.2	8.1	8.0	8.0
Labour productivity (tonnes / worker)	288.7	295.2	310.4	281.7	277.1	253.0	303.0	329.5

(1) Estimates for external trade data.
Source: Eurostat, European Bright Bar Association

1994, the Czech Republic was the most important competitor with 154 thousand tonnes, followed by Slovakia with 64 thousand tonnes, Poland with 46 thousand tonnes, Hungary with 15 thousand tonnes. Apart from EFTA countries with 527 thousand tonnes, the other main competitors in 1994 were Russia with 85 thousand tonnes, the Ukraine with 73 thousand tonnes, South Africa with 23 thousand tonnes, Japan with 26 thousand tonnes, and Slovenia with 28 thousand tonnes.

In 1995 extra-EU imports increased by 41.6% and were more than double the 1988 imports. There were 450 thousand tonnes from East Europe, including 230 tonnes from the Czech Republic, 300 thousand tonnes from Russia and 150 thousand tonnes from the Ukraine.

INDUSTRY STRUCTURE

Companies

The number of companies declined from 749 in 1988 to 652 in 1995 due to the closing of out-dated installations. If the 95 companies manufacturing profiled sheet which had not been listed in 1988 are added, the total is of 747: 206 in Germany, 187 in Italy, 116 in Spain, 88 in the United Kingdom, 78 in France, 39 in Benelux, 9 in Ireland, 9 in Portugal, 8 in Denmark, and 7 in Greece. Among the biggest companies, some are integrated to the steel industry, the others are independent and mostly small and medium-size specialised companies.

Strategies

In contrast to the major firms in the primary steel industry and the steel tube industry, mergers, acquisitions, alliances and co-operation are a less suitable strategy for the medium and small size companies of the first processing of steel sector.

The emphasis will continue to be placed on investments to achieve productivity gains. In addition, the trend towards specialisation will intensify.

Due to comparable production techniques in all Member States and harmonisation of Standards published by the National Standardisation Organisations, the quality of products exchanged within the EU is consistent.

Impact of the Single Market

As far as circulation of goods is concerned, the Single Market was born on July 1st 1968 with the abolition of custom's duties on trade between the Six Member States which founded the EU. Since then, internal trade has been growing year after year. The date of 1st January 1993 marked the beginning of a new stage in the development of the Single Market, particularly with the free circulation of goods, services and capital.

Improved circulation of products across the EU and possibly reductions in costs could be achieved through the adoption of European Standards harmonising the technical specifications. Changes in the organisation of the common commercial policy could be helpful to protect the market from unfair competition from third countries. Several subsectors consider that the commercial defence instruments should be strengthened. As the internal market becomes reality, there will be a further increase in the number of cross-border ventures in this sector.

One area in which the Internal Market programme may not have had a positive effect is the availability of valuable and up to date statistics making it possible to monitor developments in the sector.

The elimination of controls at internal frontiers has axed the Single Administrative Document and made compulsory a new system for gathering data on the Trade between Member States (Intrastat) based on direct return from businesses. The new system is, however, not yet satisfactory. For different reasons, figures published are not complete nor timely for a large proportion of the Member States.

The revision of NACE and the introduction of Prodcom will substantially improve the knowledge of the activity and produciton of the EU industries, for the two systems are to cover at least 90% of each sector in the Member States.

Table 6: Cold drawing of steel bars
Production in the EU, USA and Japan

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994
EU	2 598	2 627	2 607	2 310	2 272	2 049	2 424
USA	1 360	1 335	1 348	1 217	1 322	1 437	N/A
Japan	1 280	1 344	1 394	1 369	1 176	1 086	N/A

Source: International Iron and Steel Institute

Table 7: Cold rolling of steel strip
Main indicators

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Production	3 017	3 232	3 211	3 028	2 821	2 610	2 980	3 079
Extra-EU exports	489	494	469	400	399	391	431	470
Extra-EU imports	185	177	208	251	287	271	366	513
Trade balance	304	317	261	149	112	120	65	-43
Ratio exports/imports	2.6	2.8	2.3	1.6	1.4	1.4	1.2	0.9
Employment (thousands)	15.9	15.7	15.7	15.3	14.8	14.8	14.7	14.1
Labour productivity (tonnes / worker)	189.7	205.9	204.5	197.9	190.6	176.4	202.7	218.4

(1) Estimates for external trade data.
Source: Eurostat, Comité International d'Etude du Laminage à Froid du Feuillard d'Acier (CIELFA)

REGIONAL DISTRIBUTION

The majority of mills are concentrated in the highly industrialised regions: the Ruhr district, Northern Italy, the East and North of France, Northern Spain, the West and South Midlands in the United Kingdom.

ENVIRONMENT

Costs arising from environmental protection are significant in the first processing of steel sector. They are, to a large extent, due to costs incurred by the treatment of fume emissions from reheating furnaces, treatment of waste water from the pickling installations where they still exist, and noise control in the production units.

REGULATIONS

Trade regulations are a key concern for the EU producers of steel and articles of steel. After the expiration in March 1992 of the voluntary restraint agreements with the USA and a large part of the steel producing countries in the world which is regulated by a system of quota exports to the USA, discussions about a multi-lateral agreement regarding steel trade began in 1989, but it was not possible to bring all parties concerned to a consensus.

In November 1995, the steel producers of the USA and of the EU were presented a draft of multilateral agreement on special steel covering stainless, magnetic and tool steel products. After 7 months of discussion the interested parties succeeded in coming to an agreement. The agreement was presented to the Council of Ministers and to the US Government in March 1996. The industry has asked the authorities to continue discussions in order to achieve a multilateral agreement on steel, based on the special steel agreement.

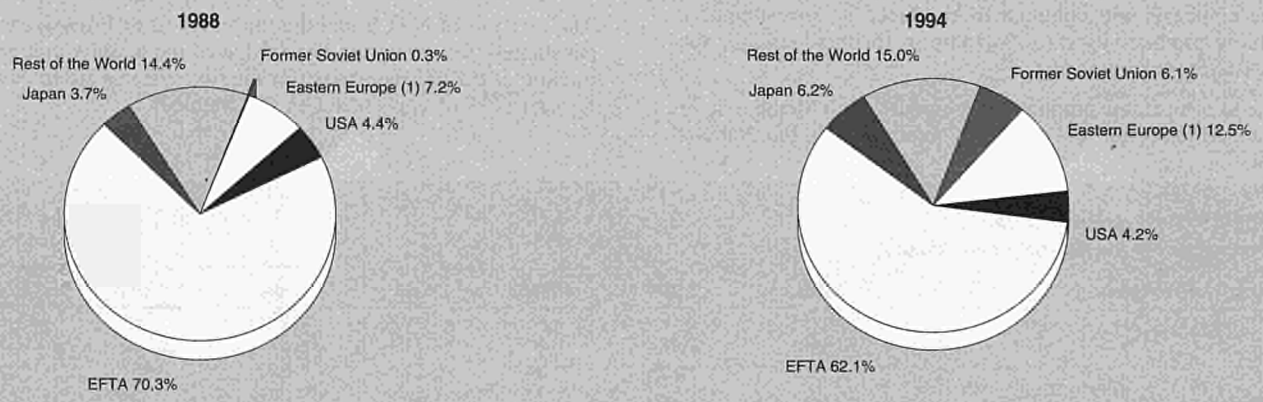
OUTLOOK

Economic recovery in the CIS and East Europe will progressively give the possibility of a development of foreign trade with these countries. In the meantime, imports from East Europe will certainly continue to increase as well as imports from Russia and the Ukraine.

As long there are no clear rules to regulate exports to the USA, EU Member States will have all kind of difficulties to sell their products in this country.

Since January 1st 1995, the GATT has been replaced by the World Trade Organisation. This new body is implementing the final agreement of the Uruguay Round. This is leading to intensification of foreign trade in the world and to higher industrial and service activities.

Figure 7: First processing of steel
Origin of EU imports



(1) Includes Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia.
Source: Eurostat

Table 8: Cold roll forming or folding of steel
Main indicators

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994	1995(1)
Apparent consumption (2)	2 478	2 507	2 530	2 862	3 064	2 760	2 899	3 062
Production (2)	2 450	2 480	2 500	2 812	3 012	2 732	2 850	3 007
Extra-EU exports	47	64	65	67	73	64	73	87
Extra-EU imports	75	91	95	117	125	92	122	142
Trade balance	-28	-27	-30	-50	-52	-28	-49	-55
Ratio exports/imports	0.6	0.7	0.7	0.6	0.6	0.7	0.6	0.6
Employment (thousands)	16.4	16.3	17.5	16.9	16.3	14.9	14.9	15.0
Labour productivity (tonnes / worker)	149.4	152.1	142.9	166.4	184.8	183.4	191.3	200.5

(1) Estimates for external trade data.
(2) Estimates between 1988 and 1991.
Source: Eurostat, CIPF, EPPF

Cold drawing of steel bars NACE (Revision 1) 27.31

INDUSTRY PROFILE

Manufacturing process

Cold drawing concerns the manufacture of steel bars or sections by cold drawing, grinding or peeling of hot rolled steel bars into so-called "Bright steel bars", having the form and characteristics required by the users. The finished product has tight tolerances, accurate mechanical properties and a high quality surface. Improved quality surface conditions and closer tolerances can be achieved by additional grinding and polishing. Cold finishing during drawing operations hardens and increases the tensile strength of the steel, while at the same time reducing the ductility, which may require an annealing treatment of the product after drawing. Bright steel bars are mainly of circular, square, rectangular or hexagonal section, but all kinds of sections can be produced according to demand.

Products manufactured

This subsector manufactures the following products: non alloy steel bars of free cutting steel and carbon steel bars; stainless steel bars; alloy steel bars of different grades including high speed steel and other tool steel and shapes and sections of different grades of steel. All these products meet the specifications of individual users.

Recent trends

Production has been continuously decreasing from 1989 to 1993. It increased by 18.3% in 1994, with a further 8.7% increase in 1995.

Apparent consumption has decreased continuously from 1989 to 1993. 1994 saw a 20.8% increase over 1993, and 1995 saw a further 17.1% increase . Extra-EU exports have increased by 25% in 1993 and by 16.3% in 1994, due to growing demand from the USA. The trade balance increased in 1993 and 1994 but fell in 1995. In 1994, imports were 33.7% higher than in 1988, while in 1995 imports were more than twice the level in 1984.

International comparison

The statistical yearbook published by the Iron and Steel Institue shows that, besides the EU, the major producing countries of cold finished bars are the USA and Japan.

Foreign trade

Concerning the destination of extra-EU exports, the US share was of 30% in 1994 compared to 24% in 1988. The share of EFTA countries and East Europe were similar, with 33% and 5% respectively. Exports to the USA rose from 89 thousand tonnes in 1988 to 146 thousand tonnes in 1994.

As for the origin of extra-EU imports, the East Europe share of was 17% in 1994, up from 12% in 1988. The share of EFTA countries fell from 59% in 1988 to 53% in 1994. The share of remaining countries was similar but included 16% for the Ukraine.

MARKET FORCES

Demand

Bright steel bars are used by industries such as the manufacture of motor vehicles, machinery, electrical goods and other industries, where a high quality basic material is compulsory.

Supply and competition

Employment decreased by 1 thousand workers between 1988 and 1995. Labour productivity was 14% higher in 1995 than in 1988. Production capacity was around 4 million tonnes in 1994 compared to a production of 2.6 million tonnes in 1995.

Intra-EU imports were of 930 thousand tonnes in 1995, an increase from 751 thousand tonnes in 1988. Extra-EU imports which had remained static at around 200 thousand tonnes from 1988 until 1993 showed an increase of 37.8% in 1994. Imports in 1994 were: 54 thousand tonnes from Sweden, 47 thousand tonnes from Switzerland, 31 thousand tonnes from Austria, 40 thousand tonnes from the Czech Republic, 40 thousand tonnes from the Ukraine. The prices were particularly low for the Czech Republic products and even lower for the Ukraine.

Extra-EU imports increased by 53.8% in 1995 due mainly to the Czech Republic with 65 thousand tonnes, the Ukraine with 70 thousand tonnes and Russia with 50 thousand tonnes.

Technological progress

There has been steady progress in processes used to manufacture bright steel bars, mainly with the introduction of computers in the production lines, in order to meet the demand of users for even higher quality finished products. The methods used keep gauge, mechanical properties and surface condition under much stricter control.

INDUSTRY STRUCTURE

Companies

The number of companies declined from 154 in 1988 to 130 in 1995: 46 in Germany, 26 in Spain, 25 in Italy, 15 in the United Kingdom, 14 in France, 2 in Portugal, 1 in Denmark, and 1 in Belgium.

Table 9: Cold roll forming or folding of steel (long sections only)
Main Indicators

(thousand tonnes)	1988	1989	1990	1991	1992	1993	1994	1995 (1)
Apparent consumption	1 270	1 301	1 318	1 493	1 566	1 438	1 569	1 611
Production	1 223	1 238	1 250	1 412	1 479	1 380	1 485	1 516
Extra-EU exports	24	24	24	32	30	28	32	36
Extra-EU imports	71	87	92	113	117	86	116	131
Trade balance	-47	-63	-68	-81	-87	-58	-84	-95

(1) Estimates for external trade data.
Source: Eurostat, Comité International du Profilage à Froid (CIPF)

ENVIRONMENT

An innovation in this field has been the substitution of pickling by shotblasting in the descaling of raw material. This has eliminated problems of discharging acid pickling tank contents into local waterways. This industry has no major problems of acoustic pollution.

Cold rolling of steel strip NACE (Revision 1) 27.32

INDUSTRY PROFILE

Manufacturing process

Cold rolling of steel strip is a process in which pickled flat hot rolled steel products are rerolled between polished rolls. The dimensions of the finished product are less than 600 mm in width and 0.025 mm up to 12.5 mm in wall thickness.

In the thickness range of 0.3 mm up to 3 mm, other flat cold rolled steel products can be obtained by slitting coils of wide cold rolled sheet manufactured by the primary steel industry. This operation is done either by the primary steel industry itself or by steel products service centres.

Rerolling gives a higher quality product with consistent dimensional and internal characteristics. The equipment used to roll, anneal, slit, and heat treat cold rolled steel strip is highly capable of producing an unique product when compared to large cold rolled sheets found in all integrated steel plants throughout the world.

The specialised rolling mills and processing equipment used allows the product to meet all the different requirements of individual customers; mainly close tolerances, special forming capabilities and special finishes (surfaces, edges, coatings, for instance) which are not possible for the primary steel industry.

Products manufactured

The subsector manufactures the following products: steel strip of a carbon content up to 1.25%, including as-rolled or blue strip for packaging; steel strip coated with zinc, tin, lead, copper, nickel or with paint, varnish or plastic, printed on request; cladded steel strip; heat treated or hardened and tempered steel strip and other alloy steel strip, but excludes stainless steel strip, tinplate (including black plate) and magnetic steel strip.

Recent trends

Production has increased by 14.2% in 1994 and 3.3% in 1995. Extra-EU exports have been decreasing from 1989 until 1993. There was an increase in 1994 of 10% and 9% in 1995. Extra-EU imports in 1995 were the highest since 1988. As for the trade balance, it decreased continuously since 1988 and was negative in 1995.

Foreign trade

Concerning the destination of extra-EU exports, the share of East Europe in 1994 was 10%, against 4% in 1988. The share of the former Soviet Union fell to 1% from 14% in 1988. The share of the USA was 16% against 9% in 1988, while the share of the EFTA countries remained static with a 40% share.

The EFTA share of extra-EU imports fell from 75% in 1988 to 58% in 1994, whilst the East Europe share increased from 7% to 19%, the Russian share climbed up to 17% in 1994 from zero in 1988.

MARKET FORCES

Demand

Cold rolled steel strip is used for the manufacture of automotive components, hardware, office equipment, fasteners, bearings, chains, tubes and many other products, whenever a high quality basic material is compulsory.

The most important consuming sector is the manufacture of motor vehicles, which accounts for more than half of the demand.

Supply and competition

Employment decreased by 1.8 thousand workers between 1988 and 1995; nevertheless, labour productivity has decreased by 14.3% between 1989 and 1993. It increased by 14.9% in 1994 and 7.7% in 1995. Capacity was around 4.3 million tonnes compared to a production of 3.1 million tonnes in 1995.

Intra-EU imports were 1 280 thousand tonnes in 1995, compared to 984 thousand tonnes in 1988.

There has been a continuous increase in extra-EU imports since 1989, except in 1993. In 1994, the increase was of 35% and 40.2% in 1995. For 1995, the level was almost three times the 1988 level, due mainly to Russia with around 200 thousand tonnes and East Europe with 90 thousand tonnes.

Imports in 1994 were 108 thousand tonnes from Austria, 57 thousand tonnes from Sweden, 60 thousand tonnes from Russia, 68 thousand tonnes from East Europe including 42 thousand tonnes from Slovakia and 21 thousand tonnes from the Czech Republic.

Technological progress

In the 1960s, an important technological innovation was brought on by the multicylinder rolling mills and particularly the so-called Sendzimir mill, which allowed rolling of wall thicknesses under 0.20 mm and as low as 0.025 mm. Since then numerous technological innovations have been made, e.g. the introduction of computers in the processing lines which keep gauge, mechanical properties and rolling speed under much stricter control.

INDUSTRY STRUCTURE

Companies

The number of companies declined from 166 in 1989 to 141 in 1995: 61 in Germany, 22 in Italy, 16 in the United Kingdom, 15 in Belgium/Luxembourg, 13 in France, 10 in Spain, 2 in Greece, 1 in Portugal, and 1 in the Netherlands.

ENVIRONMENT

Pickling installations have disappeared from the factories in many cases because coils ordered from the primary steel industry are delivered pickled and protected. In the coating installations, it is necessary to aspirate fume especially when strip receives a metallic coating. Today, fume aspiration is also necessary for annealing processes. As for acoustic pollution problems, cold rolling mills are not noisy except when processing the coil in the rolling mill.

Cold forming of steel flat products NACE (Revision 1) 27.33

INDUSTRY PROFILE

Manufacturing process

Cold forming is the manufacture of open sections of steel by progressive forming on a mill or bending on a press of hot rolled descaled flat products of steel or cold rolled coated flat steel products. Cold forming is a continuous process which allows the manufacture of large quantities of simple or complex forms. Cold bending is generally used to obtain sections of simple forms in small quantities. Compared to the simple form sections produced on the hot mill, cold formed sections are more accurate in size.

Products manufactured

The subsector covers two production areas:

- Long sections: standard sections such as L,C,U, Omega and Z and products for specific uses of complex form according to the requirements of individual customers;
- Wide sections for building purposes coated with zinc, paint, varnish or plastic, such as sandwich panels and profiled sheets.

All these products are mainly comprised of non alloy steel with a content of carbon up to 0.25%, but can also be of stainless or of other alloy steel.

Recent trends

Production of long sections increased year after year since 1988, except in 1993. In 1994, it increased by 7.7% and by 2% in 1995. Apparent consumption followed a similar pattern. Extra-EU exports have increased in 1994 and in 1995. Extra-EU imports are generally higher than exports for long sections. They have increased since 1988, except a drop in 1993.

For wide sections, production has decreased since 1992 as well as apparent consumption, but 1995 was 9.2% over 1994. Extra-EU exports are much higher than imports for these sections. Their main destination is EFTA countries.

Foreign trade

Extra-EU exports and imports are less important for this subsector than for the other classes of First processing of steel. For the total of the subsector's 27.33 exports, the share of EFTA countries was 49% in 1994, down from 61% in 1988. The East European share grew from zero in 1988 to 21% in 1994.

The EFTA share of EU imports was similar comparing 1988 with 1994 at 47%. The East European share which was of 14% in 1988 reached 40% in 1994, while the South African share fell from 13% down to 4%.

MARKET FORCES

Demand

Cold formed sections are used by sectors such as building, civil engineering and transport equipment, mainly for safety barriers for highways, sheet piling and manufacture of trucks, railway rolling stock and furniture.

A fact of increasing importance is backward integration by certain users who at present produce the sections they need themselves. A ready example of this development is seen in the storage equipment sector.

Supply and competition

Employment decreased by 1.4 thousand workers between 1988 and 1995. Labour productivity has been constantly improving since 1988, except in 1990.

The total of intra-EU imports which was 167 thousand tonnes in 1988 climbed up to 263 thousand tonnes in 1992. They were 197 thousand tonnes in 1993, 185 thousand tonnes in 1994, and 200 thousand tonnes in 1995. Extra-EU imports have been increasing from 1988 to 1992. They decreased by 26.6% in 1993 but increased by 32.6% in 1994 and by 16.4% in 1995. For EFTA countries, they increased from 35 thousand tonnes in 1988 up to 58 thousand tonnes in 1994 including 34 thousand tonnes from Austria and 17 thousand tonnes from Switzerland. For East Europe, EU imports were of 11 thousand tonnes in 1988. They more or less doubled in 1989 and 1990 and were five times higher in 1991, 1992 and 1994 with 50 thousand tonnes each year, but fell to 29 thousand tonnes in 1993. In 1994, there were 27 thousand tonnes from Poland, 11 thousand tonnes from Hungary, 9 thousand tonnes from the Czech Republic. Among the remaining countries, there were 9 thousand tonnes from SloveniIn 1995 imports from East Europe were around 80 thousand tonnes, including 45 thousand tonnes from Poland.

Technological progress

One of the main technological innovations has been the automatic machining of forming rolls. The automatic conditioning of products before shipment is also to be mentioned.

INDUSTRY STRUCTURE

Companies

For the long section, the number of companies declined from 138 in 1988 to 128 in 1995. In 1995, the number of companies for wide sections (profiled sheet only) was 95 giving a total of 223 for all sections: 43 in Germany, 42 in Spain, 35 in Italy, 37 in the United Kingdom, 28 in France, 9 in Belgium/Luxembourg, 9 in Ireland, 8 in the Netherlands, 5 in Denmark, 4 in Portugal, and 3 in Greece.

ENVIRONMENT

Pickling installations have disappeared from the factories because coils ordered by the steel industry are delivered pickled and protected. Previously used acid waters were rejected from the pickling tanks in the rivers or the lakes. This industry does not produce acoustic pollution, except when processing the coil in the forming mill.

Cold drawing of steel wire NACE (Revision 1) 27.34

INDUSTRY PROFILE

Manufacturing process

Wire drawing is an operation which consists of cold stretching hot rolled wire rod, through a die, with a form corresponding to the cross-section of the finished product. The mechanical properties of the hot raw material must be appropriate in order to have sufficient ductility to pull it through the die. After this operation, the hardness and tensile strength of the wire becomes higher and may require an annealing after drawing. For certain uses a patentage heat treatment is required. The finished products have tight tolerances, accurate mechanical properties and a smooth surface. Their cross-section may be circular, flat with rounded edges, rectangular, hexagonal, triangular, oval, semi-circular etc.

Products manufactured

Wire is manufactured in the different grades of steel: mild steel with a carbon content up to 0.25% and hard steel with a carbon content of over 0.25%, stainless and other alloy steel. Non-alloy steel wire is delivered uncoated or coated with zinc, copper, tin, nickel, chrome, plastic or varnish.

Recent trends

Production has been increasing from 1988 to 1990, it then decreased until 1993. In 1994, it was 10.2% over 1993, but 1995 was 2.9% under 1994. Apparent consumption increased steadily from 1988 up to 1994, except in 1993. The 1994 level was up 11.6% over 1993, but it increased only slightly in 1995.

Extra-EU exports have decreased from 1989 to 1992. In 1993, they increased by 15.3% and by 8% in 1994 due to strong shipments to the USA and to Far East countries and Oceania. They decreased by 3.7% in 1995. Extra-EU imports decreased from 1989 up to 1993 but increased by 27.4% in 1994 and by 42.6% in 1995 due to East Europe and to the countries of the former Soviet Union. As a consequence, the trade balance improved strongly in 1993 while it had been decreasing since 1988. In 1994, the decrease was by 14.1% under 1993. In 1995 it dropped strongly due to increased imports.

Foreign trade

The US share of extra-EU exports fell to 17% in 1994 from 24% in 1988. The share of Far East and Oceania was more than double with 15.1% in 1994 after 6% in 1988. The EFTA share and East Europe shares were similar with 30% and 5% respectively.

As for imports, the share of EFTA countries fell to 31% in 1994 from 35% in 1988, the share of the former Soviet Union was of 20% in 1994 up from 2% in 1988, the share of Japan was 6% in 1994 from 1% in 1988.

MARKET FORCES

Demand

Drawn steel wire is the raw material used for the manufacture of wire products such as strand and ropes, heavy welded mesh, plaited bands; barbed wire, wire fencing, grill, netting; welded link chains, hooks, springs, nails, etc.

These products are used in the construction of buildings and by civil engineering branches, for the manufacture of motor vehicles, machinery, fasteners, screw machine products, chains and springs, furniture, agricultural machines and telecommunication equipment.

Supply and competition

Employment decreased by 7 thousand workers between 1988 and 1995. Labour productivity has been improving year after year, except in 1993. It increased by 13.1% in 1994, but decreased in 1995.

Intra-EU imports increased constantly since 1988 growing from 934 thousand tonnes to 1 102 thousand tonnes in 1994 but with a drop down to 811 thousand tonnes in 1993, and 1 160 thousand tonnes in 1995.

As for extra-EU imports, the main competitors in 1994 were EFTA countries with 117 thousand tonnes including 50 thousand tonnes from Austria, 37 thousand tonnes from Sweden and 22 thousand tonnes from Switzerland, East Europe with 129 thousand tonnes including 85 thousand tonnes from the Czech Republic, 20 thousand tonnes from Slovakia and 13 thousand tonnes from Poland. For the remaining countries, there were 28 thousand tonnes from the Ukraine, 19 thousand tonnes from Lettonia, 18 thousand tonnes from Russia and 19 thousand tonnes from Japan. In 1995 the main competition was East Europe with around 200 thousand tonnes including 105 thousand tonnes from the Czech Republic, Russia with 50 thousand tonnes and the Ukraine with 60 thousand tonnes.

Technological progress

What is said about cold drawing (subsector 27.31) on the introduction of computer-aided manufacturing techniques in the production lines can be applied to wire drawing.

INDUSTRY STRUCTURE

Companies

The number of companies declined from 288 in 1988 to 253 in 1995: 105 in Italy, 56 in Germany, 38 in Spain, 23 in France, 20 in the United Kingdom , 5 in Benelux, 2 in Greece, 2 in Denmark, and 2 in Portugal.

Strategies

A number of mergers and restructures have taken place since 1988, especially in and among major steel producing group subsidiaries. Besides these efforts to improve productivity, a tendency to rationalise and specialise production has been spreading among the main European wire-drawing companies concerned.

ENVIRONMENT

Pickling installations have disappeared from most factories because the hot rolled wire ordered to the steel industry is delivered pickled and protected. In the coating installation, it is necessary to use fume extractors especially when applying metallic coatings.

Written by: Bernard Champin

The industry is represented at the EU level by the following organisations: European Bright Steel Association (EBA). Address: 2, rue de Logelbach , F-75017 Paris; tel: (33 1) 47 54 94 27; fax: (33 1) 47 54 94 28; and Comité International d'Etude du Laminage à Froid du Feuillard d'Acier (CIELFFA) Address: 2, rue de Logelbach, F-75017 Paris; tel: (33 1) 42 12 70 70; fax: (33 1) 47 54 94 45; and Comité International du Profilage à Froid (CIPF) and European Profiles and Panels Producers Federation (EPPF). Address: 2, rue de Logelbach, F-75017 Paris; tel: (33 1) 42 12 70 75; fax (33 1) 47 54 94 45; and Comité Européen de la Tréfilerie. Address: 2, rue de Logelbach, F-75017 Paris; tel: (33 1) 47 54 94 27; fax: (33 1) 47 54 94 28.

Ferro-alloys
NACE (Revision 1) 27.35

The economic recovery of 1994-1995 has given the European ferro-alloy industry the opportunity and the means to continue its restructuring programmes. Slightly fairer foreign competition will allow it to benefit from its position as the largest world market for ferro-alloys.

INDUSTRY PROFILE

Description of the sector

The ferro-alloy sector in the EU covers the production of various metal alloys, generally from electric arc furnaces by carbothermic reduction of metallic oxides.

The two main product categories are bulk ferro-alloys and special products. Bulk ferro-alloys include ferro-silicon, ferro-manganese, ferro-chromium, and ferro-silico-manganese, all of which are consumed in large quantities. The special products category includes ferro-titanium, ferro-vanadium, ferro-boron, ferro-molybdenum, ferro-niobium, ferro-phosphorus, and ferro-tungsten, as well as metals such as silicon, magnesium, vanadium, chromium, and other derivatives which are consumed in much smaller volumes.

A characteristic of ferro-alloys is that they are upstream of the production of other metal alloys, mainly steel and cast iron, and to a lesser degree aluminium, zinc, lead, etc. They enable alloying elements to be safely and economically introduced into metallurgical processes, thus giving certain desirable properties to these alloys.

Bulk ferro-alloys are used almost exclusively in steel making and steel or iron foundries. Advances in metallurgy and increases in yield due to the growing use of continuous casting have contributed to limiting the consumption of bulk alloys. This trend, which has now slowed down, is counter-balanced by the growing proportion of steels using ferro-alloys, especially stainless steels, manufactured in electric furnaces.

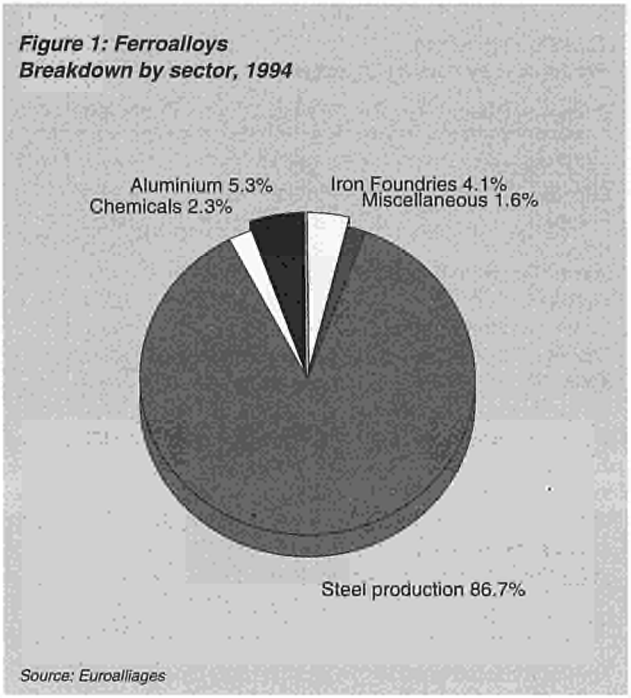
The uses of special ferro-alloys are far more varied, and the proportion used in steel making has diminished over recent years in favour of those used in the aluminium and chemical industries, especially silicon products.

Recent trends

Consumption of ferro-alloys, which is closely dependant on iron and steel production, was at 3.5 million tonnes in 1990. However the recession experienced by the EU caused the consumption to decrease to 3.1 million tonnes in 1991. From 1993 onwards, economic recovery has pushed apparent consumption back up, reaching more than 4.1 million tonnes in 1995. The reduced growth of 1996 coupled with stocks built in 1994-1995 should lead to slightly reduced apparent consumption in 1996 and moderate growth for the years 1997-1998.

This increase in demand has been met by a growing proportion of imports, at first from the newly industrialised countries and, in recent years, from the countries of East Europe and the CIS. The rapidity of growth in the latter imports has radically changed the EU's supply structure. It has become evident, however, that this penetration has been based on economically unrealistic price practices, which have been penalised by anti-dumping duties, leading to a lesser growth of imports. However, the decisions to decrease output made during the recent difficult years mean that imports will continue to grow during the next years.

Figure 1: Ferroalloys Breakdown by sector, 1994



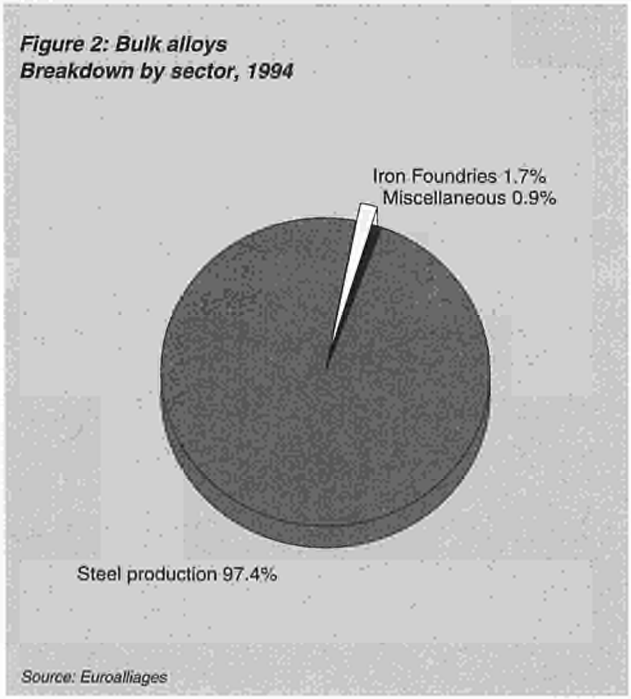
Source: Euroalliages

Output in the EU has been adversely affected by the repercussions of this penetration and has had to be adjusted downwards, especially in the case of bulk alloys. The number of bulk alloy production locations is decreasing, to the benefit of more productive plants. However, due to the very high apparent consumption in 1994-1995, output has increased again and employment has stabilised.

International comparison

In the EU, the United States and Japan, the output of ferro-alloys, traditionally associated with the production of iron and steel, has tended to decline, while domestic consumption is increasingly provided for by imports. This movement has been more noticeable in the EU than in its trading partners, owing to the opening-up of its markets and the geographical proximity of the new exporting countries (especially the CIS). Furthermore, with the EU being the cradle of world production

Figure 2: Bulk alloys Breakdown by sector, 1994



Source: Euroalliages

Table 1: Ferroalloys
Production by country in volume

(thousand tonnes)	1990	1991	1992	1993	1994	1995
Deutschland	333.7	207.5	238.7	173.6	57.4	54.8
España	165.6	129.3	82.0	123.3	153.4	193.9
France	623.5	502.3	569.8	552.8	643.0	711.0
Italia	248.1	204.5	208.3	180.6	157.7	210.3
Suomi/Finland	155.5	190.0	187.1	218.4	229.0	232.3
Sverige	136.4	136.4	151.6	146.1	152.7	154.1
United Kingdom	161.7	195.2	150.3	110.0	12.5	14.5
Others	99.1	49.7	40.0	20.2	25.4	36.7
Total	1 662.9	1 370.0	1 437.6	1 394.8	1 393.2	1 556.5

Source: Euroalliages

Table 2: Ferroalloys
Main indicators in volume, EUR15

(thousand tonnes)	1990	1991	1992	1993	1994	1995
Apparent consumption	3 570	3 120	3 464	3 493	4 000	3 793
Production	1 924	1 615	1 628	1 525	1 431	1 608
Trade balance	-1 646	-1 505	-1 836	-1 968	-2 569	-2 185
Employment (units)	8 298	7 749	6 803	6 475	5 036	5 031

Source: Euroalliages

Table 3: Bulk alloys
Main indicators in volume, EUR15

(thousand tonnes)	1990	1991	1992	1993	1994	1995
	3 079	2 681	3 034	3 081	3 439	3 285
Apparent consumption	1 670	1 396	1 418	1 336	1 224	1 375
Trade balance	-1 410	-1 285	-1 617	-1 745	-2 216	-1 909

Source: Euroalliages

Table 4: Special alloys
Main indicators in volume, EUR15

(thousand tonnes)	1990	1991	1992	1993	1994	1995
Apparent consumption	490.8	439.3	429.7	412.3	560.8	508.2
Production	254.0	218.5	210.1	188.9	207.5	232.3
Trade balance	-236.8	-220.8	-219.6	-223.4	-353.3	-275.9

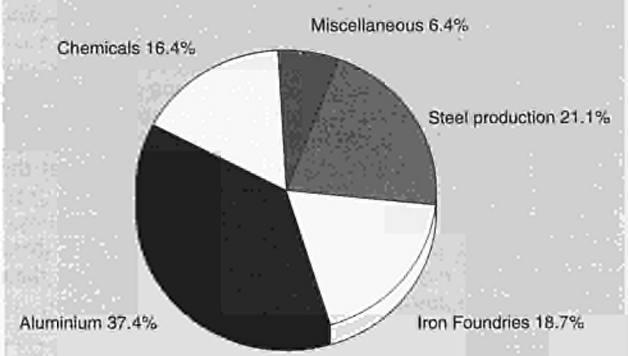
Source: Euroalliages

Table 5: Ferroalloys
Extra-EU trade by category

(million ECU)	1988	1989	1990	1991	1992	1993	1994
Bulk alloys							
Exports	117.7	158.0	116.3	122.8	92.2	94.3	88.2
Imports	746.6	1104.9	738.5	741.8	771.0	812.1	1060.1
Trade balance	-628.9	-946.9	-622.2	-619.0	-678.8	-717.7	-971.9
Special alloys							
Exports	191.8	200.1	153.2	132.1	118.5	133.4	148.1
Imports	417.5	559.7	414.1	344.6	349.4	347.5	544.7
Trade balance	-225.6	-359.6	-261.0	-212.5	-230.9	-214.1	-396.6

Source: Eurostat

Figure 3: Special alloys
Breakdown by sector, 1994



Source: Euroalliages

of ferro-alloys, it has always had a considerably higher level of export activity than the United States or Japan. This activity is currently faced with heightened international competition and is tending to decrease as time goes by.

Domestic producers in the EU, the United States, and even in Japan, have reacted to the growth of imports at excessively low prices by lodging anti-dumping complaints with the competent authorities. In particular, these complaints have been aimed at countries which formerly had state trading systems. Investigations have led, in most cases, to severe anti-dumping duties, highlighting the unfair nature of some of these exports.

Foreign trade

EU exports consist mainly (63% by value in 1994) of the so-called special alloys, which are more difficult to produce, for which the consumers' quality requirements are higher and whose unit prices are higher. However, this leads to specialisation with greater value added for EU industry products. Special alloys exports go mainly to the industrialised countries whose export share is over 90%.

Conversely, exports of bulk alloys to destinations outside the EU are tending to disappear as the world market is increasingly dominated by imports of low-priced products either from the newly industrialised countries or from countries which formerly had state trading systems. However, due to the 1994-1995 recovery and the much higher prices for ferro-alloys world-wide, the value of the EU exports increased considerably during the recent period.

The record levels of consumption reached in 1994-1995 in the EU 15 itself led to record levels of imports as well, both in bulk and special alloys. As in previous years, Norway was the largest supplier of the EU 15, along with South Africa, although a number of other countries are now supplying the EU on a regular basis. Therefore, this trend, coupled with anti-dumping measures imposed on imports originating in CIS countries, has limited the share of the EU market held by former non-market economy countries and allowed domestic producers to stabilise or even increase their market share.

MARKET FORCES

Demand

Overall demand for ferro-alloys is connected with the trends of its main markets (i.e. iron, steel and aluminium) and is affected by the cyclical nature of their activities. However, there are also significant variations between the market sectors.

Iron and steel production and iron foundry activity

Almost all bulk alloys and 40% of special alloys are consumed by the iron and steel industry, (within which a distinction must be made between oxygen steel-making and electrical steel-making) and iron foundry activity. The demand for iron foundry activity differs both in terms of types of product and specific consumption.

Oxygen steel-making accounts for 65.1% of the EU's steel output, but its share in the total is slowly declining. The most considerable advances in productivity have been achieved through continuous casting in recent years. The specific consumption of ferro-alloys has steadily declined (less than 10 kg per tonne of steel at present).

The steady increase of the share of electrical steel-making is another factor leading to a decline in the specific consumption of ferro-alloys. However, the increase in the share of high-alloy steels, especially stainless steels, has more than counterbalanced the decline in specific consumption. Demand for ferro-alloys has increased in this market segment.

Iron foundry activity consumes a large proportion of the special alloys and consumption has been more or less stable.

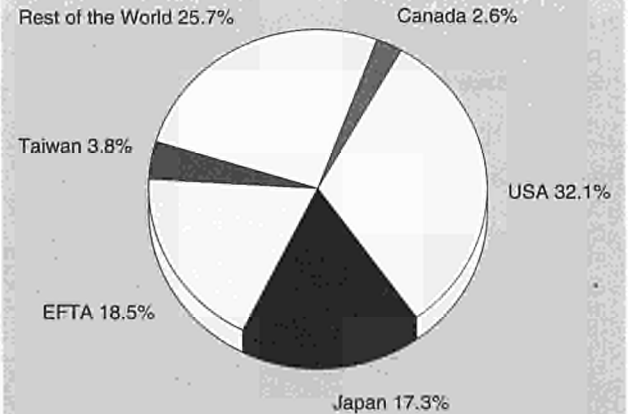
Aluminium

Ranking second as a customer for ferro-alloys (with only 5.3% of the total), the aluminium industry is primarily a consumer of special alloys, such as silicon metal and magnesium metal. In special alloys aluminium represents the first consuming sector with 37% of the market and its demand contributed heavily to the improvement of the silicon and magnesium markets in 1994-1995.

Chemical industry

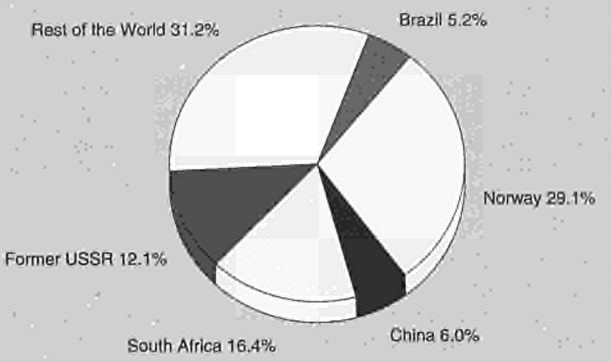
This industry mainly consumes silicon metal, which is the raw material of silicon chemistry. The prospects for this sector are considered very favourable and silicon production should benefit from the situation during the next few years.

Figure 4: Ferroalloys
Destination of EU exports



Source: Eurostat

Figure 5: Ferroalloys
Origin of EU imports



Source: Eurostat

Supply and competition

The EU ferro-alloys industry has been faced with a stagnation of its market for the last ten years. Long term growth has been practically zero, due to the stagnation of the steel production in West Europe on the one hand, and the decreasing specific consumption in some applications on the other hand. Furthermore, the cyclical variations in demand have led to cyclical variations in prices, accentuated by external competition. In order to adapt supply to market trends and competition, EU producers have undertaken very thorough restructuring programmes. During the beginning of the 1990s, 25% of the plants were closed in order to concentrate production in the most productive ones and employment was drastically reduced.

The last ferro-alloy production facility (mainly high carbon ferro-manganese) still operated by the steel industry was stopped and a larger part of the capacity is operated by companies with interests in the mining industry.

In order to influence the most important cost factor, energy, the sector introduced, among other things, flexible management systems, such as winter stoppages, in order adapt operations to the constraints of a competitive energy supply situation. Despite these measures and the 1994-1995 recovery, countries outside the EU continued to increase capacity, although during the last year some positive evolution occurred. The increasing energy prices in countries outside the EU and the awareness that unfair commercial practices were no longer tolerated led many producers to seek market acceptance through quality and service rather than dumping.

Table 6: Ferroalloys
Extra-EU trade by Member State, 1994

(million ECU)	Exports	Imports
Belgique/België, Luxembourg	4.1	135.1
Danmark	0.0	22.7
Deutschland	112.6	479.1
Ellada	1.8	3.3
España	6.7	80.5
France	43.2	146.2
Ireland	0.2	4.1
Italia	15.6	205.6
Nederland	12.2	305.0
Portugal	0.1	2.0
United Kingdom	39.7	221.2
EUR12	236.3	1 604.8

Source: Eurostat

INDUSTRY STRUCTURE

Companies

Thirty-two firms are engaged in the production of ferro-alloys in the EU. Some firms are subsidiaries of major industrial groups, such as VIAG in Germany and PECHINEY in France, but they represent only a relatively small proportion of the group's activity. Many, on the other hand, are small firms concentrating on the production of a range of ferro-alloys, or merely on a single, very specialised product. All these European firms pay special attention to the quality of their products and to customer service.

ENVIRONMENT

Production of ferro-alloys generally involves the use of open electrical furnaces into which natural products (e.g. quartz, lime, various ores, wood) with relatively fluctuating physical compositions are loaded.

The European industry has endeavoured to reduce emissions of dust by installing filtration equipment in its factories, and to recycle the by-products of what it produces to the greatest possible extent. The concentration movement of the last ten years has accelerated this process by making it possible to build larger furnaces with higher yields and emissions which can be more easily controlled than those from a multiplicity of small furnaces. These measures, however, are extremely expensive. At present, the EU industry devotes a quarter of its investment capital to installations for protecting the environment, thus responding fully to the EU's priorities.

The ferro-alloys industry, whose basic tool is an electric furnace in which metal oxides are reduced by carbon, is a major consumer of energy and a producer of carbon dioxide (CO_2). It has, therefore, always regarded reduction of energy consumption as a vital priority. Further progress in this field is limited by the laws of thermodynamics, which govern the reactions used. The increase in the size of the furnaces has already pushed up yields to very high levels. Thus the imposition of a tax on energy consumption and/or emissions of CO_2 could not act as an incentive, but this tax would have a direct and intolerable effect on the competitiveness of European producers and would give free rein to less efficient competitors in countries where awareness of ecological considerations is still to come.

OUTLOOK

After difficult years of recession, 1994 and 1995, despite some disappointment at the end of the latter year, were a relatively favourable period for the ferro-alloy industry in the EU. Better prices and larger volumes gave producers the breathing space to continue their restructuring programmes in a more relaxed way. Although some third countries are still not fully committed to fair commercial practices, it can be expected that many will not fall back into previous unacceptable practices should the economic situation be less optimistic than forecasts. Therefore, the EU ferro-alloy industry depends largely on the health of its EU consumers, and mainly the steel industry, to warrant its future development.

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Casting of metals
NACE (Revision 1) 27.5

The EU is one of the world's largest producers of castings with an annual output valued at about ECU 20 bn. The greater part of this output is supplied as components to the motor and machinery manufacturing industries. The structure of the foundry industry is based on small and medium-sized enterprises. Many foundries are part of a larger company and produce castings for internal requirements. The substantial fall in employment while output has largely remained constant clearly shows the rise in labour productivity over the past ten years. The EU's trade balance currently shows a surplus. Until 1992, however, imports rose faster than exports, thereby showing a deficit. It was not until 1993 that the trend reversed itself and the trade balance began showing a surplus.

INDUSTRY PROFILE

Description of the sector

Foundries are industrial subcontractors. The castings they produce are normally used as intermediate products in other industrial companies. End products made from castings are the exception rather than the rule.

Castings obtain their shape from metals being poured into a mould in the liquid state and solidifying as the liquid cools down. The designer is essentially free to choose any shape he wishes. This means that both the surface and the cavities can be very complex. Depending on whether the liquid metal is introduced into a mould corresponding to the desired product under the influence of gravity, centrifugal force or pressure, or depending on the technique used for making the mould, the following classifications apply: sand casting, shell moulding, gravity die casting, pressure die casting, centrifugal casting, continuous casting, investment casting, precision casting and art casting.

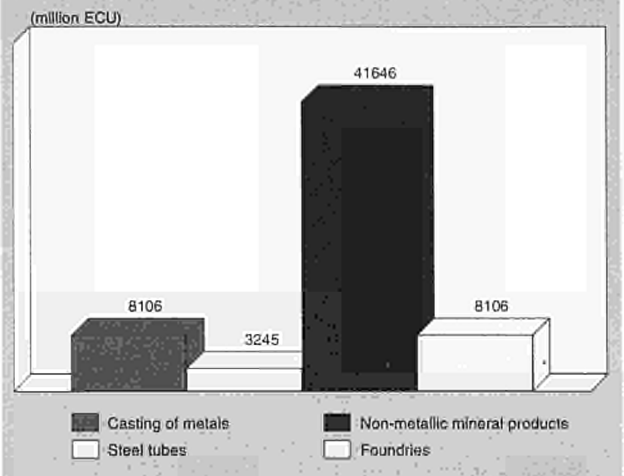
Another means of classification is by the materials used. Such a classification forms the basis of this study as well as of the NACE. In NACE code 27.5 (previously 3110) "foundry products", a distinction is made between the main types of materials, and is further elaborated by the NACE based PRODCOM classification system, which extends beyond the NACE four digit codes.

- 27.51 Casting of iron, with PRODCOM sub-classes:
- 27.51.11 Malleable castings;
- 27.51.12 Nodular cast iron;
- 27.51.13 Grey cast iron
- 27.52 Casting of steel
- 27.53 Casting of light metal, with PRODCOM sub-classes:
- 27.53.11 Aluminium pressure die casting;
- 27.53.22 Other casting of light metal
- 27.54 Casting of other non-ferrous metal, with PRODCOM sub-classes:
- 27.54.11 Zinc pressure die casting;
- 27.54.22 Other casting of non-ferrous metal.

Only those semi-finished products and miscellaneous cast products that are intended for sale are shown and recorded, in so far as they have been produced for third parties to the latter's specifications. Output intended for further processing (in house), so-called castings for own use, is not recorded any longer for statistical purposes. Finally, these NACE groups also do not include the manufacture of cast finished products, such as standard (catalogue) items, pipes, boilers, heaters or even cast household items. Most of these finished products are recorded in other sections of NACE and cannot be identified unequivocally as "castings". This applies, in particular, to cast metal products, although some finished products can be clearly identified. Specifically, these are:

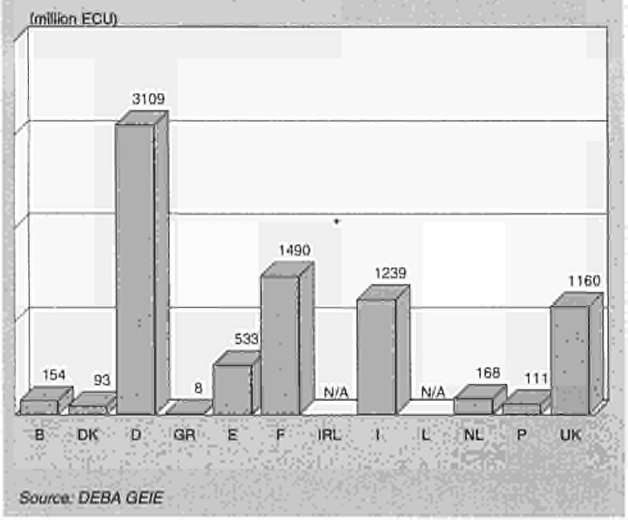
- 27.21.1 Cast iron tubes;
- 27.21.2 Tube shaping, closure and connecting parts in cast iron;
- 28.22.11.30 Parts for central heating systems (some of which are cast);
- 28.75.11.21 Bath tubs in cast iron, including enamelled;
- 28.75.12.13 Other household items in cast iron, enamelled;
- 28.75.27.13 Climbing irons for drains;
- 28.75.27.15 Grinding spherules in iron or steel, cast;
- 28.75.27.17 Other products in iron or steel, cast;

Figure 1: Casting of metals
Value added in comparison with related industries, 1994



Source: DEBA GEIE

Figure 2: Casting of metals
Value added by Member State, 1994



Source: DEBA GEIE

Table 1: Casting of metals
Main indicators in current prices (1)

(million ECU)	1985	1990	1991	1992	1993	1994	1995 (2)	1995 (3)	1996 (4)	1997 (4)	1998 (4)
Apparent consumption	14 708.1	19 926.0	19 280.8	18 754.2	16 020.4	17 537.2	20 104.0	21 310.0	21 500.0	22 600.0	23 800.0
Production	15 228.7	20 379.2	19 671.7	19 120.5	16 483.6	18 031.8	20 617.0	21 854.0	22 100.0	23 200.0	24 300.0
Extra-EU exports	925.6	959.8	976.3	991.0	1 075.1	1 203.5	1 274.7	1 195.1	1 220.0	1 250.0	1 260.0
Trade balance	520.6	453.2	390.9	366.3	463.2	494.6	512.3	490.7	520.0	530.0	535.0
Employment (thousands)	282.9	275.7	262.8	248.8	220.0	214.2	225.0	243.0	240.0	241.0	244.0

(1) Some country data for apparent consumption, production and employment have been estimated.
(2) DGV estimates.
(3) DGV estimates for EUR15.
(4) DGV forecasts for EUR15.
Source: DEBA GEIE, Eurostat

Table 2: Casting of metals
Average real annual growth rates (1)

(%)	1985-90	1990-94	1985-94	1993-94
Apparent consumption	2.7	-3.9	-0.3	10.0
Production	2.6	-3.8	-0.3	10.0
Extra-EU exports	-1.6	3.5	0.6	11.3
Extra-EU imports	1.1	4.1	2.4	11.4

(1) Some country data for apparent consumption and production have been estimated.
Source: DEBA GEIE, Eurostat

Table 3: Casting of metals
Breakdown of production by main European producers, 1994

(thousand tonnes)	D	E	F	I	UK
Ferrous metals	3 218	643	1 977	1 462	1 127
Gray iron	1 992	290	961	1 131	628
Ductile iron	1 058	289	880	248	412
Steel	168	64	136	83	87
Non ferrous metals	597	131	293	583	177
Cu-base	81	18	24	111	36
Al-base	438	93	229	397	106
Other non ferrous (1)	78	21	40	75	35
All castings	3 815	774	2 270	2 045	1 304

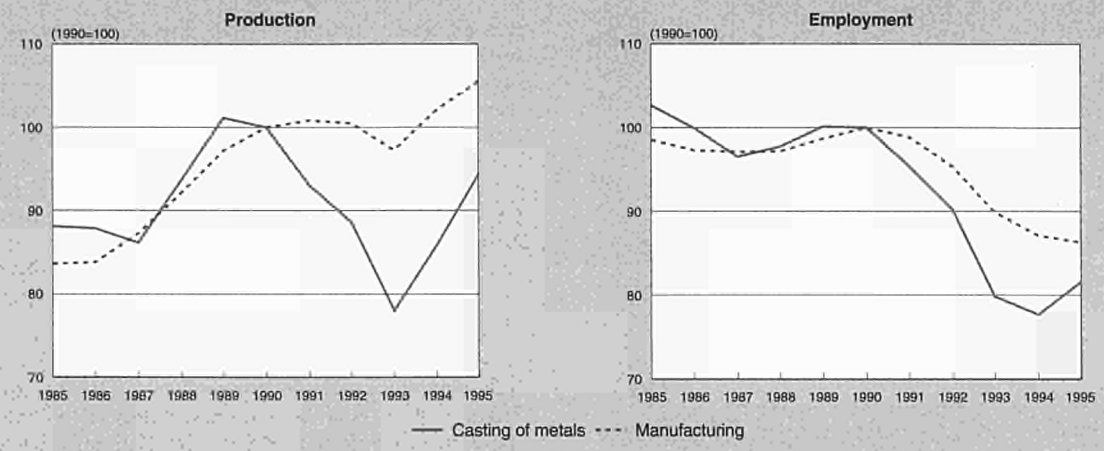
(1) DGV estimates for the United Kingdom.
Source: CAEF, Modern Casting , DGV

Table 4: Casting of metals
External trade in current prices

(million ECU)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 (1)	1995 (2)
Extra-EU exports	925.6	865.8	826.2	919.0	962.8	959.8	976.3	991.0	1 075.1	1 203.5	1 274.7	1 195.1
Extra-EU imports	405.0	341.3	353.3	388.1	450.7	506.6	585.3	624.7	611.8	709.0	762.5	704.4
Trade balance	520.6	524.5	472.9	531.0	512.1	453.2	390.9	366.3	463.2	494.6	512.2	490.7
Ratio exports / imports	2.3	2.5	2.3	2.4	2.1	1.9	1.7	1.6	1.8	1.7	1.7	1.7
Terms of trade index	105.3	108.7	110.3	105.4	101.9	100.0	98.7	99.2	94.6	91.5	N/A	N/A

(1) Eurostat estimates.
(2) Eurostat estimates for EUR15.
Source: Eurostat

Figure 3: Casting of metals
Production and employment compared to EU total manufacturing industry



1995 are For foundries, DGV estimates.
Source: DEBA GEIE, Eurostat

- 29.24.53.13 Rolls in iron or steel, cast, for calanders and rolling mills;
- 29.32.70.30 Other parts in iron, or steel, cast;
- 29.51.12.50 Rolls for metal rolling mills, cast, in iron or steel:

For each NACE category countless alloys exist, some of which are standardised. Many of them are specially developed to meet the customer's specific requirements. It is not uncommon for foundries to offer up to 200 different grades or alloys.

The availability of statistical data and their degree of detail varies widely between the individual EU countries. The recording of foreign trade is particularly unsatisfactory in every way. Many foundry products do not have a separate product number in the foreign trade statistics. They are lumped together with other products in the category "Various products". This is particularly true for the components supplied to the motor industry.

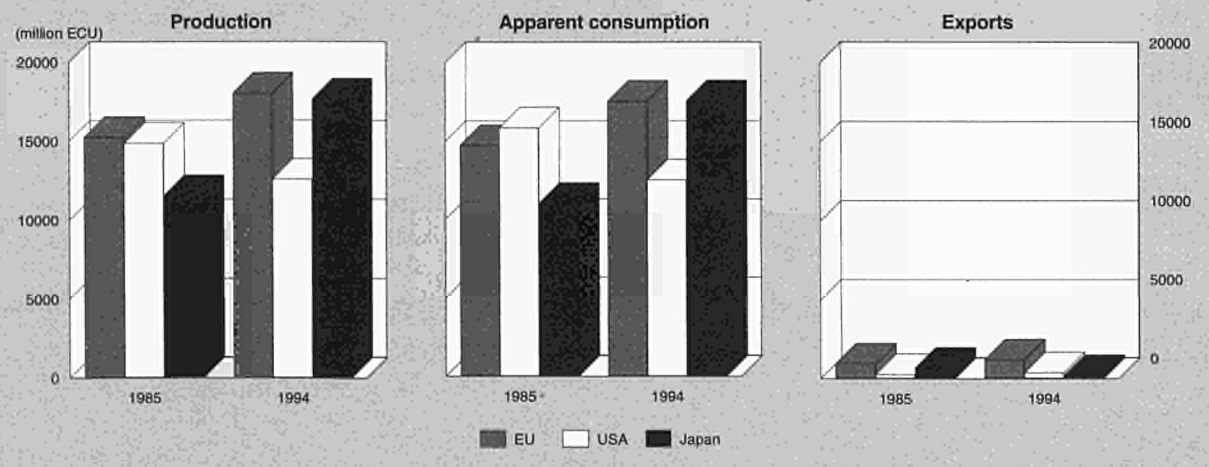
In the past, many foundries were established near coal mines or close to the iron and steel industry. That is, the foundry industry's sites were geared towards the raw materials. In the course of time, however, orientation towards the raw materials has been increasingly superseded by orientation towards the customers. That is, nowadays foundries chiefly operate in the places where their main customers, the motor and machinery manufacturing industries, are located.

Recent trends

As manufacturers of intermediate products and components, foundries depend, to a great extent, on the trend of business and their customers demand behaviour. For example, in the late eighties the strong growth in the motor and machinery manufacturing industries led to high rates of growth for foundries. On the other hand, the fall in demand for cars and machinery in the early nineties caused a sharp drop in foundry production - as much as 40% in some cases. Since 1994, production has been rising once again. This trend has continued in 1995 and should lead to the production levels that were reached in 1989. The revival of business brought an end to redundancies, although there has been very little recruitment of new employees. Since 1989 the European foundry industry has thus shed 50 000 jobs - about 20% of its former total.

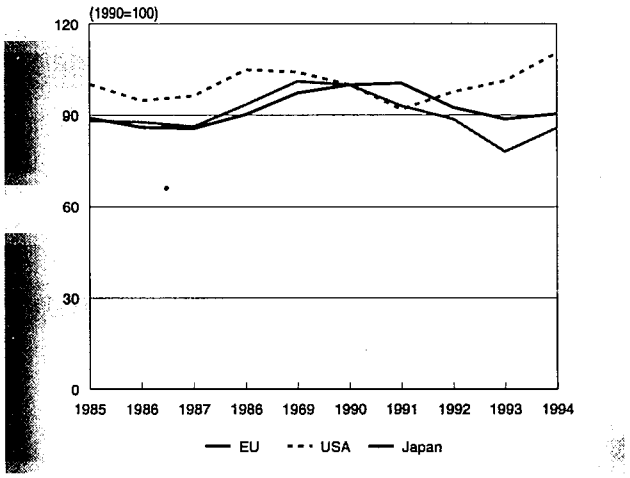
The extremely deep recession and the time lags inherent in all employment restructuring measures have obscured long-term trends for the time being. "Normally", in fact, value

Figure 4: Casting of metals
International comparison of main indicators in current prices



Source: DEBA GEIE, Eurostat

Figure 5: Casting of metals
International comparison of production in constant prices



Source: DEBA GEIE

added, measured in relation to a single employee, rises much faster than the volume produced. This documents the trend towards higher-quality castings. First, the share of non-ferrous metal castings in total output rose from 13.1% in 1985 to 17.1% in 1994. Second, the castings have become increasingly thin-walled, lighter and more complex to manufacture.

The EC's foreign trade balance is positive, but the surplus has been shrinking. As recently as 1985, 2.7 times as many castings were exported as were imported. In 1994, it was only 1.7 times as many. In regional terms, there is a relatively high degree of concentration within the EAbout 38% of the European foundry industry's value added is accounted for by Germany alone. Next comes France with 18%, Italy with 15%, the UK with 14% and Spain with 7%. Thus the five biggest producer countries account for 92% of total EC output. In the foundry industry, labour costs account for 50% of the prime cost. The sector's value added compared with the value of production is correspondingly high.

International comparison

It is extremely difficult to make precise statements about the order of precedence of the world's largest producers of castings. Only a few, rather vague, estimates are available about the Commonwealth of Independent States and the People's Republic of China. In the industrialised countries of the West too, there are very wide discrepancies in the figures, depending on what source is used. There are a couple of reasons for this. The high proportion of small and medium-sized enterprises output is not included in many industrial statistics because they have fewer than 20 employees. Secondly, the output intended for further processing in the same company, is also not included in some statistics.

With these caveats, it is nevertheless possible to state the following: the world's largest producer in 1994 was the United States with 13.3 million tonnes, followed by the People's Republic of China and the CIS with 11.6 million tonnes each. The EU (12 countries) was in fourth place with 10.7 million tonnes, and Japan came in fifth with 6.7 million tonnes.

With the accession of Austria, Sweden and Finland, the EU (15 countries) has caught up with the CIS and the People's Republic of China. In the period from 1992 to 1994 the three countries combined had an output representing only 5 to 6% of the EU total (12 countries). In 1995, however, they recorded growth rates well above the average for the EU countries (12); Finland was in the lead with a growth rate of over 30%.

Finally, the individual materials are of comparable importance in the three economic areas of the EU, USA and Japan. This applies, in particular, to the proportion of non-ferrous castings in total output. This is between 14 and 17% of the volume produced, or 30 to 35% of the value produced, and is expected to rise further in the years to come.

Foreign trade

Castings are tailor-made products specially produced for the customer according to his specifications. Furthermore, they have to meet increasingly exacting demands. These two factors

Table 5: Casting of metals
Breakdown of production by product line (1)

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Ferrous metals	9 452	9 070	8 786	9 374	9 900	9 683	9 535	8 912	8 089	8 903
Non ferrous metals	1 425	1 556	1 637	1 800	1 915	1 888	1 843	1 795	1 623	1 836
All castings	10 877	10 626	10 422	11 174	11 815	11 571	11 378	10 707	9 712	10 739
% ferrous metals	86.9	85.4	84.3	83.9	83.8	83.7	83.8	83.2	83.2	82.9
% non ferrous metals	13.1	14.6	15.7	16.1	16.2	16.3	16.2	16.8	16.8	17.1

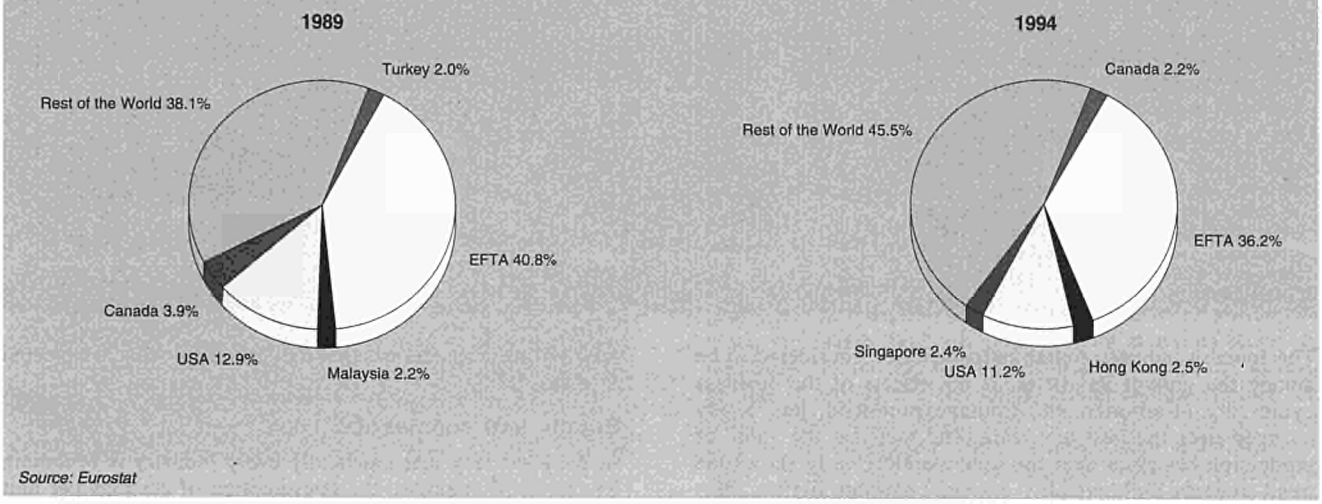
(1) Excluding Greece, Ireland and Luxembourg; from 1989 onwards including Denmark; from 1991 onwards, including East Germany.
Source: CAEF

Table 6: Foundries.
Major customer industries of gray and nodular iron, 1994

(%)	D	E	F	I(1)	UK
Pipes, fittings	11.6	16.3	30.0	26.9	25.4
Building, domestic	3.5	13.0	5.1	N/A	4.8
Ingot moulds, rolls	2.0	0.4	0.7	2.5	3.2
Machine building	27.2	21.6	14.8	30.3	22.4
Vehicle industry	44.1	26.8	34.9	35.6	25.5
Others	11.6	21.8	14.5	4.7	18.7

(1) Pipes and fittings include building and domestic.
Source: CAEF

Figure 6: Casting of metals
Destination of EU exports



Source: Eurostat

make close collaboration and communication necessary between the foundry and its customer. If the high weight per unit volume, and in some cases the high absolute weight as well, of the castings, and the difficulties in achieving just-in-time delivery of castings are taken into account, the scope for transporting (or even trading) these products over long distances is very limited. The importance of foreign trade is correspondingly low compared with other sectors. On average, for the five major EU countries, exports account for only 16% of the value of production in 1994. The share of imports in consumption amounts to just 11%. By far, the largest proportion of foreign trade takes place between neighbouring countries. These are the EU Member States, the EFTA countries and now also Poland and the Czech Republic.

With the incorporation into the EU of the neighbouring countries of Austria, Sweden and Finland, extra-EU trade, which was already insignificant, will shrink further. Deliveries to distant countries are an exception. They relate essentially to the delivery of components or spare parts for industrial plant construction and generally involve very high quality products.

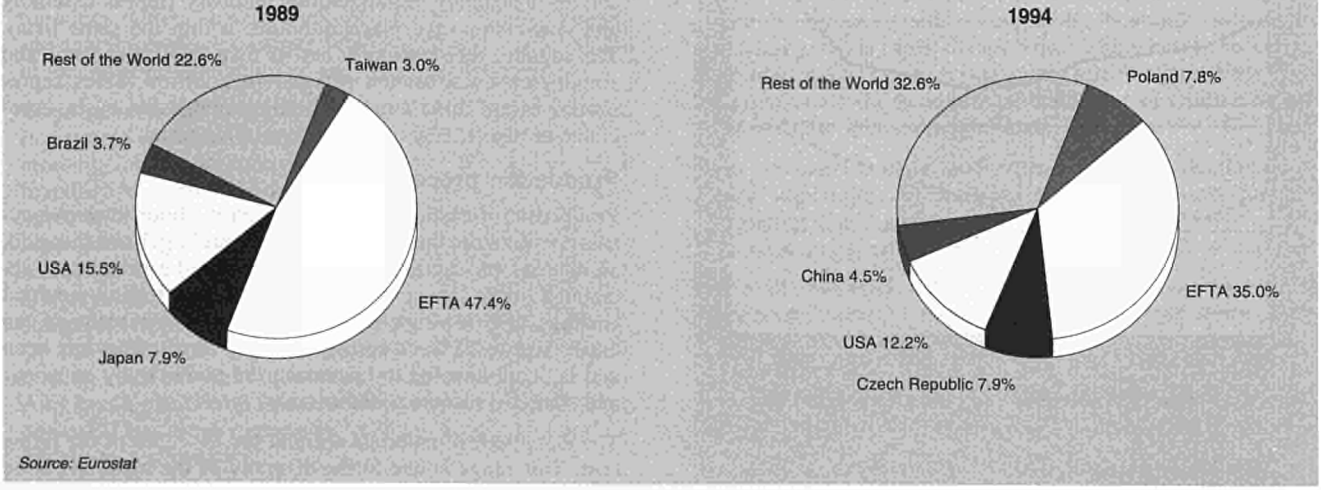
MARKET FORCES

Demand

The foundry industry's largest customer by far is the motor industry. Over 70% of the output of light alloy castings (mainly aluminium alloys) is accounted for by components for motor vehicles. In the case of cast ferrous metals, the share in the EU is about 35%, with Germany in the lead at 44.1%.

In second place is the machinery manufacturing industry. Due to the strong global position of the German machinery manufacturing and plant construction industry, deliveries of castings attain the greatest importance in absolute terms. In 1994, 0.8m tonnes of grey and nodular cast iron, 27.2% of all deliveries, were supplied to the machinery manufacturing industry. In the late eighties the figure was actually above 30%. Looking solely at the relative importance of the deliveries to the machinery manufacturing industry, the largest share in 1994 was in Italy at 30.3%. (Pressure) Pipes and fittings are the foundry industry's most important end products. Their significance is greatest in France, where they account for 30% of total grey and nodular cast iron production. However, their value (ECU/kg) is fairly low.

Figure 7: Casting of metals
Origin of EU imports



Source: Eurostat

Table 7: Casting of metals
Labour productivity, unit costs and gross operating rate (1)

(1990 = 100)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Labour productivity index (2)	85.9	87.9	89.3	95.8	101.0	100.0	97.6	98.3	97.7	110.4
Unit labour costs index (3)	88.1	91.2	93.5	91.6	92.8	100.0	109.1	112.7	115.0	103.5
Total unit costs index (4)	86.8	87.1	87.2	91.0	96.9	100.0	103.9	106.2	106.3	101.6
Gross operating rate (%) (5)	7.4	9.5	10.0	10.3	9.5	9.2	9.0	8.9	6.8	10.3

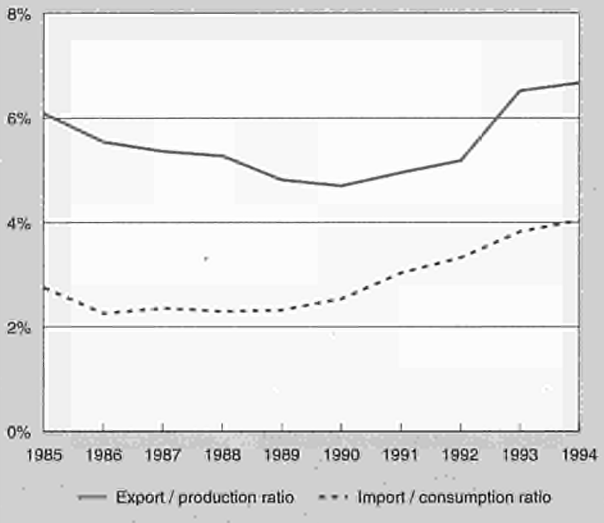
(1) Some country data has been estimated.
(2) Based on index of production / index of employment.
(3) Based on index of labour costs / index of production.
(4) Based on index of total costs (excluding costs of goods bought for resale) / index of production.
(5) Based on (value added - labour costs) / turnover.
Source: DEBA GEIE, Eurostat

The foundry industry cannot necessarily be considered to be among the growth industries. If the effects of the business cycles are eliminated, the tonnage produced, has barely changed over the past ten years. The fact that the value of production has risen over the same period clearly shows the trend towards higher-quality castings: towards lighter, thin-walled, complex components requiring many cores and towards lighter (especially aluminium-base) alloys.

Casting, as a primary shaping process, is in direct competition with sintering. However, of particular value in practical application are, first, the metal-forming processes: forging (hammer forging or drop forging), rolling, presswork, drawing and deep drawing and second, the joining techniques should be mentioned; these include welding, bonding, riveting and bolting.

Of far greater importance over the past few years, however, has been the competition between the various materials, and in this context between metals and plastics. The role of plastics in the manufacture of motor vehicles, household goods, pipes or couplings has grown significantly over the past few years at the expense of metals. The reasons which lead to the substitution of one material for another include: weight, tensile and compressive strength, resistance to wear, heat, rust or acid, ageing behaviour and, last but not least, price and recyclability. Mineral-based products, e.g. ceramics, or composite materials are likely to become more important in future. Whether they will find acceptance will mainly depend on their selling price and whether they can fulfil what is expected of them.

Figure 8: Casting of metals
Trade intensities



Source: DEBA GEIE, Eurostat

Supply and competition

In the same way that practically every industry is becoming less material-intensive, the consumption of castings per unit of production, (e.g. in the motor industry or the machinery manufacturing industry) is also falling. This means, first, that the growth rates of the foundry industry are below those of their most important customers and second, that the volume of output has declined significantly in the longer term, as a comparison of current production with the production volumes of 1970 or 1980. This means that the existing melting, moulding shop and fettling shop capacities are more than adequate to satisfy demand. This is resulting not only in cut-throat competition among the foundries but also in a weak market position in relation to their major customers. As a result, the foundry industry has little room for manoeuvre on prices and a relatively low return on sales.

International competitive tendering for public contracts within the EU and lower freight rates due to liberalisation in the transport sector have undoubtedly increased the foundries' room for manoeuvre. At the same time, though, this has shifted the (cut-throat) competition among the foundries still more from the national to the international plane. To ensure a level playing field for this competition, the pollution control regulations and the ancillary (non-wage) labour costs should be harmonised in particular.

The greater part of foundry production is delivered by the foundries direct to their customers. This is particularly true in the case of mass production for the motor industry, where even just-in-time deliveries are frequently agreed on the basis of long-term master contracts. In this case the selling costs, measured as a proportion of the cost of production, are relatively low. On the other hand, these costs are far higher in the case of single-piece production or short production runs for the machinery manufacturing industry (unless assembly and conversion take place in-house, within the same firm). The foundry then generally has its own field sales force and sometimes even branch offices. In addition, sales representatives are often employed on a commission basis, especially in distant regions and above all, abroad.

Production process

Production of castings remains a highly labour-intensive activity. Even when the production process is largely mechanised, as in mass production, the proportion of the prime cost accounted for by labour costs reaches 40%. With hand-moulded castings, (e.g. in single-piece production) this percentage can easily rise to 55%. A correspondingly large effort has been and is being devoted to increasing the productivity of labour and, thereby reducing labour costs.

The metallic raw materials account for 15 - 25% of the prime cost. This range is due to the diversity of the materials to be

Table 8: Casting of metals
Production specialisation (1)

(ratio)	1985	1994
Belgique/België	0.5	0.6
Danmark	0.6	0.6
Deutschland	1.3	1.1
Ellada	N/A	0.2
España	1.0	0.9
France	0.9	1.0
Ireland	N/A	N/A
Italia	1.1	1.2
Luxembourg	N/A	N/A
Nederland	0.4	0.4
Portugal	1.2	1.3
United Kingdom	0.9	0.9

(1) Ratio of production in the sector compared to manufacturing industry for each country, divided by the same ratio for the EU. Estimates.
Source: DEBA GEIE

produced and the charge make-up, which in turn depends on the melting equipment. Depending on whether a build-up heat is being produced or a material is simply being re-melted along with the proportions of scrap, pig iron, (ferro-)alloys or high-grade pure metals in the heat, the proportion of the prime cost is higher or lower. Finally, the influence of the market prices should not be underestimated. Whereas foundries benefited from falling prices for their metallic raw materials from 1989 to the beginning of 1993, since then they have, in some cases, once again been faced with sharply rising prices. The proportion of the prime cost accounted for by the cost of capital, depreciation, and interest as calculated for costing purposes varies between 10 and 15%. It is essentially dependent on the production technology and is naturally higher in a highly automated mass-production plant than in the case of a hand-moulded single piece.

Lastly, energy costs are also worth mentioning. In this context, the foundries which still use a cupola are the most cost-efficient. For them, coke is the most important energy source. However, rising quality demands, the declining share of grey cast iron and, in turn, the rise of nodular cast iron are causing many foundries to switch to electric furnaces. Energy costs then attain up to 15% of the prime cost.

INDUSTRY STRUCTURE

Companies

The foundry industry has preserved its small-scale character right up to the present day. Over half of all foundries still employ fewer than 50 people and many are still family-owned. In some cases they work solely for other firms as jobbing foundries. Often, though, they are part of a larger company and mainly produce castings "for internal use", e.g. for use in machinery manufacturing and plant construction.

There is no discernible trend towards larger corporate units. Investment in recent years has been aimed especially at increasing labour productivity. Comparing the ferrous metal foundries with the non-ferrous metal foundries, the former have, on average, a significantly larger workforce than the latter. However, in the foundry sector too technical progress has led to the emergence of a number of large companies. For example, with the development of automatic moulding equipment large production runs became much more efficient. On the other hand, the more capital-intensive nature of production made two-shift or even three-shift working necessary. As a result, plants with up to 1000 employees were eventually created. They usually specialise in the production of castings for the motor industry.

Strategies

The measures which have been taken to increase productivity include automation of sand preparation, the development of automatic moulding equipment and the development of holding furnaces and induction crucible furnaces. At present, investment is particularly taking place in medium-frequency furnaces and more efficient core shooting machines. In the moulding shop, investment is concentrated on fully automatic casting equipment and knock-out machines. Additional machinery and aids are used in the fettling shop in order to improve working conditions and (by this and other means) to improve labour productivity. In the future, the greatest successes are likely to come from the use of CAD and CAM in pattern-making and in the fettling shop.

The demands on castings are becoming more and more exacting and at the same time increasingly diverse. In the first place, this makes the development of new materials necessary. Secondly, tighter and tighter dimensional tolerances have to be met. Castings are becoming thinner-walled, lighter and require more cores, while their cavities and surfaces are becoming more complex. Other castings have to be produced with a greater and greater volume and weight. The result of all this is that foundries are specialising more and more and the industry is becoming increasingly heterogeneous.

It is, therefore, not possible to speak of a general or a uniform strategy for foundries. A hot topic at the moment is the debate on the added-value chain from the raw material to the end product. For the firms involved in production (various industries), a restructuring of the distribution of activities within this chain may be imminent. For foundries this may mean the taking on of research and development activities along with machine operations and by supplying ready-to-fit components, thereby, increasing their own value added.

Where foundries are taken over by other firms, they are generally run as profit centres of the new owner. There is usually little change to the size and orientation of the plant. Thus take-overs essentially take place for two reasons. The first is to produce in-house the castings which the company needs for its own manufacturing, so as to gain independence from other suppliers. The second is to offer customers the full range of foundry products, from light alloy castings to stainless steel castings, from hand-moulded castings to automatic-moulded castings, from small components to large castings, etc.

ENVIRONMENT

The foundry industry has always placed a high value on recycling. This especially applies to the most important raw materials: sands and metals. Sands are reconditioned and metals, in the form of returns, are re-melted. Used castings are returned to the production cycle through the trade as "cast scrap". However, generation of wastes cannot be prevented entirely. Certain residues, especially thermally degenerated moulding sands, will always arise. The foundry industry is nevertheless working on financially justifiable methods of further reducing the quantities of residue or of facilitating their use in other industrial processes.

Air pollution control, and especially dust collection, is the most important environmental protection measure for many foundries. Strict statutory regulations must be complied with. In some cases, considerable capital expenditure is necessary.

Not all foundries will have sufficient funds to handle the necessary capital expenditure and will close down after a transitional period. For many foundries, however, profitability will deteriorate further if the cost of pollution control cannot be passed on to customers. Thus the same basic conditions should apply to everybody, at least within the EU, so as to

Table 9: Foundries
Number of enterprises and employment, 1994

(units)	D	E	F	I	UK
Number of establishments					
Ferrous metals	388	174	174	349	283
Non ferrous metals	445	80	334	N/A	N/A
Employment					
Ferrous metals	52 879	14 335	33 637	21 590	32 300
Non ferrous metals	35 919	5 590	16 846	N/A	N/A

Source: CAEF

minimise the decline in competitiveness of foundries located in countries with a stricter environmental policy.

REGULATIONS

There are no specific EU directives or regulations relating exclusively to foundries. However, foundries are especially affected by all provisions relating to environmental protection, ancillary labour costs, trade with the associated states in Eastern Europe, energy prices and charges for public services (e.g. waste disposal) and taxation (local trade taxes, property tax, corporation tax).

OUTLOOK

The last recession from 1990 to 1993 hit the foundries hard. The year 1994 finally saw a change for the better in this industry. Since, in the preceding years, far-reaching measures to restructure capacity and employment were taken and many procedures were rationalised through capital investment, there is again a certain degree of optimism in the industry. The most impressive illustration of the rationalisation measures that have been implemented is the fact that the volume of production achieved in 1995 required 20% fewer people than in 1989. The foundry industry's dependence on the motor and machinery manufacturing industries in particular will change little in future.

However, foundries will be even more concerned to boost quality further and to develop new materials and production processes. Furthermore, they may be faced with new and additional demands arising from a redistribution of activities between the individual firms sharing in the added-value chain from the raw material to the finished product. These demands should certainly also be viewed as opportunities. For example, foundries might decide to increase their value added by supplying components machined ready for fitting.

Against the background of the labour-intensiveness of production, which remains very high, future investment will continue to concentrate on rationalisation and further increases in labour productivity. The goal is and remains the (further) cutting of costs to preserve and, if possible, boost the industry's (international) competitiveness. Progress can be expected in particular from the use of CAD/CAM systems in pattern-making and in the fettling shop, both of which are still very labour-intensive stages of production. Finally, factors which should not be ignored in international competition are meeting of schedules, shortening of processing times, and just-in-time delivery.

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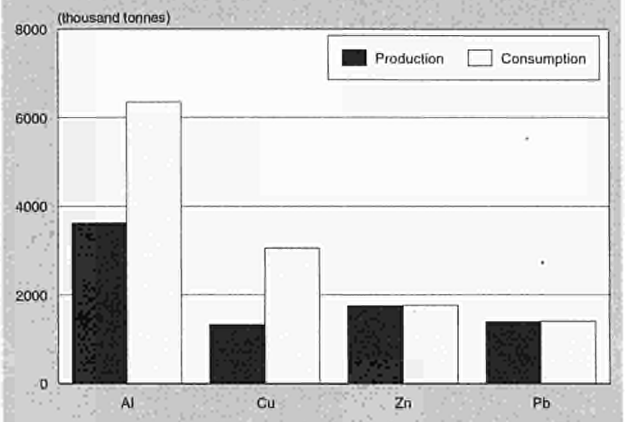
Overview

NACE (Revision 1) 27.4

The EU non-ferrous metals industry employed nearly 300 000 people at some 3 000 industrial units in 1994. Having very few mining resources at its disposal, the EU is responsible for less than 3% of the mining production of the market economy countries for aluminium, copper, zinc, lead and nickel. Nevertheless, in refined production it is of leading importance among the market economy countries with a metallurgical output of the base non ferrous metals (Al, Cu, Zn, Pb and Ni) representing 20% of the market economy countries' total. EU consumption of these same metals is even higher, representing nearly 28% of market economy countries' demand. The EU non-ferrous metals industry is a net importer of raw materials: ores, concentrates and other raw materials for refining, and unwrought metals for processing. It is also highly dependent on secondary materials (scrap and residue), which constitute the only "domestic" resource of major size in the EU. In purchasing the raw materials which are necessary for its supplies, and, to a lesser extent, in selling its products outside the EU borders, the EU non-ferrous metals industry is very much present on the international market, and its profitability is highly sensitive to the fluctuations of the EU currencies exchange rates to the US dollar.

Figure 1: Refined metals
EU production and consumption, 1994



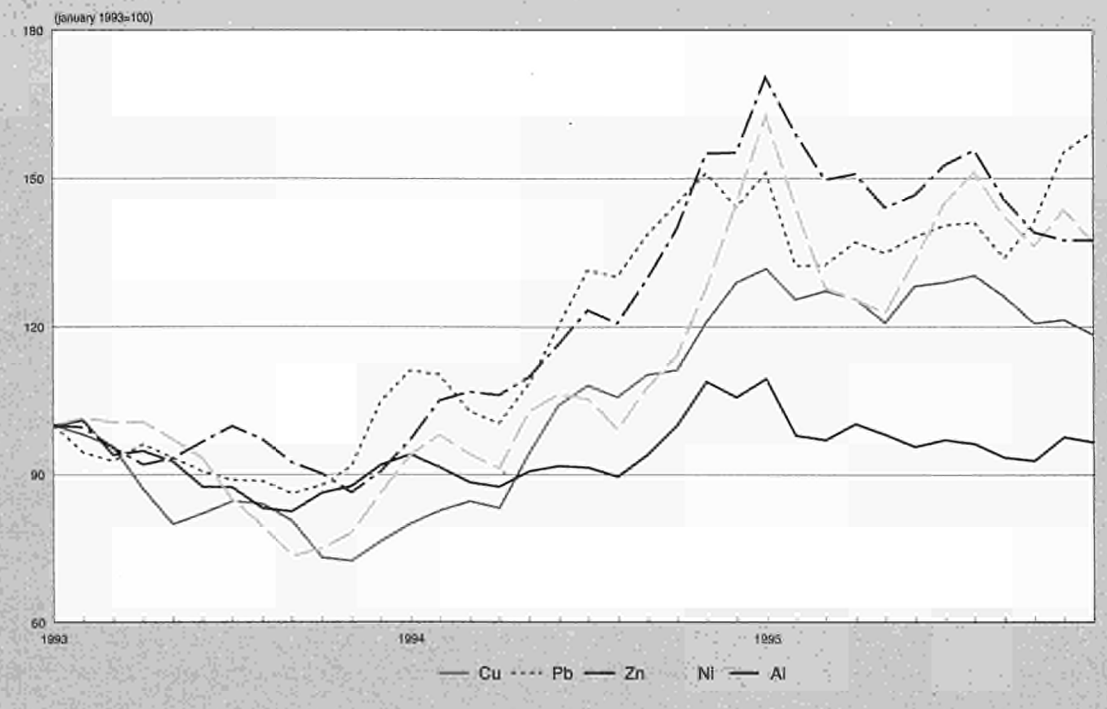
Source: Metallgesellschaft Metal Statistics 1984-1994

INDUSTRY PROFILE

Description of the sector

The EU non-ferrous metals industry is widely diversified in terms of metals which are produced or processed. These include the base non-ferrous metals aluminium (Al), copper (Cu), zinc (Zn) and lead (Pb) - but also the precious metals gold (Au), silver (Ag), platinum (Pt), palladium (Pd) and rhodium (Rh); and the alloying metals and other minor non-ferrous metals such as nickel, molybdenum, vanadium, tungsten, manganese, cobalt, germanium, cadmium, etc.. In view of the fact that the EU is relatively poor in mining resources, its industry is largely dependent on primary raw materials imports, and also finds a significant proportion of its supplies in secondary materials (scrap and residue). It is consequently geared to primary and secondary smelting and refining, and to processing.

Figure 2: Refined metals
LME 3-month quotations



Source: Metal Bulletin LME Quotations

Table 1: Non-ferrous metals
Imports and exports by Member State, 1994 (1)

(thousand tonnes)	Aluminium		Copper		Lead		Zinc	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Belgique/België	425	129	189	158	21	103	139	281
Danmark	30	17	2	0	6	1	13	0
	1 197	272	563	169	132	87	299	123
Ellada	59	54	62	0	6	0	18	0
España	116	148	25	37	38	5	7	164
France	447	212	464	25	54	83	167	134
Ireland	10	4	0	0	17	0	2	0
Italia	577	25	420	16	62	35	111	28
Nederland	971	613	96	44	50	7	136	278
Portugal	66	1	7	0	20	0	12	0
United Kingdom	309	190	308	40	192	131	130	40

(1) 0 = negligeable amount.
Source: Eurostat - Trade Data (CN codes 7601 - 7403 - 7801 - 7901)

Table 2: Non-ferrous metals
Production of primary and secondary unwrought metal

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Aluminium										
EU	3 483	3 611	3 693	3 906	4 020	3 936	3 833	3 855	3 663	3 622
World	20 931	21 082	22 313	23 882	24 591	25 127	25 347	25 798	25 954	25 830
EU share (%)	16.6	17.1	16.6	16.4	16.3	15.7	15.1	14.9	14.1	14.0
Copper										
EU	1 129	1 136	1 097	1 188	1 222	1 227	1 219	1 303	1 386	1 333
World	9 616	9 829	10 097	10 577	10 807	10 813	10 692	11 182	11 258	11 089
EU share (%)	11.7	11.6	10.9	11.2	11.3	11.3	11.4	11.7	12.3	12.0
Lead										
EU	1 377	1 345	1 374	1 441	1 422	1 388	1 423	1 375	1 370	1 394
World	5 317	5 210	5 411	5 518	5 685	5 426	5 338	5 347	5 464	5 251
EU share (%)	25.9	25.8	25.4	26.1	25.0	25.6	26.7	25.7	25.1	26.5
Zinc										
EU	1 592	1 616	1 667	1 708	1 686	1 701	1 765	1 827	1 793	1 752
World	6 466	6 385	6 608	6 851	6 783	6 683	6 834	6 892	7 090	6 990
EU share (%)	24.6	25.3	25.2	24.9	24.9	25.5	25.8	26.5	25.3	25.1

Source: Metallgesellschaft Metal Statistics 1984-1994

Table 3: Non-ferrous metals
Consumption of primary and secondary unwrought metal

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Aluminium										
EU	4 643	4 924	5 136	5 656	5 891	5 986	6 032	6 309	5 601	6 356
World	21 462	22 049	23 185	24 465	24 953	25 451	24 743	26 098	26 318	28 192
EU share (%)	21.6	22.3	22.2	23.1	23.6	23.5	24.4	24.2	21.3	22.5
Copper										
EU	2 358	2 419	2 463	2 525	2 709	2 804	2 845	2 955	2 793	3 052
World	9 885	10 183	10 430	10 660	11 046	10 761	10 712	10 819	10 962	11 481
EU share (%)	23.9	23.8	23.6	23.7	24.5	26.1	26.6	27.3	25.5	26.6
Lead										
EU	1 348	1 393	1 378	1 423	1 478	1 513	1 476	1 454	1 348	1 404
World	5 169	5 274	5 334	5 420	5 600	5 355	5 161	5 119	5 092	5 023
EU share (%)	26.1	26.4	25.8	26.3	26.4	28.3	28.6	28.4	26.5	28.0
Zinc										
EU	1 415	1 477	1 491	1 570	1 585	1 654	1 739	1 711	1 697	1 776
World	6 265	6 438	6 622	6 802	6 729	6 689	6 713	6 592	6 714	6 940
EU share (%)	22.6	22.9	22.5	23.1	23.6	24.7	25.9	26.0	25.3	25.6

Source: Metallgesellschaft Metal Statistics 1984-1994

The most important consumer markets for the EU non-ferrous metals industry are within the EU itself, but outlets have also been found beyond EU borders. The industry is therefore involved in the international non-ferrous metals market, not only as a purchaser of raw materials, but also as a supplier of metals and processed or speciality products. In both these respects, it is extremely sensitive to the world balance of markets and to their cyclic developments, which are often irregular. The EU non-ferrous metals industry operates in a highly competitive field and is supported by long years of technological expertise making it the world leader in various segments of its activities.

MARKET FORCES

Supply and demand

In terms of volume produced, aluminium, copper, zinc and lead are the dominant metals of the EU non-ferrous metals industry.

In the aluminium sector, EU production hovers between 3.5 and 4 million tonnes of metal per year, which is equivalent to about 60% of EU demand. This represents only 14% of world production, however. The aluminium industry is facing two serious problems: the recent massive increase in exports of metal from the CIS and the ongoing tendency to move production units to geographic zones where energy (an important cost component) is both abundant and inexpensive.

The EU zinc industry produces about 1.8 million tonnes of metal per year. Such an output represents 26% of world production and slightly exceeds EU market demand. The industry's major problem is unquestionably how to manage the long cycles which affect its market, with a certain degree of inertia in the adjustment of supply to demand.

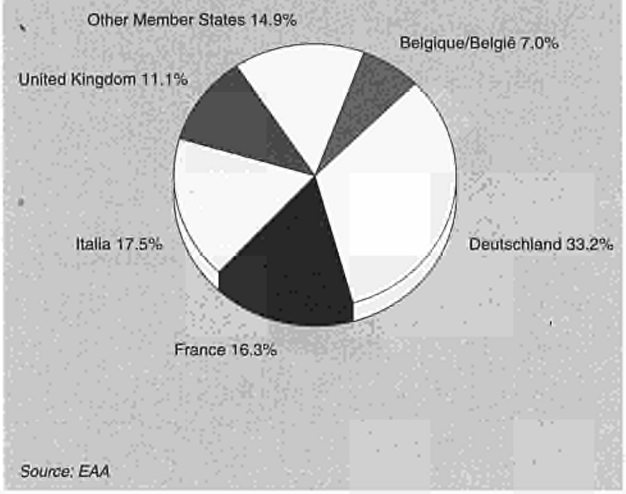
In the copper sector, the EU produces about 1.3 million tonnes of metal each year. As the EU is the largest consumer market in the world, this production volume barely reaches about 45% of its requirements. To lessen its dependence on imported copper raw materials, the EU industry has considerably developed recycling technologies, and is therefore able to secure a significant amount of its supplies from scrap and residue within the EU itself.

Producing about 1.4 million tonnes of metal per year (one quarter of world production), the EU lead industry is able, for the most part, to satisfy the requirements of its market. The industry is experiencing problems due to inherent properties of the metal, the use of which, particularly in "diffuse" applications, is tending to decrease due to constraints connected with the environment. With this in view, the car battery sector is the only consumer industry capable of offsetting the losses of consumption in the other sectors, and increased recycling will further boost the share of secondary lead in the industry's supplies (more than 50%).

The EU has the largest refining and fabricating capacity for precious metals in the world. As its actual mineral resources of such metals are very limited, it has developed considerable expertise in the treatment of secondary raw materials (scrap, mining and metallurgical residue...) both from within the EU and from the rest of the world. It is an advanced technology, high performance industry with world-wide outlets and whose R&D efforts are aiming at developing not only new uses for the precious metals but also new techniques for improving the efficiency of use of the precious metals in the existing applications.

The EU is also a world leader in special cobalt products with a strong international "spread" as its enterprises import their feed materials from remote countries and export their products not only within Europe but also to all parts of the world.

Figure 3: Aluminium semis
Breakdown of production by Member State, 1994



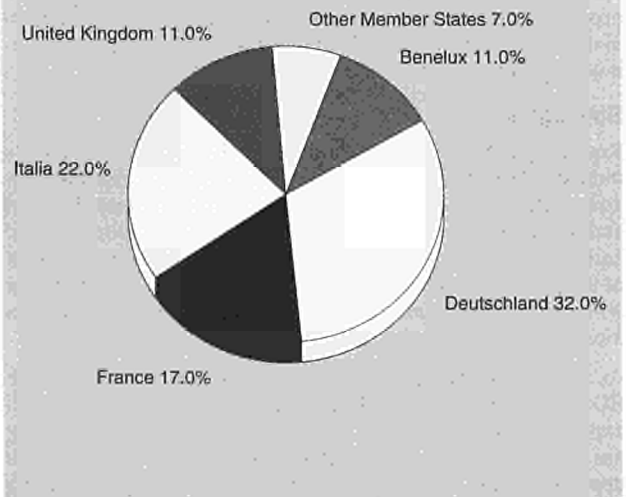
Source: EAA

With regard to nickel, the EU is the largest consuming area in the market economy countries making up approximately one-third of total demand. Its domestic production is comparatively more modest: it builds up around three companies only whose combined output account for 16% of the market economy countries' total.

Prices

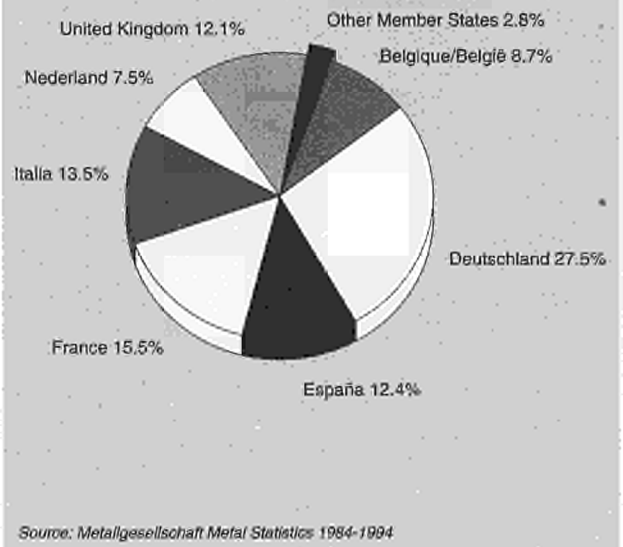
London Metal Exchange (LME) quotations generally govern the pricing of base non ferrous metals transactions made by the industry. Their development normally reflects the market balance at world level. However, the influence of large investment funds has largely contributed to the prices recovery in 1994: at the end of 1993, fund managers have viewed "commodities" as under-valued in the event of a global economic upturn and have heavily invested in metals as a natural hedge against inflation and interest rises. Such speculative

Figure 4: Copper semis
Breakdown of production by Member State, 1994



Source: IWCC

Figure 5: Refined metals (aluminium, copper, lead, zinc) Breakdown of production by Member State, 1994



Source: Metallgesellschaft Metal Statistics 1984-1994

interventions can only but increase the volatility of quotations as they are likely to recur in the future. The EU industry will have to cope with this as an exogenous factor in the same way as it must cope with the fluctuations of currency exchange rates vis-à-vis the US dollar whose impact on its profitability is quite significant.

INDUSTRY STRUCTURE

Companies

The EU non-ferrous metals industry comprises about 3000 companies, most of which are active in the processing sector. The upstream sectors of primary and secondary smelting and refining metallurgy are more concentrated.

Of the four base non-ferrous metals - aluminium, zinc, copper and lead - the activities of the primary aluminium industry are most strongly integrated.

In 1994, Germany accounted for 28% of the total EU refinery output of the four base non-ferrous metals, compared with 16% accounted for by France. Italy, Spain and the United Kingdom follow closely with 12% to 13% each, while Belgium and the Netherlands trail behind. The breakdown of semis production by country confirms the leading position of Germany with more than 30% of the total EU copper and aluminium semis output, followed by Italy and France.

Strategies

Recycling is an important feature of the EU non-ferrous metals industry. "Secondary" materials, i.e. recyclable scrap and residue constitute an essential input for many of its metallurgical and processing concerns. Some of the latter's supplies depend entirely on access to secondary materials, although, for most of the producers, recourse to secondary materials goes together with primary raw materials feed, for both economic and technical reasons.

As a result of the scarcity of European mining reserves, the EU non-ferrous metals industry has naturally developed much expertise in the processing of secondary materials. Recycling has therefore traditionally enabled the industry to reduce its dependence on raw materials imports by making use of the "surface" resources generated by the consumption of goods (old scrap) and by the industry itself (new scrap and metallurgical residue). Considerable investments are devoted to recycling, in terms of research, equipment and human resources, to such an extent that recycling is at the root of more than 50% of total EU production of the four base non-ferrous metals (aluminium, copper, zinc and lead), and accounts for more than 35% of their consumption in the EU.

In view of this, the ever mounting restrictions on the transfrontier movements of secondary materials as a result of environmental regulations are causing extreme concern to the industry as they seriously disrupt and hamper their feed supply flows, increase operational costs and jeopardise years of efforts in recycling at a time when everything should be done to promote the latter.

ENVIRONMENT

More than ever, environmental concerns are impelling the EU non-ferrous metals industry to keep abreast of innovation in the recycling sector. The upgrading and processing of scrap and metallurgical residue are contributing to the protection of the environment, reducing the need for disposal capacities and dependence on non-renewable natural resources, and allowing considerable energy savings in the extraction and processing of metals (from 60% for copper to 90% for aluminium).

Waste management legislation raises difficult questions of direct relevance to the non-ferrous metals industry. A clear definition of what is to be understood by waste, as opposed to product, and a consistent legislation on the management and the control of movements of wastes are critical for the non-ferrous metals sector as non-ferrous scrap and residue are used as an essential feed material by the sector and are traded extensively on the international market. A competitive recycling industry and considerable energy-saving potential could be affected by limits on this trade.

Additional measures concerning landfills are being discussed and are another area which could entail a large number of adjustments for the industry. The new directive on packaging waste will also have implications for the non-ferrous metals industry.

Besides, the EU environmental policy emphasises integrated pollution control and, in this context, many of the issues related to the protection of the environment are of direct relevance to the non-ferrous metals industry.

The legislation currently being developed by the EU in the field of industrial pollution, which are based on the concept of "Best Available Techniques", increase the need to analyse, in a comprehensive way, the impact of an activity on the whole environment taking into account the whole life-cycle of a product and providing for the appropriate monitoring of specific risks at each processing stage.

In addition, legislation on hazardous products is developing in such a way as to take into account the conditions of exposure over and above the intrinsic properties of products, which is a positive trend when it comes to assessing the real impact of metals.

OUTLOOK

During the 1990's, the industry will have to face two major problems.

The first is the opening-up of the former command economies of Central and Eastern Europe and the CIS and of China. The changed macro-economic position of the CIS and former COMECON countries now almost exclusively takes the form of movements of raw materials, non-ferrous metals in the first instance. It is therefore the EU's non-ferrous metals sector which is exposed in the first place to the sudden and massive exports of these countries which have thrown the cyclic ad-

justments between supply and demand on the international market structurally off balance.

In the case of aluminium for instance, exports from the CIS have dramatically increased from some 300 000 tonnes per year in 1990 to more than 2 million tonnes in 1994. In the case of zinc the CIS has become a net exporter whilst it was previously an importer.

In the case of non-ferrous metals semis, the countries of Central and Eastern Europe are exporting increasing tonnage at lower than prevailing market prices, fostering a severe downward pressure on the industry's revenues.

With regard to China, the industrial strategy and commercial practices of this country in the non ferrous metals sector have been, and still are, considerably damaging to the metals markets and to the EU industry in particular (unpredictable export/import policy, unfair pricing, "squeezing" of entire market segments, etc.).

In view of these developments, it is vital to make every effort to ensure that the liberalisation of trade develops on a more harmonious basis, which does not disrupt the international markets, among other things by promoting market transparency and "responsible" marketing, by adapting products to international standards, by diversifying outlets and by taking into account the free-market mechanisms in which this trade will henceforth be conducted. Adhesion negotiations to the World Trade Organisation as well as bilateral agreements and co-operation initiatives should all contribute to this aim.

The second major challenge of the non-ferrous metal industry for the 1990's is the increasing legislation relating directly or indirectly to environment protection, the development and effects of which ought to be managed not only with a view to maintaining the access to a whole range of raw materials (secondary materials) but also to maintaining future development of the non-ferrous metals uses.

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Precious metals
NACE (Revision 1) 27.41

The EU has the largest refining and fabricating capacity for precious metals in the world, even though its actual mineral resources of such metals are very limited. The recycling of precious metals from scrap and industrial residues has always been an important raw material source for the EU industry. Consumption of gold in the EU is mainly for jewellery, with smaller amounts used in electronics and other industrial and decorative applications. The principal users of silver are the photographic and jewellery industries. The imposition of strict emissions limits on vehicles sold in the EU has stimulated demand for platinum group metals used in catalytic converters.

INDUSTRY PROFILE

Description of the sector

Precious metals include such well-known metals as gold and silver as well as the six platinum group metals: platinum, palladium, rhodium, iridium, ruthenium and osmium.

Precious metal activities can conveniently be separated under five headings: mining; refining and production of metals in unwrought forms; fabrication, i.e. processing, alloying and conversion of the metals into wrought or semi-manufactured forms, chemical compounds, catalysts and industrial components; manufacturing, i.e. production of goods for sale at retail level such as jewellery, silverware etc.; trading, i.e. commodity dealing, investment bars and coins.

Recent trends

Mining

The twelve countries of the EU possess within their borders relatively insignificant sources of gold and silver and practically none at all of the platinum group metals. Primary precious metals which are actually extracted from ores mined in the EU are mainly by-products of copper or lead and zinc mining.

Among EU Member States in 1994, only Spain and France appeared in the world list of gold producing countries, with a combined output of 9.5 tonnes, equivalent to only 0.5% of market economy countries' gold output. Seven EU states produced silver in 1994 (Table 1), but total EU production represented only around 2.5% of total world annual output. The entry of Sweden and Finland into the EU in January 1995 has boosted EU gold production by around 80%, and approximately double EU silver output.

Refining and recycling

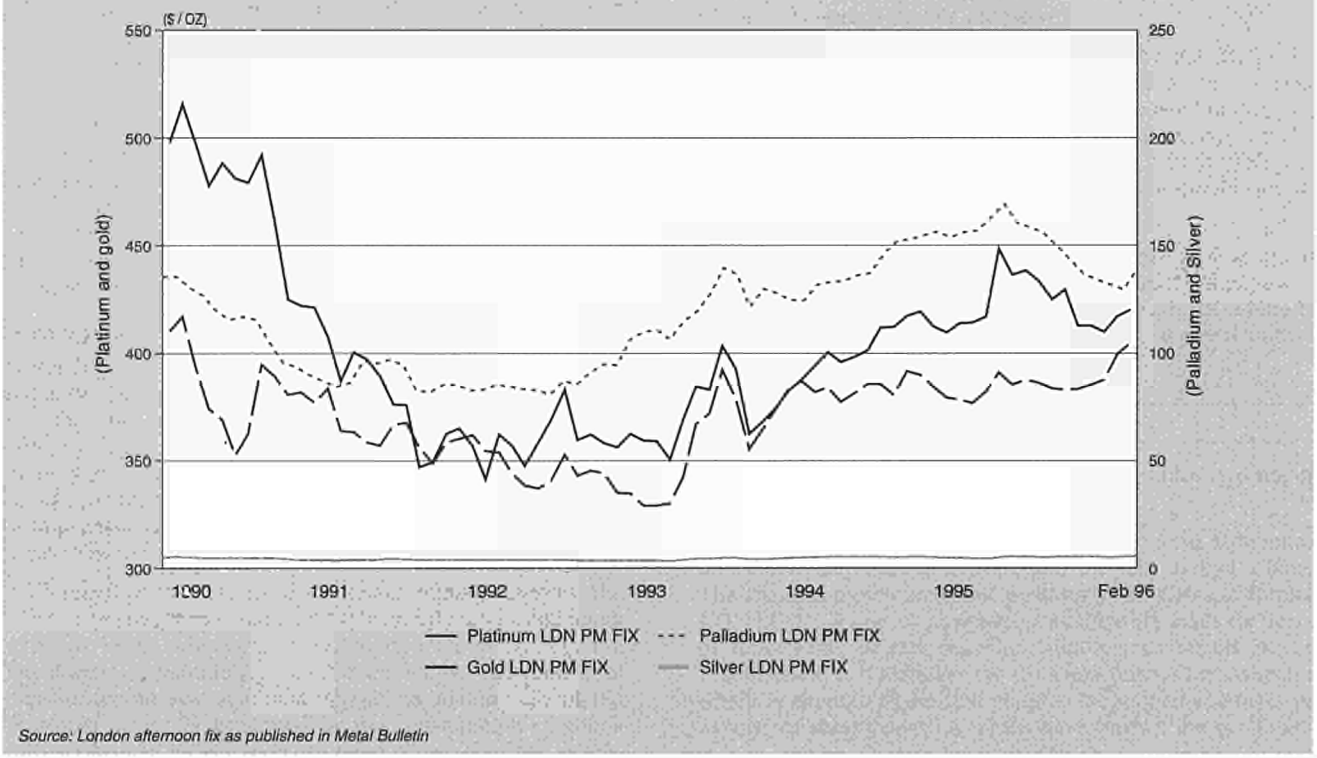
The refining of gold, silver and the platinum group metals in the EU takes place either at the specialist precious metal refining and fabricating companies or at base metal refineries equipped to treat such precious metals either as by-products of non-ferrous metal refining or by recovering them from low grade industrial residues and scrap materials. Total precious metal refining capacity of the EU firms is the largest in the world.

Consequently mines in all parts of the world still consign large quantities of precious metals in crude or by-product forms to the EU refineries, wherever local facilities do not exist, have inadequate capacity or are unable to treat the mine output satisfactorily to achieve optimal recovery rates or generally acceptable commercial quality.

Base metal refineries with significant precious metal capacities are to be found in Belgium, Germany and the United Kingdom. These typically recover precious metals from lead and zinc, copper or nickel ores, as well as low-grade scrap materials of all kinds, and they supply the pure metals in the form of unwrought "good delivery" bars or plates, grain or sponge.

The largest EU specialist precious metal refining firms are to be found in France, Germany and the United Kingdom.

Figure 1: Precious metals Prices (monthly averages)



Source: London afternoon fix as published in Metal Bulletin

Table 1: Silver
Mine production of silver

(tonnes)	1988	1989	1990	1991	1992	1993	1994
EU	355	342	390	406	372	287	287
Deutschland	20	22	8	7	2	2	2
Ellada	62	52	63	70	61	59	60
España	227	221	230	233	233	160	160
France	21	20	21	28	13	12	10
Italia	16	16	14	14	12	5	5
Portugal	4	4	42	43	38	36	32
United Kingdom, Ireland	6	7	12	11	13	13	18
Market economy countries	11944	12395	12999	12803	12820	12086	11444
Share of EU in market economy countries total (%)	3.0	2.8	3.0	3.2	2.9	2.4	2.5
World (including China/CIS)	14109	14581	15992	15696	15534	14570	13817
Share of the EU in world total (%)	2.5	2.3	2.4	2.6	2.4	2	2.1

Table 2: Gold
Total gold fabrication in the EU by Member State (1)

(tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EU (2)	420.1	402.5	415.3	471.8	573.0	629.9	658.1	697.8	671.8	669.8
Belgique/Belgïe, Luxembourg (2)	2.3	2.0	16.2	10.5	8.0	4.4	2.7	2.4	2.2	1.9
Danmark	0.8	0.9	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1
Deutschland	57.7	54.8	57.2	65.3	69.8	77.5	80.8	76.8	73.5	72.0
Ellada	11.6	11.1	10.8	10.8	10.5	10.6	10.1	9.4	9.1	9.9
España	16.7	16.7	18.1	25.2	32.1	36.2	34.6	32.1	27.9	28.8
France	23.4	25.7	27.0	29.3	32.7	39.9	39.3	43.3	44.6	42.2
Italia	261.6	246.9	232.8	273.7	359.2	395.9	430.2	473.3	452.3	450.5
Nederland	4.6	4.7	4.5	5.1	5.7	6.3	7.0	8.0	7.9	8.1
Portugal	3.6	3.6	4.2	5.0	5.7	7.6	9.2	11.4	14.5	13.5
United Kingdom, Ireland	37.8	36.1	43.7	46.1	48.5	50.6	43.3	40.1	38.8	41.8

(1) Including the use of scrap.
(2) 1993 and 1994, excluding Luxembourg.
Source: Gold 1995, Gold Fields Mineral Services

Table 3: Silver
European silver fabrication demand (1)

(tonnes)	1990	1991	1992	1993	1994
EU	5783	6065	6424	6124	6257
Belgique/Belgïe	629	632	633	656	690
Deutschland	1681	1793	1699	1501	1616
España	191	251	223	204	234
France	765	742	918	865	873
Italia	1426	1582	1831	1702	1496
United Kingdom, Ireland	801	796	840	916	1044
Other EU	290	269	280	280	304
Market economy countries	18313	18079	19405	21631	21230
Share of EU in market economy countries total (%)	31.6	33.5	33.1	28.3	29.5
World (including China/CIS)	21256	21188	22161	23672	23307
Share of the EU in world total (%)	27.2	28.6	29.0	25.9	26.8

(1) Including the use of scrap.
Source: World Silver Survey 1995, The Silver Institute

Table 4: Platinum
Breakdown of demand by application in Western Europe

(tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Autocatalyst										
gross	2.0	3.8	7.0	7.6	9.7	11.7	15.0	17.9	18.9	18.8
recovery	0.0	0.0	0.0	0.0	0.0	-0.2	-0.4	-0.6	-0.8	-0.9
Chemical	2.9	2.4	2.5	1.6	1.6	1.9	1.7	1.6	1.2	1.6
Electrical	1.7	1.2	1.2	1.2	1.2	1.2	0.9	0.9	0.6	0.8
Glass	0.9	0.9	0.9	0.9	1.1	0.8	0.6	0.5	0.5	0.9
Investment	2.8	3.1	2.0	1.7	1.1	1.2	1.2	1.1	0.8	1.4
Jewellery	1.6	1.7	1.4	2.2	2.3	2.5	2.6	2.6	3.3	3.0
Petroleum (1)	-0.6	-0.2	0.8	0.2	0.3	1.3	0.9	0.6	0.8	0.8
Other	1.1	1.7	1.6	1.6	1.4	1.4	1.6	1.7	1.9	2.0
Total	12.4	14.6	17.4	17.0	18.7	21.8	24.1	26.3	27.2	28.4

(1) In the years 1985 and 1986, the Western Europe petroleum industry sold back to the market more platinum than it purchased new metal.
Source: Platinum 1995 Interim Review, Johnson Matthey plc

The specialist refiners are also fabricators, able to process the precious metals into alloys and chemical compounds and to supply all forms of wrought materials such as wire, sheet, tubing and industrial components of many shapes and sizes.

Despite the lack of indigenous precious metal mineral sources, the EU can count on substantial "above ground" raw material supplies in the form of scrap and secondary materials sent for recycling both from within the EU and from the rest of the world. There are a number of EU companies who specialise in the collection, pre-processing and trading of such materials before the actual assay and refining stages take place. Typical items are discarded printed circuit boards, obsolete computers, old photographic film, X-ray plates and solutions, spent electro-plating baths etc.

The cost of recovery and recycling is more than justified by the high intrinsic value of the precious metals contained in these scrap and residues. It is not just the economic aspects that encourage the recycling of precious metals but also the environmental issues where the regulatory authorities are setting ever stricter limits on the tolerable metal content of waste materials sent for dumping.

In this respect, it is unacceptable that this valuable international business of recycling precious metals is being jeopardised by the application to such materials of the Basle Convention on Transfrontier Movements of Hazardous Wastes and the corresponding EU Directive.

The severe delays and high notification procedure costs imposed by the legislation are having serious adverse effects on the EU precious metals refining industry and are hindering the obvious environmental and financial benefits to be gained from precious metals recycling and secondary refining in which the EU precious metal industry has developed exceptional skills.

None of the precious metal bearing feedstocks for secondary refining should be classified as "waste"; in fact, the precious metal content of these materials usually has a value far exceeding the cost of treatment and the owners of such materials want to realise the value as quickly as possible and with the maximum environmental safety.

Via its professional associations, industry is working very actively to ensure that all precious metal bearing materials be correctly classified so as to exempt their trade from the application of the Basle Convention and in the longer term to redefine these materials as products rather than "waste". To this end, industry is supporting the efforts made by the OECD to establish criteria allowing a proper distinction between what should be considered as "waste" and what should not.

Trading

The major EU financial centres, such as London but also Paris, Frankfurt and Luxembourg are significant markets for trading gold and silver both as commodities and for investment purposes. The daily fixing prices quoted by the London Bullion Market and the London Platinum and Palladium Market are those most widely used throughout the world as reference prices. "Good delivery" gold ingots and silver bars bearing the stamps of the major EU refiners are to be found in the vaults of banks and commodity traders in all the world's financial centres and international monetary agencies. Private individuals and other financial institutions generally prefer the smaller investment bars where once again it is the major EU refiners whose bars carry the most prestigious marks which are recognised everywhere as a guarantee of quality and accurate assay.

Market forces require that the trading of the main precious metals on a 24 hours basis be organised so that forward cover and location swaps are provided for international customers. This push has caused many of the leading EU traders to set up facilities in North America and the Far East to complement their activities in Europe.

Fabrication

Most of the precious metals are fairly easily fabricated either as pure metals or as alloys. Gold in particular is usually turned into specific alloys for jewellery or dental purposes in order to improve its wear-resistance or colour. Because of the high intrinsic value and the wide range of forms and alloys required, such metals are usually fabricated or processed in relatively small quantities compared with base metals. One of the few precious metal products manufactured in tonnage quantities is silver nitrate for the photographic industry. A product that has recently entered the multi-million unit scale of production in the EU is anti-pollution car exhaust catalysts, each containing just a gram or so of the platinum group metals, and some members of the EU precious metal industry are strongly represented in this field world-wide. The EU demand trend is discussed in more detail below.

Manufacturing

Converting precious metal alloys into finished products to be sold to the retail trade is largely the responsibility of the jewellery, silverware and tableware industries, which is outside the scope of this article. These industries, however, are major consumers of gold and silver, especially in Italy.

Table 5: Platinum
Demand by region

(tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Western Europe	12.4	14.6	17.4	17.0	18.7	21.8	24.1	26.3	27.2	28.4
Japan	38.9	31.4	51.3	59.1	51.9	57.5	63.8	58.2	61.4	66.6
North America	31.4	37.0	28.0	26.9	27.8	24.6	25.4	21.9	23.6	29.2
Rest of market economy countries	5.3	5.3	5.6	9.3	8.2	11.2	13.1	11.8	12.9	15.9
Total market economy countries	88.0	88.3	102.3	112.3	106.6	115.1	126.4	118.2	125.1	140.1

Source: Platinum 1995 Interim Review, Johnson Matthey plc

MARKET FORCES

Demand

The industrial and manufacturing demand absorbs the major share of precious metals fabrication, though gold and silver still play roles in coinage (now mostly commemorative coinage). Gold, of course, remains the main investment metal world-wide even in today's highly sophisticated financial circles, though part of its role as an internationally recognised store of value has been taken over by currency trading. EU major precious metal outlets include the following: jewellery in the case of gold, photographic products for silver, automobile exhaust catalysts for platinum and dental alloys and electronics for palladium.

Consumption trends are closely linked to the outlook for consumer goods and industrial consumables. In the case of the platinum group metals, however, EU demand in recent years has been driven by legislation and the Single Market. As a result since 1 January 1993 most new European automobiles have been fitted with catalytic converters to control exhaust pollution. Such devices have been compulsory since the 1970s in the USA and Japan but only more recently has legislation been adopted by the EU and other states of Europe.

Gold and silver are able to rely on the jewellery and tableware markets as a fairly constant source of demand, although this does fluctuate with consumer purchasing power. There is also a small but growing demand for platinum jewellery and watches in the EU. In the case of palladium, world demand has risen recently because of increased use in auto-catalysts and electronic components such as those used in mobile telephones and personal computers.

All the precious metals except gold are consumed mainly in the industrial regions: North America, Japan and Europe. These three zones currently account for 90% of market economy countries' consumption of platinum and palladium, over 70% for silver but less than half world gold consumption. More than 50% of gold demand in 1994 is thought to have occurred in the developing countries.

Gold

The EU accounts for just under 25% of total market economy countries' demand for gold (Table 2). In 1994, EU utilisation is estimated to have decreased by 3%, following a 4% decline the previous year, a reversal of the growth trend seen between 1986 and 1992. It is Italy which traditionally dominates EU demand. In 1994, consumption of gold by the Italian jewellery industry was steady at around 440 tonnes, which is about 75% of the total EU usage for jewellery, estimated at 564 tonnes. Much of the Italian production is exported to North America, the Middle East and other EU countries such as Germany and the United Kingdom, although it is Italy itself which is by far the largest jewellery market among EU Member States. In 1994, Italian consumers bought some 120 tonnes of fine gold in the form of gold jewellery, around 9% less than in 1993. This weak Italian domestic demand was compensated for by increased exports. Gold jewellery production in Germany and France fell sharply in 1994, but the Spanish and United Kingdom markets showed some signs of recovery.

EU demand for gold for purposes other than jewellery rose slightly in 1994, with small increases in consumption in electronics, dental, industrial and decorative applications.

Silver

Industrial demand for silver in the EU now represents under 30% of the market economy countries' total (Table 3). One principal consumer sector in Europe is the photographic industry, where overall demand has grown steadily in recent years and increased to 7% to reach 2 199 tonnes in 1994. The other major use for silver in Europe is jewellery, cutlery and silver tableware: EU manufacturers in this sector consumed 1 889 tonnes of silver in 1994. Italy used to be by far the world's largest manufacturer of silver jewellery and tableware, but between 1992 and 1994 production there fell by almost 25% to around 1 140 tonnes and was overstepped by Indian output which rose to 1 835 tonnes.

Platinum

In 1994, the EU accounted for approximately 20% of market economy countries' platinum demand (Tables 4 and 5). Its main use is in catalytic converters for the car industry. Since 1 January 1993, strict emissions legislation has resulted in the use of auto-catalysts containing platinum group metals on all new petrol-engine cars in the EU. Following a sharp decline in new car sales and production in 1993, vehicle output in the EU rose by some 12% in 1994. However, demand for platinum in auto-catalysts was similar to that in 1993, because a number of European car companies began to adopt palladium-containing catalysts on some models.

In 1994, there was stronger demand for platinum from industrial users in the EU. This was associated with an improvement in world-wide economic conditions, which led to higher consumption of platinum in applications such as nitric acid and glass fibre production.

Jewellery industry demand for platinum in Western Europe declined slightly in 1994, due to lower production of platinum watches in Switzerland. However, there was growing domestic demand for mid-price platinum jewellery in Germany and Italy, while some manufacturers in these countries enjoyed higher exports to Japan and the USA.

During 1992 and 1993, Western Europe demand for platinum exceeded that of North America. However, US consumption overtook that of the EU in 1994, as stricter emissions legislation resulted in greater use of platinum on US vehicles. Japan remains by far the largest consumer of platinum, due to its high demand for platinum jewellery. In 1994, 45 tonnes of platinum were used by Japanese jewellery manufacturers compared with 85 tonnes of gold; in the EU the ratio was under 3 tonnes of platinum to 592 tonnes of gold.

Palladium

EU demand for palladium represents about 18% of market economy countries' consumption (Tables 6 and 7). The use of palladium in the automotive sector increased by 56% be-

Table 6: Palladium
Breakdown of demand by application in Western Europe

(tonnes)	1989	1990	1991	1992	1993	1994
Autocatalyst, gross only (1)	0.2	0.2	0.2	1.3	3.6	8.1
Chemical	2.0	2.3	2.2	2.3	2.0	1.9
Dental	7.8	8.1	9.3	9.3	8.3	7.9
Electrical	6.5	6.2	6.2	6.5	6.5	7.9
Jewellery	1.1	1.1	1.1	1.1	1.1	0.9
Other (2)	0.6	0.5	0.3	0.5	-0.3	0.8
Total	18.2	18.4	19.3	21.0	21.2	27.5

(1) Recovery equal to zero.
(2) In 1993, sales of palladium, principally by the petroleum industry, exceeded new metal purchases in this category.
Source: Platinum 1995 Interim Review, Johnson Matthey plc

tween 1993 and 1994, as technical advances in palladium-containing catalysts led to their wider use in European cars. The electronics industry consumed 18% more palladium in 1994 than in 1993, as rising sales of mobile telephones and personal computers led to strong demand for palladium-containing electronic components.

Supply and competition

Gold is mined in most continents apart from Europe. The largest output still comes from the Republic of South Africa, where production declined by 6% to 584 tonnes in 1994. Other major producers include the USA, Canada, Australia and the Federation of Russia, while many countries in Latin America and Asia also supply smaller but still substantial quantities of gold. World supply from old gold scrap has risen significantly since 1991, and increased by 7% to 573 tonnes in 1994 as more old jewellery was recycled in the Middle East. EU supply of gold from old scrap was 36.1 tonnes, of which 23 tonnes originated in Italy.

Silver is largely a by-product of lead and zinc mines, particularly those in Mexico and Peru, as far as primary metal sources are concerned. Around 25% of total silver output in 1994 is thought to have been derived from secondary sources such as scrap and residues from the photographic industry.

South African primary ores are especially rich in platinum, but also contain smaller amounts of the other platinum group metals. In the Federation of Russia and Canada, where platinum group metals are by-products of nickel mining, more palladium than platinum is recovered. The Federation of Russia is now by far the world's largest supplier of palladium, selling over 100 tonnes of the metal in 1994 (compared with 47 tonnes from South Africa). Shipments of Russian platinum and palladium currently exceed production, with the balance being supplied from government-controlled strategic reserves.

Much of the platinum group metals used in industry is eventually recycled. As cars fitted with catalytic converters in the 1970s and early 1980s in North America and Japan reach the end of their useful life, a steadily growing source of platinum has been scrap car catalysts, which now yield the equivalent of about 17% of the platinum currently required for new car catalysts.

The mineral sources of gold and silver are widely dispersed and mining activity is subject to only limited political risk. In the case of the platinum group metals, which rely to such an extent on the sources in the Republic of South Africa and the Federation of Russia, there is the risk that internal political events might affect supplies. In the former country, this threat has diminished since the peaceful transition to multi-racial democracy. Palladium supplies are particularly dependent upon the existence of Russian stocks, and the willingness of the Russian Government to make metal available from these reserves.

INDUSTRY STRUCTURE

Companies

The principal precious metals refiners and fabricators of the EU operate on an international scale and are world leaders in their field. Prominent names are Degussa and Heraeus in Germany and Johnson Matthey in the United Kingdom. The US precious metals firm, Engelhard Corporation, has been operating in the EU for a number of years and in late 1994 announced a joint venture with the French precious metals company CLAL. Major EU base metal refiners with significant precious metal involvement include Union Minière in Belgium, Norddeutsche Affinerie in Germany and Inco in the United Kingdom. With the enlargement of the EU to 15 Member States, Boliden in Sweden will join the list.

The installed precious metal refining and fabrication capacity controlled by the EU industry as a whole is the largest in the world and exceeds that of equivalent US and Japanese firms. It draws its supplies from all over the world both in the form of primary metal from mines and secondary or recycled metal. It also delivers its fabricated products, not merely within the EU, but also to the developing countries of Africa,

Table 7: Palladium
Demand by region

(tonnes)	1989	1990	1991	1992	1993	1994
Western Europe	18.2	18.4	19.3	21.0	21.2	27.5
Japan	47.1	47.6	56.0	55.4	61.9	68.4
North America	33.3	33.6	34.1	35.9	40.3	43.9
Rest of market economy countries	5.3	6.7	8.6	8.7	9.3	11.0
Total market economy countries	103.9	106.3	118.0	121.0	132.7	150.8

Source: Platinum 1995 Interim Review, Johnson Matthey plc

the Middle East and Asia. It is such factors which give the EU precious metals industry its international character.

The EU precious metal concerns form an advanced technology, high performance industry which is very strongly focused on research and development. This encompasses not merely new uses for the precious metals but also the discovery of techniques for economising the quantities of precious metals used in existing applications.

Prices

The main precious metals are all traded on international commodity markets, in particular those of London, New York and Tokyo, and prices can be quoted on a 24 hours basis. Thus refiners and fabricators are able to hedge prices quoted to their customers to avoid the risk of price movements. Gold is the metal perhaps most sensitive to the world political and economic climate, largely because it is the precious metal of most interest to investors and speculators. Although silver and the platinum group metals are industrial metals to a much greater extent, and their prices are therefore subject mainly to supply and demand expectations, in practice they still move to some extent in sympathy with the price of gold.

For several years up to 1993, precious metal prices in US dollar terms tended to slide downwards as supply was generally ahead of demand. In the case of gold the market had to absorb substantial sales by central banks who had surplus stocks or needed foreign exchange. Since 1993, precious metal prices have shown an upward trend as demand in some markets such as the US has recovered and there have been several surges in speculative and investment interest (Figure 1).

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Aluminium
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There are ten primary aluminium producing companies in the EU, some of which operate plants in different EU countries or have subsidiaries or branches in other parts of the world. The number of companies in the aluminium processing industry is much larger with a fairly good integration of the rolling activity into the smelting but with much less integration of the extrusion industry. Aluminium demand follows a rising average trend of 2.5% per year in the long term, mainly driven by the three major markets: transport, packaging and construction. As the production of unwrought aluminium in the EU is insufficient to meet market needs, the EU is a net importer of unwrought metal; this tendency is expected to become increasingly accentuated in the future.

INDUSTRY PROFILE

Description of the sector

The aluminium industry is the largest of the non-ferrous metal industries, and is the youngest as well in that aluminium smelting only began about a century ago. Lightness, longevity, resistance to corrosion, electrical and thermal conductivity and reflectivity make aluminium a popular choice in many sectors of the economy. Its aesthetic qualities, alloy possibilities and easy recyclability all add to this appeal.

The aluminium industry encompasses several activity segments, from bauxite mining and alumina production to primary and secondary smelting and metal processing into semi-finished products (e.g. bars, profiles, wires, sheets, foils, tubes, pipes) or specialty products, e.g. powders, special alloys).

As far as the EU major metal producers are concerned, those activities are to a large extent integrated, but a number of EU manufacturers are focusing their activity on one particular segment only, such as recycling and secondary smelting or semis fabrication.

Recent trends

The EU aluminium industry directly represents a workforce of about 200 000 people and its annual turnover is in the order of 20 billion ECU. Total production of unwrought metal amounted to 3.5 million tonnes in 1994, approximately the same as in 1993. About 44% of this output is accounted for by the processing of recycled scrap, which has been constantly growing.

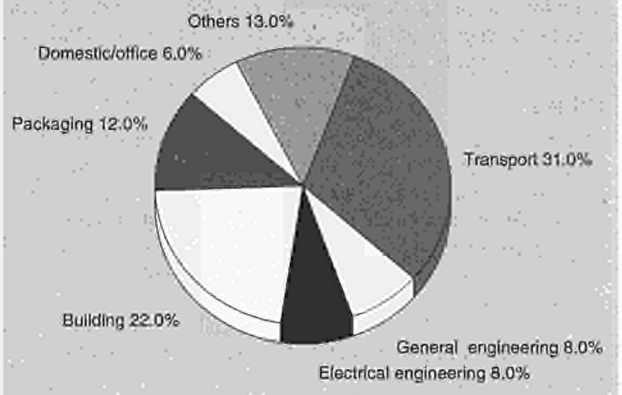
The EU consumer market for aluminium exceeds domestic supply. Posting 5.5 million tonnes in 1993, demand has increased by about 11% in 1994 due to generally positive economic developments. The market enjoys a rising trend of 2.5% per year in the long term; there are, however, ups and downs in relation with the business cycle fluctuations.

International comparison

In terms of primary metal production, the EU accounted for 14% of the market economy countries' production in 1994, ranking third to the USA and Canada. On the other hand, production of recycled aluminium in the EU is the highest in the world. Hovering at about 1.5 million tonnes in 1994, it represented 22% of the market economy countries' output from recycled materials.

Regarding the production of semis in 1994, the EU was responsible for approximately 30% of the world's output of rolled and extruded products, wires, cables and castings, with a total production of 5.8 million tonnes.

Figure 1: Aluminium
EU consumption by end-use, 1994



Source: EAA and OEA

Supply requirements of the EU primary and recycled aluminium producers are largely met by domestic alumina production and scrap recycling, but the total metal output falls short of the processing industry needs: it meets only 45% of the EU demand, which is rising, while there has been hardly any net growth of metal production capacity during the past years.

Foreign trade

As a result of the deficit in metal production capacity versus semis production capacity, the EU is a regular importer of unwrought aluminium. The EFTA countries traditionally accounted for about 45% to 50% of these EU imports with Brazil, Africa and Canada making up at least another 25%. Imports from the CIS, however, have made sharp inroads since 1991, increasing from about 60 000 tonnes per year in the late 1980s to 625 000 tonnes in 1994 and pushing back the share of the traditional major suppliers to just over 60% of total imports, or 1.7 million tonnes.

This phenomenon not only affected the import picture regarding the sourcing of the metal, but it also had a major impact on the overall market balance. The sudden and massive aluminium export flow originating from the CIS created a huge surplus which resulted in soaring inventories on the London Metal Exchange (LME), reaching a peak in early 1994, and unprecedented price destabilisation.

The situation became so alarming that the governments of the major producing areas and of the Federation of Russia recognised the need for joining forces in order to promote a more balanced integration of the Russian aluminium industry into the international market. This assessment was enacted by a Memorandum of Understanding about which more details are given below.

Regarding trade of semi-finished aluminium products, developments are highly contingent on currency evolution, especially as regards the USD/ECU exchange rate. In this respect, the EU had lost its long-time position of net exporter in the early 1990s but the trade balance showed again a net surplus as from 1993.

Table 1: Aluminium
Main EU indicators in volume - semi products

(thousand tonnes)	1985	1990	1991	1992	1993	1994
Apparent consumption	2 960	4 180	4 205	4 315	3 880	4 462
Production	3 271	4 095	4 172	4 285	4 047	4 521
Trade balance	311	-85	-33	-30	167	59

Source: European Aluminium Association

MARKET FORCES

Demand

Aluminium is a material with an incomparably large range of applications, in the transportation, construction and packaging industries, the electricity sector, household appliances, and the mechanical and agricultural sectors Researchers and engineers have been constantly improving the qualities of the material; they have developed new alloys and production processes to open up new areas of application.

The transport sector is by far the largest client sector, accounting for approximately 31% of total EU aluminium consumption. It is the market segment with the best growth potential, as the strength and stability properties of aluminium alloys, combined with their lightness, make them an attractive material in all transport applications where reduced weight translates into energy consumption savings. In the car industry, for instance, 90% of cylinder heads and 25% of engine blocks, gear boxes and wheels are made of aluminium castings. Many other components are made of rolled and extruded aluminium products (e.g. radiators, roof racks, ABS components, licence plates).

New casting and body-frame techniques should allow further development of the use of aluminium by the automobile producers; the metal is already widely used for frame parts in air, road and rail transportation as well as in commercial and cruise ships.

Construction is the second largest aluminium consumer sector, making up about 22% of EU demand for aluminium. Aluminium products such as profiles, claddings, window and door frames, staircases, roof panels, greenhouse frames, smoke and fire protection systems, etc., find markets not only in new buildings but also in the renovation of old ones. They are selected for a number of qualities, such as resistance to corrosion, lightness, easy machinability and installation, low maintenance and repair costs, good formability and shaping along modern design requirements.

The third most important client sector for aluminium is packaging which accounts for an estimated 12% share in EU aluminium demand. Packaging applications are numerous, not only in relation to foodstuffs and household products, but also for pharmaceuticals and cosmetics. Aluminium has the necessary properties to protect and preserve these goods and to ensure their safe transportation and distribution as well as their convenient use.

Further progress can be expected in the use of aluminium in this sector as technical developments will further improve thin strip quality, down-gauging, lacquering and coating.

Supply and competition

Since 1991, the world aluminium market had developed into an imbalance between supply and demand. Imports from the CIS played a determining role under these circumstances. Until 1990, trade between the market economies and socialist countries resulted in net imports from the latter, which hovered around 300 000 tonnes per year. However, from 1991 onwards, the collapse of the Soviet system fundamentally changed the picture: the loss of the COMECON outlets, the sudden drop of domestic demand for military applications and a surge in the need for hard currency have propelled the former Soviet Union aluminium industry out onto the international market. Exports of the CIS world-wide increased by more than 100% in 1991, and by a further 35% in 1992. In 1993 exports further increased to an estimated 1.8 million tonnes and nearly reached 2.5 million tonnes in 1994. As a result, primary aluminium inventories on the LME have jumped from a mere 300 000 tonnes at the end of 1990 to more than 2.5 million tonnes by early 1994 and prices dropped to an extremely low level.

Table 2: Aluminium
Breakdown of EU production, 1994-95

	Bauxite		Alumina		Primary aluminium		Aluminium semis		Secondary aluminium	
(thousand tonnes)	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
EU	2 345	2 228	5 185	N/A	1 985	2 064	N/A	N/A	1 545	N/A
Belgique/België, Luxembourg	0	0	0	N/A	0	0	318	340	0	0
Danmark (1)	0	0	0	N/A	0	0	18	16	20	N/A
Deutschland	0	0	948	N/A	504	575	1 500	1 542	438	418
Ellada (2)	2 194	2 077	607	N/A	138	131	167	173	N/A	N/A
Ireland	0	0	1 150	N/A	0	0	N/A	N/A	N/A	N/A
España	0	0	1 070	N/A	337	361	N/A	N/A	104	N/A
France	128	128	438	N/A	384	365	737	739	253	244
Italia	23	23	852	N/A	172	178	792	815	356	397
Nederland	0	0	0	N/A	219	216	N/A	N/A	150	N/A
Portugal	0	0	0	N/A	0	0	N/A	N/A	N/A	N/A
United Kingdom	0	0	120	N/A	231	238	500	502	224	N/A

(1) Aluminium semis estimated.
(2) Estimates for aluminium semis in 1995.
Source: European Aluminium Association

Table 3: Primary aluminium
World refined production by country, 1994

(thousand tonnes)	
EU (1)	1 985
Deutschland	504
Ellada	138
España	337
France	384
Italia	172
Nederland	219
United Kingdom	231
USA	3 299
Canada	2 255
Australia	1 315
Brazil	1 182
Norway	858
Venezuela	590
India	479

(1) Belgium, Denmark, Ireland, Luxembourg and Portugal do not produce primary aluminium.
Source: European Aluminium Association

The EU market was the first to be hit, as it is situated the nearest to the former Soviet Union; safeguard measures in the form of an import quota were imposed from August 1993 to the end of February 1994. These measures prompted a multilateral dialogue with the major CIS exporter, the Federation of Russia, and the governments of USA, Canada, Australia, Norway and the European Union, which recognised the need to address the fundamental problem of the integration of formerly state-run industries into the international market economy.

The dialogue resulted, on 1 March 1994, in the ratification by the six governments of a Memorandum of Understanding whereby the severeness of the market disruption was assessed and initiatives were formulated with a view to improving market transparency and to facilitating a balanced economic integration of the Russian aluminium industry in the world market. It was left up to market forces to remedy the current oversupply, while the Russian industry would temporarily reduce its production rate. The Memorandum of Understanding was due to expire after a maximum of 24 months.

Table 4: Aluminium semis
EU exports and imports, 1994

(thousand tonnes)	Exports	Imports
Belgique/België	353	168
Danmark	26	99
Deutschland	768	621
Ellada	106	31
España	278	92
France	455	401
Ireland	6	57
Italia	269	338
Nederland	225	580
Portugal	10	27
United Kingdom	277	391

Source: Eurostat - External Trade Data (CN codes 7604 to 7608)

In this context, the EU producers contributed to the rebalancing of the world market through moderate production programmes and primary aluminium output for the whole year 1994 did not exceed 2.0 million tonnes. At the world-wide level, similar efforts were made to restore market balance and reduce inventories while a strong recovery of demand helped the whole process.

INDUSTRY STRUCTURE

Companies

At the beginning of 1994, 22 primary aluminium smelters were operating in the EU, but the number of producer companies is, in fact, much smaller: the major ones are Aluminium Pechiney (F), VAW aluminium (D), Inespal (E), Alumix (I), Hoogovens (NL) and British Alcan (UK). Some of these companies operate plants in different EU countries or have subsidiaries or branches in other parts of the world.

The number of companies involved in aluminium processing is much larger, although there is a fairly good integration of the rolling activity into the smelting. The structure of the extrusion industry is, on the contrary, much less integrated, with about 170 production sites scattered on the EU territory.

Table 5: Aluminium
Primary aluminium producers, 1994

Country	Company	Locations	Theoretical annual capacity (thousand tonnes)
Deutschland	VAW aluminium AG	Norf, Töging, Stade	310
	Hoogovens Aluminium GmbH	Voerde	78
	Aluminium Essen GmbH	Essen	91
	Hamburger Aluminium-Werk GmbH	Hamburg	120
Ellada	Aluminium de Grèce	Distomon	150
España	INESPAL	Aviles, La Coruna	163
	Aluminio Español S.A.	San Ciprian	196
France	Aluminium Pechiney	Auzat, St Jean de Maurienne, Lannemezan, Dunkerque	430
Italia	Alumix	Fusina, Porto Vesme	172
Nederland	Aluminium-Delfzijl	Delfzijl	98
	Pechiney Nederland N.V.	Vlissingen	175
United Kingdom	British Alcan Aluminium plc.	Kinlochleven, Lochaber, Lynemouth	114
	Anglesey Aluminium plc.	Holyhead	127

Source: European Aluminium Association

ENVIRONMENT

Although bauxite mining activity is of minor importance in the EU, a lot of attention is paid to the rehabilitation of mined land. With regard to metal production, the European aluminium industry has made considerable efforts to reduce its electricity consumption, bringing it down from 17 KWh per kg produced in 1980 to 15 KWh per kg today.

The industry has also worked out and implemented processes and devices to reduce emissions. These have been cut down, over the last fifteen years, by a factor of four to ten, depending on the type of emission. The European aluminium industry complies thereby to existing regulations and in some cases goes even below the imposed limit values.

The European aluminium industry has established a European average database (life cycle inventory), for all production stages, which is used for bench marking within the industry to control and improve its environmental performance.

Aluminium has properties which make it increasingly competitive in an ecology-conscious world. Its light weight is particularly effective in increasing energy savings in transportation applications. The high recyclability of aluminium is an additional important competitive advantage. Currently, 44% of total EU aluminium output on average arises from scrap recovery. This proportion varies widely among Member States, however.

The industry welcomed the EU initiatives to solve the waste stream problems, in particular the EU Directive on Packaging and Packaging Waste which sets certain targets for recycling used packaging materials. Whereas in most other aluminium applications collection, sorting and recycling of used aluminium products are relatively easy to manage, in the case of packaging, the aluminium industry co-operates with other packaging material producers, fillers, retailers and communities in order to implement better collection and sorting systems with a view to minimising the impact of packaging on the environment.

OUTLOOK

Primary aluminium consumption in the EU is expected to grow at an average annual rate of 2% to 3% during the 1990s. Total aluminium demand, (i.e. including recycled aluminium) should grow at a slightly higher pace as a result of the development of recycled metal uses, especially in the transportation and packaging sectors.

The packaging industry is expected to make considerable progress: the canning sector is far from maturity, and will give rise to considerable demand.

In the transportation industry the growth of aluminium demand is expected to arise chiefly from the private automobile sector, where aluminium can further contribute to the lightness of cars, not only in castings, but also in wiring and body frames.

Increases in aluminium consumption in the construction industry is a function of the development of that sector.

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Zinc
NACE (Revision 1) 27.43

The EU zinc industry holds a top ranking position at world level not only in terms of production, but also in terms of know-how and consumer market basis. It is currently confronted with the effects of serious market imbalance created by both the lasting slump in demand and the sudden inversion of net trade with the countries of Central and Eastern Europe, the former Soviet Union and China. As a result, London Metal Exchange inventories have surged to unprecedented levels and prices have collapsed.

INDUSTRY PROFILE

Description of the sector

Zinc is the third most used non-ferrous metal, behind aluminium and copper. Primary zinc production results from the processing of zinc ores into zinc concentrates of approximately 60% zinc content which are then smelted and refined into zinc metal. Zinc production may also arise from secondary source materials such as galvanising residue, flue dust from steel plants, new or old die castings, sheet or brass scrap. Metal production from secondary sources accounted for more than 8% of the total EU refined zinc output in 1994. The recycling of zinc and zinc containing products is a key issue for the industry.

Zinc is supplied to the market in various qualities and shapes: metal ingots of various grades (the highest quality is SHG, Special High Grade, which rates 99.995% Zn, while the lowest quality is only about 98% pure); extrusion products such as bars, rods and wires (mainly brass); rolling products such as sheets and strips; casting alloys; and powders and chemical compounds, such as oxides.

End-uses include a wide range of applications, the most important one in terms of volume being steel protection against rust through galvanising for the automobile, appliance and building industries. Zinc alloys (e.g. brass, bronze, die casting alloys) and zinc semis are respectively the second and third major consumption areas with applications also in the building, appliance and car industries.

Recent trends

In 1994, the EU mine output further dropped to 383 000 tonnes of zinc contained in concentrates from 397 000 tonnes in 1993, as a result of the exhaustion of reserves and lower ore grades at some mining operations. Metal production stepped back below the 1.8 million tonnes mark which it had overstepped in 1992, while consumption of refined zinc increased from 1 640 000 tonnes to 1 770 000 tonnes, accounting for 30% of the demand for zinc in the market economy countries.

International comparison

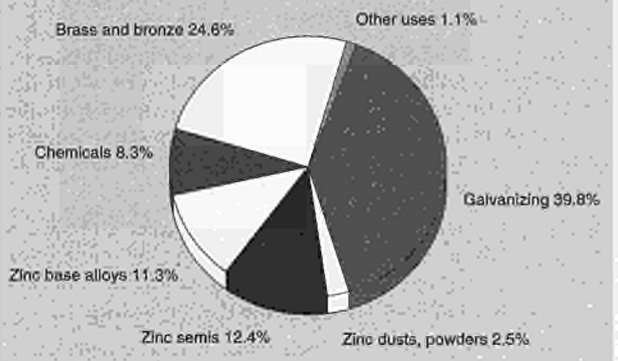
As shown in Table 1, although it has been decreasing since the late 1980s, the EU production of zinc concentrates is still significant at international levels, ranking in 5th position behind Canada, Australia, Peru and the USA.

The EU mine output is essentially accounted for by Ireland and Spain. In the other countries, mining is gradually being phased out as mine reserves are exhausting and operations are becoming uneconomic due to the high cost of labour and environmental protection, and the relatively low grade of ores. Considering these factors, combined with the persisting low prices for metal, zinc mining in the EU is bound to decline further in the coming years. While EU concentrates used to meet more than 45% of the EU refinery requirements 10 years ago, they now account for less than 25% of these. The deficit is filled in by increased imports, as mine production capacity is currently increasing in North America, Australia and some South American countries.

In terms of refined zinc production, the EU definitely stands as the world leader, far ahead of Canada and Japan which rank on the second and third position respectively. In 1994, the EU output was recorded at 1 749 000 tonnes metal, accounting for nearly 33% of the market economy countries' total of 5 376 000 tonnes.

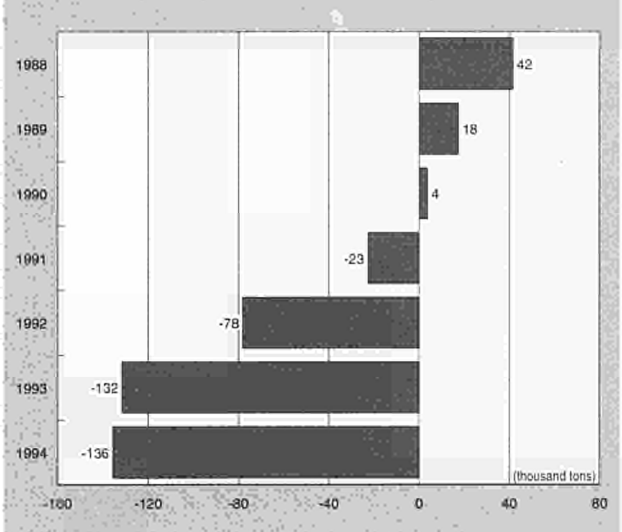
The EU is also the major consumer area for zinc among the market economy countries. The 1 770 000 tonnes zinc consumed in 1994 was 49% above the second largest consumer market, (USA) and 145% above the third (Japan).

Figure 1: Zinc
Breakdown of EU consumption by use, 1994



Source: International Lead and Zinc Study Group, October 1995

Figure 2: Zinc (1)
EU net trade with former USSR and COMECON



(1) Unalloyed and alloyed unwrought zinc; CN code 7901.
Source: Eurostat

Table 1: Zinc
Production of zinc concentrates

(thousand tonnes of zinc content)	1985	1990	1991	1992	1993	1994
EU (1)	726	629	604	500	411	383
Danmark	70	48	0	0	0	0
Deutschland (1)	118	59	54	14	0	0
Ellada	21	27	30	26	22	17
España	234	257	265	208	171	150
France	41	24	27	16	14	0
Ireland	192	166	188	194	194	194
Italia	45	42	37	31	7	22
Portugal	0	0	2	11	3	0
United Kingdom	5	6	1	0	0	0
Canada	1 172	1 203	1 157	1 325	1 004	1 008
USA	252	543	547	551	513	601
Peru	583	598	638	626	668	682
Australia	713	884	1 048	1 014	1 007	928
Market economy countries (1)	5 148	5 396	5 601	5 704	5 244	5 162

(1) Data from 1991 onwards includes former East Germany.
Source: International Lead and Zinc Study Group, February 1996

Foreign trade

Zinc metal is a widely traded commodity as shown in Tables 4 and 5. Trade patterns have undergone a major change, however, with the opening of Eastern Europe. In the past, the countries of Central and Eastern Europe (CEEC) and the former Soviet Union were net importers of about 75 000 tonnes zinc per year from the West. With the dismantling of the COMECON and the collapse of the state monopolies, the trade flows which traditionally existed between those countries were dismantled. In addition, the rouble clearing system broke up, a phenomenon which was accelerated by the devaluation of the rouble. Simultaneously, major production outlets in defence applications vanished, and since the conversion of the industry from defence to consumer products is a slow process, metal demand has dropped dramatically.

Due to these developments and the urgent need of these countries for "hard currencies", domestic production has been diverted from home markets: it is estimated that about 216 000 tonnes of refined zinc were exported from the CEEC and the CIS during 1994.

The EU zinc industry used to export significant tonnage of zinc on a regular basis to the former Soviet Union and, to a lesser extent, Czechoslovakia, while imports from the COMECON remained negligible.

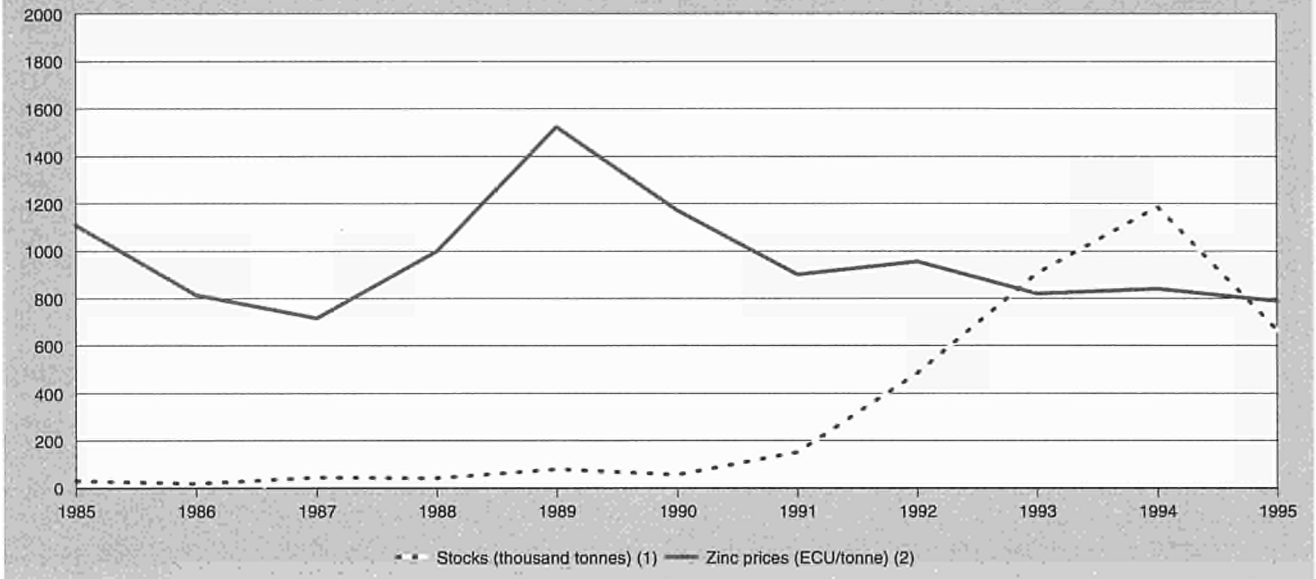
By the beginning of the 1990s however, a drastic change occurred in these trade flows: EU exports rapidly decreased from more than 46 000 tonnes in 1988 to a mere 6 000 tonnes in 1991, and imports from the CIS and the countries of Eastern and Central Europe mushroomed from about 1 000 tonnes in 1989-1990 to nearly 27 000 tonnes in 1991 and almost five times as much in 1993. Figure 2 shows this development: the net trade surplus of the late 1980s had turned into a major deficit in 1993 and 1994. Within four years, not only did the EU zinc industry lose a market outlet which it had won owing to the superior quality of its product, but it also had to incur fierce inroads on its domestic market by lesser quality low price imported zinc products.

Table 2: Zinc
Production of refined zinc (1)

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EU (2)	1 694	1 619	1 677	1 719	1 695	1 703	1 777	1 844	1 819	1 749
Belgique/België	271	269	284	298	285	290	298	217	210	211
Deutschland (2)	367	371	380	356	353	338	346	383	381	360
España	216	202	224	256	257	257	274	368	342	296
France	247	257	249	274	266	264	299	304	310	309
Italia	310	230	247	242	246	248	256	253	254	256
Nederland	203	198	206	210	203	207	201	218	214	212
Portugal	6	6	6	6	5	6	2	2	3	4
United Kingdom	74	86	81	77	80	93	101	97	105	101
Canada	692	571	610	703	670	592	660	672	662	693
USA	334	316	344	330	358	358	376	400	382	356
Japan	740	708	666	678	665	687	731	729	696	666
Australia	293	308	312	302	294	303	326	333	317	318
Market economy countries (2)	4 996	4 854	5 058	5 240	5 215	5 206	5 385	5 441	5 457	5 376

(1) Total production by smelters and refineries of zinc in marketable form or used directly for alloying including production on toll in the reporting country, regardless of the type of source material. Remelted zinc and zinc dust are excluded.
(2) Data from 1991 onwards includes former East Germany.
Source: International Lead and Zinc Study Group, February 1996

Figure 3: Zinc
LME zinc prices and stocks



(1) London Metal Exchange; end-of-year.
(2) London Metal Exchange settlement.
Source: International Lead and Zinc Study Group, February 1996

The move of the CIS and former COMECON zinc industry towards foreign markets, their currency owning EU neighbours, is a major blow to the balance of the zinc market. This has a direct impact on the supply/demand balance and resulting market prices; but, more perniciously, it also pulls the market value of zinc down as CIS and former COMECON zinc is offered at significant discounts.

China has also become a significant player on the zinc market lately. Although production statistics are not quite reliable, market analysts agree to view China as a net exporter of 200 000 to 300 000 tonnes metal per year for some time until domestic consumption, which is currently very low, develops.

Prices

Zinc is quoted on the London Metal Exchange (LME) where demand and supply regulate the price. As production remained slightly below consumption in 1990 and 1991, the price drop linked to business cycle factors was stopped in 1992 and prices increased during the first months of the year until the rising of stocks forced them to drop back.

The stagnation of consumption world-wide, the increasing exports from the former COMECON countries and the CIS and the unexpected surge in exports from China did in fact create a significant surplus which has been heavily depressing price levels since October 1992. On 29 September 1993, zinc was quoted on the LME at USD 859 per tonne, which is the

Table 3: Zinc
Consumption of refined zinc (1)

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EU (2)	1 424	1 475	1 500	1 594	1 594	1 671	1 751	1 709	1 671	1 770
Belgique/België	169	172	163	175	174	185	200	189	210	225
Danmark	12	15	10	12	11	13	13	16	14	12
Deutschland (2)	410	434	455	450	453	484	540	532	495	519
Ellada	15	15	14	14	17	20	16	12	12	12
España	103	100	109	127	116	125	129	112	119	139
France	247	260	253	290	279	284	289	258	219	241
Ireland	1	1	1	2	2	1	2	1	2	1
Italia	218	232	245	254	262	275	283	300	300	320
Nederland	51	54	50	67	75	76	82	87	90	90
Portugal	9	10	12	10	11	15	13	12	14	14
United Kingdom	189	182	188	193	194	193	184	190	196	197
Canada	156	154	158	159	148	122	121	126	134	148
USA	962	998	1 052	1 089	1 059	992	931	1 048	1 125	1 185
Japan	780	753	729	774	769	814	846	784	719	721
Australia	107	99	94	108	111	114	113	119	143	173
Market economy countries (2)	4 737	4 885	5 044	5 267	5 199	5 199	5 366	5 396	5 557	5 868

(1) Total consumption of refined zinc for the production of zinc alloys, regardless of the type of source material from which produced. Remelted zinc and zinc dust are excluded.
(2) Data from 1991 onwards includes former East Germany.
Source: International Lead and Zinc Study Group, February 1996

Table 4: Zinc
Imports of refined zinc (1)

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EU (2)	504	475	491	556	573	598	642	796	N/A	N/A
Belgique/België	47	45	38	35	30	25	39	142	180	121
Danmark	12	12	10	12	12	11	14	16	12	12
Deutschland (2)	152	159	156	179	186	222	270	284	234	256
Ellada	15	17	15	16	17	13	11	10	14	N/A
France	62	64	70	87	84	89	82	98	92	116
Italia	63	55	64	53	76	77	71	82	89	92
Nederland	14	17	19	36	36	26	25	29	N/A	N/A
Portugal	8	4	5	5	6	11	10	12	10	3
United Kingdom	131	102	114	133	126	124	120	123	119	124
USA	611	665	706	749	712	632	549	645	724	793
Japan	65	93	105	113	133	141	142	106	84	64
Taiwan	39	56	65	64	57	72	126	129	171	170

(1) World imports of unalloyed unwrought zinc.
(2) Data from 1991 onwards includes former East Germany.
Source: International Lead and Zinc Study Group, February 1996

lowest level since 1987 in real terms, and at the end of the year, the LME inventories were piling up at 907 000 tonnes, an unprecedentedly high level.

In 1994, oversupply was still characterising the zinc market (see Figure 3). Stocks soared up to 1 185 000 tonnes at the end of the year, forcing the prices down again below the 1 000 USD/tonnes level to 839 ECU/tonnes.

INDUSTRY STRUCTURE

Companies

Table 6 identifies the EU top zinc metal refiners with reference to their 1994 production capacity.

Strategies

The major EU refiners have a diversified product list as they process part of their unwrought zinc output into value added products such as rolling products (sheets and strips of various dimensions), casting alloys or specialty products such as galvanising anodes, powders and callots for the battery industry, wires for the surface treatment of steel, dust and oxide.

Backward integration at the mine level is limited and none of the EU refiners can rely significantly on its own mines' concentrate supplies, if any exist. A significant share of zinc mine production in the EU is not dedicated to any particular refinery. In Ireland for instance, Tara Mines has no integrated refinery and sells its concentrates on the market, and the current major mining projects or developments, in Ireland and Spain, are not geared to the exclusive supply of any EU zinc refinery.

Yet, with the progress made with respect to the development of the Galmoy orebody (ARCON International Resources), Ireland reinforces its position as the leading zinc mining country in the EU. The first Galmoy concentrates should be produced by the end of 1996 if development work continues on schedule. Capacity is rated at 120 000 tonnes per year of concentrates with 55% zinc content, based on two main orebodies totalling some 6 million tonnes ore reserves grading 11% zinc and more than 1% lead on average.

ENVIRONMENT

Zinc and zinc containing products can be recycled to a large extent. Estimates based on historical consumption and product life cycles indicate that a recovery rate of 80% has been reached. The recyclability of zinc is far advanced, not only as zinc metal but also in several different forms.

Primary and secondary facilities in the EU operate under strict emission control and limit values with respect to air and water. The technology currently implemented is state of the art in this respect, making the EU production units the most environmentally friendly in the world.

Table 5: Zinc
Exports of refined zinc (1)

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EU (2)	659	597	655	703	686	631	618	824	809	730
Belgique/België	157	137	160	155	158	132	126	150	183	148
Deutschland (2)	94	78	79	99	93	72	74	118	106	103
España	127	94	106	146	148	137	146	218	198	150
France	69	66	71	66	71	74	81	147	184	130
Italia	44	46	58	50	45	51	35	34	16	20
Nederland	160	165	177	180	162	157	140	144	103	161
United Kingdom	8	11	4	7	9	8	16	13	19	18
Suomi/Finland	137	128	134	128	134	135	149	139	137	137
Canada	556	427	441	528	495	450	521	510	493	551
Australia	215	217	241	207	203	244	253	259	259	265

(1) World imports of unalloyed unwrought zinc.
(2) Data from 1991 onwards includes former East Germany.
Source: International Lead and Zinc Study Group, February 1996

Table 6: Zinc
Top EU producers in terms of annual capacity, 1994

Country	Company	Location	Theoretical annual capacity	Process (1) (thousand tonnes)	Employment (unit)
Belgique/België	Union Minière	Balen-Wezel	E	200	725
Deutschland	Ruhr-Zink GmbH	Datteln	E	96	231
	M.I.M. Hüttenwerke Duisburg GmbH	Duisburg-Wanheim	ISF-RT	100	580
	Metaleurop Weser Zink GmbH	Nordenham	E	130	440
	Harz Zink GmbH	Harlingerode	CV	30	59
España	Asturiana de Zinc S.A.	San Juan de Nieva	E	320	896
	Española del Zinc S.A.	Cartagena	E	60	298
France	Union Minière France	Auby	E	220	700
	Metaleurop S.A.	Noyelles Godault	ISF-RT	100	485
Italia	ENIRISORSE	Porto Vesme (Sardegna)	ISF-RT	75	751
	Porto Vesme (Sardegna)		E		80
	Pertusola Sud S.p.A.	Crotone (Calabria)	E	100	637
Nederland	Budelco B.V. (Pasminco + Billiton)	Budel-Dorplein	E	210	600
United Kingdom	Britannia Zinc (MIM Holdings)	Avonmouth	ISF-RT	105	531

(1) E = Electrolytic plant; ISF = Imperial Smelting Furnace; CV = Vertical retorts; RT = Fire refining.
Source: Industry statistics

Environmental concerns leading to the classification of all materials with respect to their hazardous character are taken very seriously by the EU zinc industry which is actively involved in the conducting of scientific risk assessment programmes for zinc and its compounds with a view to asserting their properties on a sound scientific basis. The ultimate goal is to avoid having zinc be misperceived in the environmental regulations and its uses thereby endangered for lack of appropriate communication of scientific arguments towards the relevant authorities.

OUTLOOK

The oversupply of zinc metal, due to reduced consumption and increased exports from former COMECON countries, the CIS and China, has resulted in extremely low prices which do not cover production costs for most mines and smelters, especially in the EU.

The integration of the former Soviet Union and COMECON countries in the international zinc market appears to be the major determining factor for the future. This might lead to some fundamental restructuring of the industry world-wide, but the EU is more specifically affected as its neighbouring position makes it the closest target for the newcomers' exports. Meanwhile, the resumption of consumption might bring some relief in absorbing the current market surplus, although the latter has developed to unprecedented levels, and being a mature metal, zinc demand growth rates are not expected to be higher than a few per cent.

Nevertheless, in order to foster the growth of demand and counter the threats of substitution by competing materials such as organic coatings, plastics, or aluminium and magnesium alloys, the EU zinc producers are pursuing market development programmes, mainly through the European Zinc Institute (E.Z.I.) and in collaboration with end users. Current efforts are focusing on three lines of action: first, a five-year marketing plan aiming at expanding the market for galvanised steel, with the support of the European General Galvaniser Association (ECGA) and the national galvanisers associations; second, the continuous and in-depth monitoring of market trends for zinc coated steel sheet products which are a key growth factor to both the zinc and the steel industries, not only with reference to the Atlantic Basin markets, but also with reference to the Pacific Basin markets: the automotive and building sectors offer the most promising outlets for these products whose recyclability is increasingly regarded as a plus point vis-à-vis competing materials); and third, sustained efforts in technological research relating to zinc alloy die casting with a view to improving product quality and process productivity.

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Lead
NACE (Revision 1) part of 27.43

The EU possesses few lead mine resources, but its lead metallurgical activities are powerful and competitive. During the last 10 years, EU consumption and production have experienced only modest growth, resulting in a decrease in the EU's share in world markets. Considerable restructuring has been taking place in the lead refining industry and in its major client industry, the battery sector. The restructuring will require the building up of new relationships between suppliers and consumers. Secondary smelting is an increasingly important source of lead, particularly as environmental regulations become more stringent.

INDUSTRY PROFILE

Description of the sector

Lead is the most abundant heavy metal in the earth's crust. It is normally found in mixed ores where it is associated with zinc and small amounts of silver and copper. Lead's softness, low melting point, chemical reactivity and resistance to corrosion give it great functional value, both in its pure form and in alloys or compounds.

Mine production of lead has decreased regularly since the mid-1980s as a result of the growing importance of recycling. Refined lead is derived from two sources: primary material in the form of lead ores and concentrates, and secondary material in the form of scrap and residue. Primary production requires the smelting of lead-bearing ores to produce refined lead bullion. Primary refining is very much linked to the economics of mining lead-zinc orebodies. The bulk of lead mine production comes predominantly from operations in which zinc, and silver to a lesser extent, are the principal profit makers; less than a third comes from the actual lead ore mining operations in which lead is the principal metal recovered.

Secondary production may also require refining facilities if the secondary raw materials contain unwanted compounds. As a result of environmental and other regulations aiming at the recycling of lead-bearing scrap and residue, the secondary refining industry now supplies more than 50% of the lead consumed in the market economy countries. As lead acid accumulators in cars are the main source of scrap for secondary refining, this proportion will increase as the world car population increases.

The most important consumer of lead is the battery industry which creates nearly 70% of the demand. Other uses for lead mainly include pigments and compounds, rolled and extruded products for the building industry, cable sheathing, shots and gasoline additives.

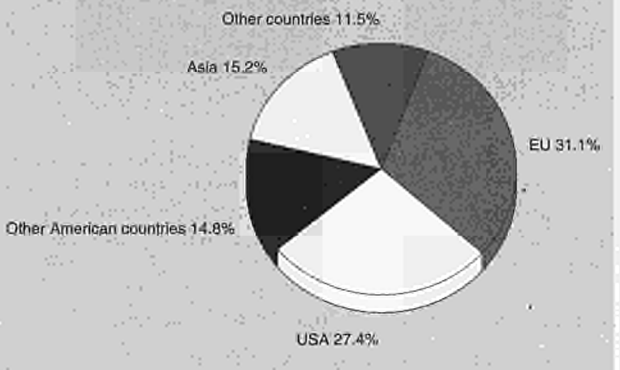
Recent trends

Consumption of lead in the market economy countries rose significantly in the 1980s overstepping the 4.5 million tonnes mark at the turn of the decade and reaching a record level of 4.8 million tonnes in 1994. In the EU, however, consumption of refined lead has been stepping back since 1991 and levelled off only in 1994.

The EU is not a significant mining region with regard to lead. Its mine output was only 120 000 tonnes of lead in 1994, i.e. less than 6% of the total output of the market economy countries. This situation should change with the enlargement to 15 Member States as Sweden would join with more than 100 000 tonnes of lead per year from mine production.

EU metal production is much higher, ranking first among the market economy countries with 1 398 000 tonnes in 1994, of which 52% was from secondary feed materials. The industry is responding effectively to ecological concern by recovering ever increasing amounts of lead so that primary production is steadily declining.

Figure 1: Refined lead
Market economy countries production, 1994



Source: ILZSG

International comparison

The EU is the largest lead producing area world-wide, ahead of the United States (Figure 1). In 1994, these two regions together accounted for 59 % of the market economy countries' total refined production of 4.5 million tonnes.

The leading position of the EU would be reinforced with the enlargement to 15 Member States as Austria and Sweden would add up some 110 000 tonnes production per year. The United Kingdom, Germany, France and Italy are the major producers and, on average, 49 % of their output is based on secondary feed supplies. The EU average of 52 % is in this respect significantly lower than the US average of 72 %, which is the highest world-wide, but it remains well above that in any other market economy country (Figure 2).

With regard to consumption, the EU ranks second to the United States, accounting for 28 % of the market economy countries lead consumption in 1994, whilst the US share is close to 30 % (Figure 3). Both areas should be on a par with each other as a result of the enlargement of the EU to 15 Member States. The four major producing Member States of the EU are also the major consuming markets, with Germany ranking second at world level in fact, ahead of Japan.

MARKET FORCES

Demand

Consumption of lead generally follows the business cycles, increasing during periods of high economic activity and falling during periods of recession. So was it in the EU from 1991 to 1994 with the result that the average annual growth rate recorded over the 1980s dropped from 1.5% to 1% per year.

Regional trends in consumption are variable. For example, the EU share in the market economy countries' consumption has fallen in recent years from 35% at the turn of the decade to 28% in 1994. In contrast, most other areas have increased their share in world consumption of lead. Apart from the major influence of business cycles, consumption trends are largely driven by regulatory control on lead products (e.g. gasoline additives) and the cost and availability of substitutes.

Table 1: Refined lead
Main indicators in volume

(thousand tonnes)	1989	1990	1991	1992	1993	1994
Consumption	1 479	1 531	1 516	1 456	1 346	1 396
Production	1 435	1 390	1 425	1 373	1 359	1 398
Extra-EU net trade	-226	-292	-291	-303	-231	-189

Source: ILZSG, Eurostat trade data (CN code 7801)

Demand from the battery industry will continue to underpin consumption, largely as a result of rising demand for lead acid batteries for the automobile industry. Between 1979 and 1991 lead consumption in the battery industry increased by almost 43%, at an average annual rate of 3.25%. In 1994, it had increased by a further 14% above the 1991 level, accounting for some 70% of total refined lead demand.

The vast majority of storage batteries are used in starting, lighting and ignition (SLI) applications in motor vehicles. Demand for such batteries depends on the number of vehicles built and, more importantly, on the number of batteries required to replace exhausted units. Demand has also increased for other types of batteries, such as those used in load levelling/peak sharing applications, as well as in electric-powered vehicles and standby power applications.

Environmental constraints and competition from other metals or materials have resulted in a stagnation or decline of lead demand in most of its other end-uses. Consumption rose only marginally in rolled and extruded products, shots, pigments and other compounds: these sectors contributed little to overall growth. In applications such as cable sheathing, alloys and gasoline additives, consumption has declined regularly for several years: more recently, i.e. between 1990 and 1994, consumption in these three sectors fell by as much as 20%. By the end of 1994, these applications accounted for only 7.5% of the total whilst they made up more than 20% in the late 1970s.

In the case of cable sheathing and alloys, lead has suffered both from the substitution by other materials and from the introduction of new technologies. Increasing awareness about the impact of polluting emissions on the environment is the main reason for the drop in lead consumption in gasoline additives. Over the past 15 years, consumption of lead for this end-use fell by more than three-quarters, and it only remains of any significance in the United Kingdom which consumed 66% of the total recorded in 1994.

The structure of lead consumption by end uses and its development during the last 5 years in the major market economy countries are detailed in Table 2. The specific structure of lead consumption in the EU is presented in Figure 4, showing higher than average consumption for rolled and extruded products, pigments and compounds as well as gasoline additives and lower than average consumption for batteries.

Supply and competition

The market for primary lead and lead products is international in scope. Large consumer markets such as the EU are significant importers of lead concentrates and bullion. North America and Australia are large exporters of the same after having met their own market's requirements. The market for secondary refined lead is more regional as secondary refining is predominantly carried out in the country where the scrap arisings occur and production is supplied directly to the neighbouring market.

With the growing importance of secondary refining from an environmental standpoint the majors in Europe have a vested interest to be active in both primary and secondary refining. These companies are best placed to finance the investment that will be required to conform with increasing environmental legislation.

With the collapse of COMECON and the former Soviet Union in the early 1990's, increasing tonnages of refined metal of good to mediocre quality have been exported from these countries, disturbing the prevailing trade patterns primarily on the Western European market since it was the closest outlet to the Eastern producers. The flow of Eastern material has enhanced the downward pressure on prices which were already suffering from the slump in demand and has significantly contributed to the piling up of metal inventories on the London Metal Exchange (LME). These overstepped the 300 000 tonnes mark at the end of 1993 whilst they were below 60 000 tonnes at the end of 1990. In 1994, the LME stocks kept on rising, up to a record level of 372 000 tonnes in September, exports from China playing in turn a dominant role in this development.

Prices

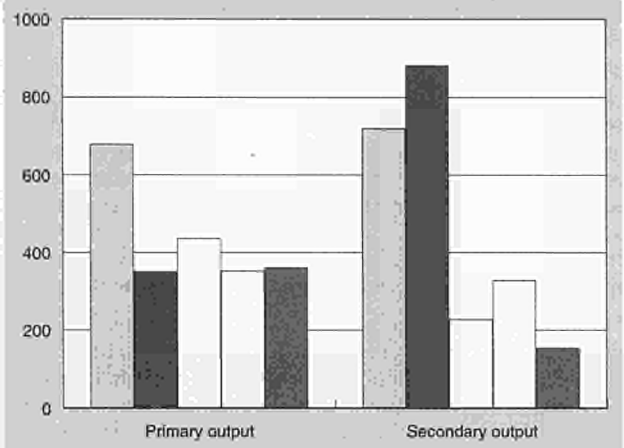
The London Metal Exchange quotations for refined lead of min. 99.97% purity generally govern the pricing of lead transactions made by the industry The evolution of the LME lead

Table 2: Refined lead
Consumption in the market economy countries by end-use (1)

(thousand tonnes)	1990	1991	1992	1993	1994	share 1994 (%)
Batteries	2 545	2 566	2 591	2 610	2 924	68
Cable sheathing	178.1	164.9	147.2	137.9	126.2	3.0
Rolled and extruded products	312.0	285.8	273.2	264.4	271.1	6.3
Shot/ammunition	100.3	106.8	111.2	118.6	115.7	2.7
Alloys	133.9	130.9	137.2	136.8	141.5	3.3
Pigments and other compounds	529.0	544.8	535.8	492.8	485.3	11.4
Gasoline additives	86.9	74.0	58.1	55.3	53.1	1.2
Miscellaneous	137.6	149.9	146.7	155.0	158.7	3.7
Total	4 023.1	4 023.2	3 999.9	3 970.5	4 275.2	100.0

(1) Covers approximatively 90% of market economy countries' consumption.
Source: ILZSG

Figure 2: Refined lead
Market economy countries production by type of feed, 1994



Source: ILZSG

prices generally reflects the market balance at world level (Figure 5). In 1994, prices recovered sharply from the doldrums of the past three years when substantial oversupply had developed. The 1994 upturn was not only due to the fact that the market was returning to a better balance between metal supply and demand as a result of improved economics but it also had to do with large investment funds turning to base metals as a hedge against inflation and interest rises.

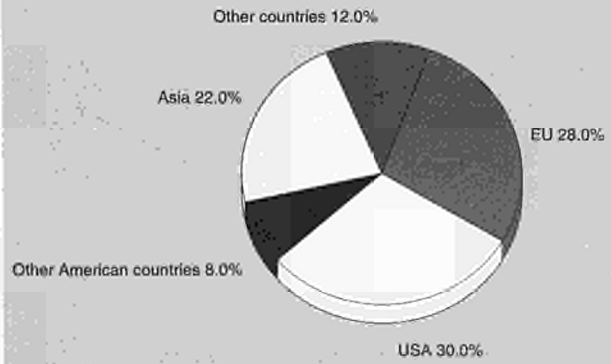
The firming up of LME quotations was extremely welcome as the price levels which had been prevailing in 1993 were actually jeopardising the viability of the industry.

INDUSTRY STRUCTURE

Companies

Within the EU there are 7 primary smelters/refiners whose production capacity ranges in size from 40 000 tonnes per year to 245 000 tonnes per year.

Figure 3: Refined lead
Market economy countries consumption, 1994



Source: ILZSG

The primary refineries are mostly multinational, and are spread throughout the United Kingdom (Britannia Refined Metals), France (Metaleurop), Germany (Metallgesellschaft, Metaleurop), Belgium (Union Minière) and Italy (Enirisorse). All plants, with the exception of Britannia Refined Metals, smelt lead or lead/zinc concentrates before refining lead bullion. Britannia Refined Metals refines only crude lead bullion imported from its parent company MIM in Australia. With the exception of Union Minière, all of these primary refiners are involved in secondary recycling/refining as well.

The secondary industry is characterised by a large number of smaller refineries, many of which are independent. There are approximately thirty secondary smelters/refiners in the EU producing from 5 000 to 65 000 tonnes per year. They recycle and refine scrap generated in their local area. The number of these refineries is decreasing as the large multinational companies, and the major battery manufacturing groups as well, acquire the smaller secondary facilities or set up their own new recycling operations.

The enlargement of the EU to 15 Member States would increase the number of lead operators with one primary smelter/refiner in Sweden (Boliden) and a few secondary refineries in Austria (BBU-Metalle being the largest one).

Strategies

During the last three years there has been considerable restructuring within the overall lead refining industry and its major outlet, the battery industry. The effects of such restructuring so far can mostly be noticed within the battery industry, with the emergence in Europe of five major battery groups. These groups have become very powerful in their bargaining capabilities and some are competing with the lead refiners by integrating their battery manufacturing facilities into lead recycling/refining operations: they process their own scrap collected from their own collecting networks for spent batteries, which are returned through their distributor networks.

In the future, secondary refiners will have to work more closely with the major battery companies in order to maximise the recycling rate of battery scrap and to comply with national legislation implementing the EU Battery Regulation. Government approved collection schemes will be set up hopefully in close collaboration between the refiners and the battery manufacturers.

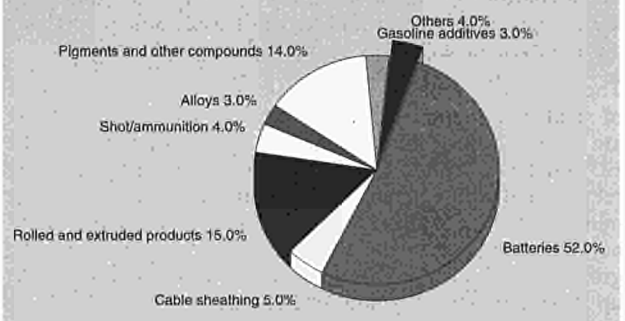
Such schemes should be harmonised throughout the EU to allow fair competition on supply of lead and lead alloys between EU Member States and other European countries with similar schemes.

Environmental legislation will also require investment to reduce lead in air emissions. In recent years several new technologies have been developed and implemented which offer more efficient, environmentally acceptable methods of smelting lead concentrates. These new technologies should rapidly gain ground because of their ability, in most cases, to handle secondary feed material as well. They integrate the smelting and refining operations, offering many advantages such as economies of scale, synergy of the smelting and refining processes, concentration of lead production in fewer areas, and closure of environmentally unacceptable plants and lower lead emission levels.

It seems certain that the new pyrometallurgical technologies will further increase their share of total lead smelting capacities over the next decade at the expense of the conventional blast furnace. Ultimately, looking further ahead, hydrometallurgical processes will probably make their way through, there are already signs of such development in the treatment of battery paste, in fact.

Undoubtedly, the number of operational refining sites will decrease in Europe: consolidation and rationalisation are

Figure 4: Refined lead
EU consumption by end-use, 1994



Source: ILZSG

bound to take place as companies are confronted with facts and figures relating to possible return on investments.

ENVIRONMENT

As lead is a toxic metal, it ranks high among environmental concerns. The metal has relatively little impact on ecosystems though and there has been much debate about the levels of lead which can actually cause harm: general policy is normally to restrict emissions to the lowest practicable levels given the state of technology, and recycling is normally conducted whenever appropriate and economic. Most control measures are concerned principally with human exposure (humans are most affected by lead exposure) although there are certain instances in which animals can be exposed to environmental lead.

Lead is increasingly recyclable in its major applications. Batteries, which created 52% of lead consumption in the EU in 1994, are recycled with more than 90% efficiency. Indications are that this efficiency rate should further improve in the future. Among the other uses, tetraethyl lead (petrol additives), pigments and shots have declined dramatically or disappeared completely over recent years.

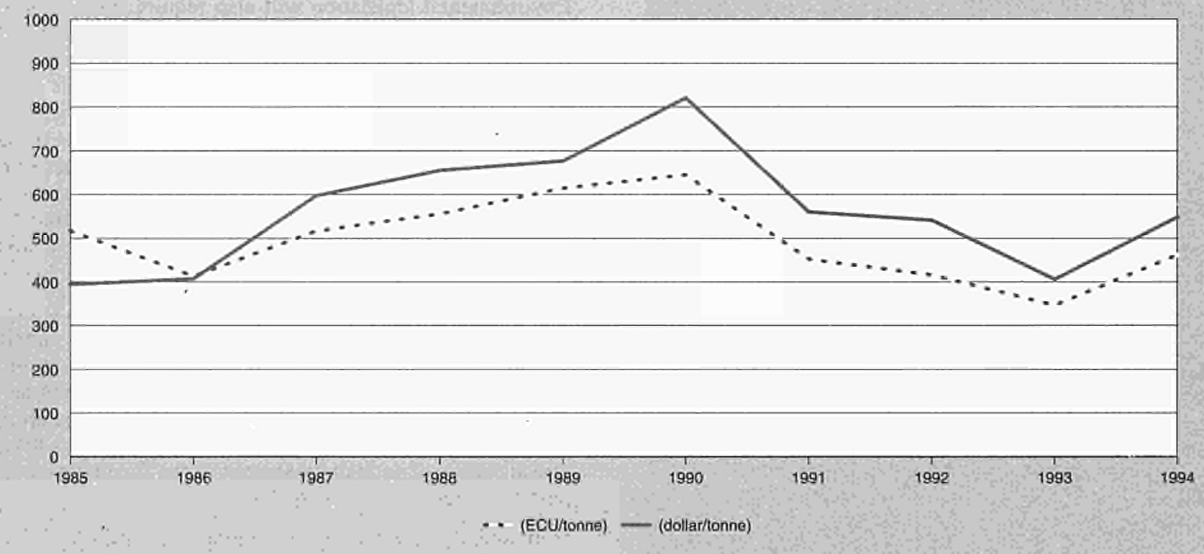
This has been partly as a result of environmental legislation (e.g. tetraethyl lead), partly as a result of voluntary reductions by industry (e.g. lead shots for fishing weights) and partly as a result of substitution (pigments). As far as the other uses are concerned, lead is mostly used in products from which it cannot be easily extracted such as glass, ceramics, plastics, so even in these cases there is minimal risk for ecological impact. The net result is that those uses of lead which can really affect the environment are steadily disappearing.

During the production and processing of lead there are inevitably occasions for emissions. These are kept to a minimum through the use of pollution control technologies and the strict compliance to legal limit values on the amounts which are allowed to escape. Airborne emissions are controlled through efficient filtration systems and through the implementation of design and management systems which prevent uncontrolled losses to the environment. Aqueous effluents are treated before discharge to ensure their compliance with limits imposed by water authorities. Finally, solid residues may not be disposed of indiscriminately. Depending on their lead content or their ability to dissolve into the environment, residues are designated as safe or hazardous and disposed of in authorised landfills.

REGULATIONS

Regulations affecting lead fall into three main categories: occupational exposure, emissions from plants and controls on products. Occupational exposure is addressed under EU Directive 82/605/EEC of July 28, 1992 on the protection of workers from risks related to exposure to metallic lead and its ionic compounds at work. This directive sets allowances on the level of lead in air in the workplace and on certain biological indicators which reflect the level of exposure of individual workers. The limit values are complemented by rules on the protection of the workforce providing for the use of protective clothing, respirators, washing facilities or specifying rules on eating, drinking, smoking, etc.

Figure 5: Lead prices
LME settlement annual averages



Source: Metal Bulletin - London Metal Exchange

Emissions from lead works are normally controlled by means of national regulations relating to air or water. There are no universal European limits in these areas. However, lead in the general atmosphere is limited under Directive 82/844/EEC of December 3, 1982 which sets a limit for levels of lead in air throughout the EU. These limit values are currently being revised. Levels of lead in water are also controlled in a number of directives relating to water depending on its type and use e.g., water intended for human consumption, water for bathing, fishing waters, etc.

Regarding products, regulations do apply to a number of non-recoverable uses of lead. The use of lead in petrol, for instance, is controlled under Council Directive 85/210/EEC of March 20, 1985. Several Member States have their own regulations which impose tighter limits or which require the availability of unleaded petrol for vehicles introduced on to the market after a certain date. Another area in which legislation is applied is the use of lead in paints, which has been restricted under various national legislation for many years.

Recently, lead carbonates and lead sulphates have been also controlled under EU Directive 89/667/EEC of December 21, 1989. This directive prohibits the sale of lead pigmented paints and prohibits their use in domestic buildings.

OUTLOOK

The potential for growth in the lead market essentially relies on two factors:

- the development pattern of the major end-use, i.e. batteries,
- the expansion of consumption in the newly industrialised and developing countries.

For many years now, environmental concerns have already restricted the use of lead in many applications and the major challenge facing the industry in the future will be to reduce the risk associated with the usage of lead in order to prevent that lead be gradually phased out from a growing number of applications.

Considerable efforts are being made by industry both at European and international level with a view to asserting lead properties on the basis of sound scientific arguments and avoiding misjudgements which would be detrimental to the usage of lead.

Production and processing are also under great environmental pressure. It is driving the industry towards constant technology improvements both at primary and at secondary plants and is leading to the commissioning of new installations and the phasing-out of old processes.

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Copper
NACE (Revision 1) 27.44

The EU possesses few copper mine resources, but its copper metallurgical activities are highly significant. Its refining and semi manufacturing capabilities have developed in line with the requirements of its large consumption, using imported primary raw materials and domestic as well as imported scrap. EU copper demand follows the slow growth pattern of a mature market. Recycling is brought to a high level as, in many of its applications, copper can be reprocessed without loss of its intrinsic properties.

INDUSTRY PROFILE

Description of the sector

The core of the EU copper industry is in refining and semi-manufacturing, in comparison with which the EU mining capabilities are negligible. Since the start-up of mining at Neves Corvo in 1989, Portugal has become the only EU country with a sizeable copper mine production (130 000 tonnes of copper in 1994). With about 135 000 tonnes of copper extracted from domestic ores in 1994, the EU accounts for less than 2% of the total western world (i.e. market economy countries') copper mine output. The enlargement to 15 Member States should bring this share up to some 3%, essentially due to the mining activity in Sweden.

Recent trends

Annual refined copper production in the EU is in excess of 1.3 million tonnes. The largest facilities are located in Germany, Belgium and Spain. Refinery output essentially arises from electrolytic processes, in the form of cathodes, that are often melted and cast on the premises into "refinery shapes", i.e. billets, cakes. Some refineries also produce wire rod at the refinery location or elsewhere. About 60% of the feed supplies to the EU copper refineries are purchased on the international market in the form of copper blister, anodes or scrap. The remaining 40% come from the refiners' own smelting operations whose feed consists of domestic and imported copper concentrates as well as copper bearing residue or scrap.

The products of the refineries are the major feed material for the copper semis manufacturers. The EU copper semis output exceeded 4.6 million tonnes in 1994. This was nearly 7% above the record output of 1992. Germany, Italy and France accounted for about 71% of EU output, with the Benelux countries, the United Kingdom and Spain making up most of the balance. The range of products supplied by the semis manufacturers is very wide. They consist primarily of rods, profiles, wires, sheets, strips, tubes, etc., with applications in such diverse sectors as electrical engineering, automobiles, construction, machinery, shipbuilding, aircraft, precision instruments, watches and clocks.

With an output which is three and half times that of EU refinery output, the EU copper semis manufacturers must turn to the international market to secure adequate volumes of supplies, together with the required alloying metals (zinc, tin and nickel for the most part).

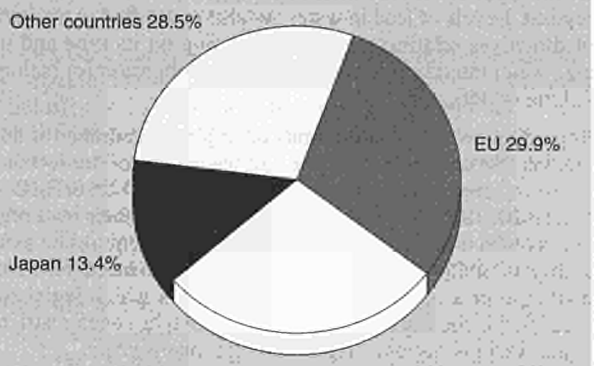
The EU semis production is in excess of demand, and the EU copper semis manufacturing industry is a net exporter by about 300 000 tonnes per year.

International comparison

Nearly 30% of the market economy countries' 10 million tonnes demand for refined copper arises from the EU market. The EU consumed 3 million tonnes of copper, more than both North America's consumption of 2.9 million tonnes and Japan's 1.4 million tonnes. Germany, France, Italy, Belgium and the United Kingdom are each among the top ten consumers together with the United States, Japan, Taiwan, South Korea, and India.

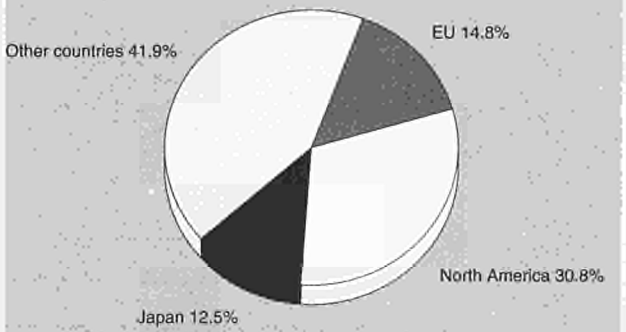
In terms of production, the EU refiners account for about 15% of the market economy countries' output. The EU's 1.3 million tonnes produced per year is slightly ahead of Japanese and Chilean production, each of around 1.2 million tonnes, but behind North American production (slightly below 3.0 million tonnes). However, in the coming years, EU production may be losing its second place ranking to Chile, whose production is rising sharply. For copper semis production, the EU countries hold by far the most dominant position at world level, accounting for 40% of the market economy countries' estimated 11.7 million tonnes output in 1994, with the United States and Japan contributing 28% and 18% respectively.

Figure 1: Refined copper
Market economy countries consumption, 1994



Source: World Bureau of Metal Statistics, January 1996

Figure 2: Refined copper
Market economy countries production, 1994



Source: World Bureau of Metal Statistics, January 1996

Table 1: Refined copper
Main EU indicators in volume

(thousand tonnes)	1989	1990	1991	1992	1993	1994
Consumption	2 709	2 804	2 845	2 955	2 793	3 054
Production	1 222	1 227	1 219	1 303	1 386	1 333
Trade balance	-1 454	-1 689	-1 728	-1 701	-1 586	-1 644

Source: World Bureau of Metal Statistics, January 1996 and Eurostat External Trade

Table 2: Copper semis
Main EU indicators in volume (1)

(thousand tonnes)	1989	1990	1991	1992	1993	1994
Consumption (2)	3 441	3 563	3 680	3 829	3 649	4 074
Production	4 079	4 142	4 218	4 323	4 095	4 613
Trade balance	273	242	227	220	299	292

(1) Excluding Denmark and Ireland.
(2) Sum of individual countries apparent domestic consumption data, excluding intra-EU trade from 1993.
Source: International Wrought Copper Council, London - Eurostat External Trade Data (CN codes 7407 to 7412)

MARKET FORCES

Demand

Though lacking copper primary resources, the EU has a strong copper industry, being the largest copper consumer market among market economy countries. Demand for copper mainly comes from the electrical and electronics industries, which absorb about 50% of total EU consumption. These industries use copper primarily as a conductor material to carry electricity, in the form of wires, profiles and rods made of unalloyed copper. The construction sector is the second largest consumer: excluding building wire, it accounts for approximately 25% of total EU copper demand. A wide variety of semi finished products, of both unalloyed and alloyed copper, is used in plumbing, roofing, decoration, etc. The remaining 25% of demand arises mostly from industrial machinery and equipment, transportation equipment and consumer products. Copper's excellent thermal and electrical conductivity, corrosion resistance and malleability make it an ideal and safe choice for these applications.

Copper applications are well developed and the growth pattern of copper consumption closely follows the cycle of overall industrial activity at large. Copper demand in the EU market as a whole is growing slightly, as in most industrialised areas in the world. Trends differ from country to country, however. Reconstruction in the east German Länder has contributed to higher than average copper demand but this trend is levelling out.

Supply and competition

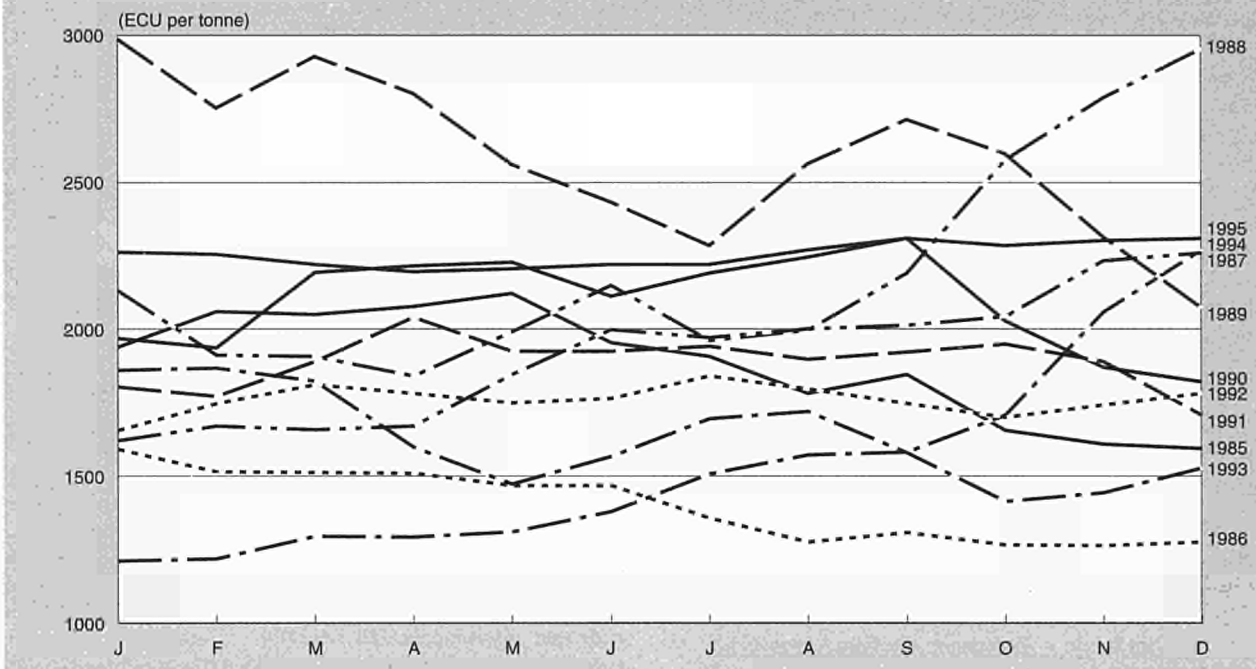
EU copper refining activity has been able to grow primarily by securing raw materials on the international market and making use of the domestic "surface mine" consisting of copper scrap and residue generated by consumers and processors, as well as by demolition and obsolescence. Access to primary supplies has become increasingly difficult over the past few

Table 3: Refined copper
International comparison of consumption

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1994 shares (%)
Market economy countries	7 362	7 674	8 012	8 211	8 636	8 766	8 988	9 107	9 396	10 220	100.0
EU	2 358	2 419	2 457	2 525	2 709	2 804	2 845	2 955	2 793	3 054	29.9
Belgique/België	310	303	292	318	376	390	372	386	332	407	4.0
Deutschland	754	771	800	798	854	897	1 006	1 032	921	1 000	9.8
España	116	130	131	135	146	146	156	153	162	178	1.7
France	398	401	399	409	459	478	481	488	474	513	5.0
Italia	362	394	420	445	458	475	471	502	490	480	4.7
Portugal	16	17.6	26	28	21.7	24.5	26	21	10	7	0.0
United Kingdom	347	340	328	328	325	317	269	308	325	377	3.7
USA	1 976	2 100	2 127	2 206	2 204	2 150	2 058	2 176	2 359	2 678	26.2
Canada	223	226	232	236	219	181	159	156	186	199	1.9
Japan	1 226	1 211	1 277	1 331	1 447	1 577	1 613	1 411	1 384	1 375	13.5
Taiwan	92	156	208	215	315	265	399	416	477	547	5.4
South Korea	207	262	259	266	252	324	343	354	400	476	4.7

Source: World Bureau of Metal Statistics, January 1996

Figure 3: Refined copper
LME quotations (settlement-grade A)



Source: World Bureau of Metal Statistics

years, as copper mining countries have developed their own refining facilities close to their mines, thereby reducing raw materials availability on the international market. Furthermore, competition by rapidly industrialising countries for copper raw materials has increased as these countries develop domestic refining capacity to satisfy the requirements of their consumer markets.

Copper refiners and semis manufacturers in the EU face heavy international competition for their raw material purchases, especially from producers in certain markets, mainly in the Far East, which benefit from protective measures. Trade in secondary materials is increasingly being restricted by environmental regulations such as the Basel Convention and the EU Regulation 259/93 ruling trans-frontier shipments of hazardous materials. These regulations have a real impact on certain areas of the international copper scrap trade, restricting free movement of scrap copper, thus impacting on currently established recycling circuits.

The potential for expansion of copper refinery capacities in the EU is limited due to the difficulties of access to feed supplies as well as the heavy investment requirements and operational costs arising from environmental protection measures, which are far above the average world standard. Nevertheless, following the acquisition of Rio Tinto Minera in Spain by a major mining company, Freeport, with a world class copper mine in Indonesia, an expansion of the Spanish smelter and refinery is taking place. Besides, refinery modernisations have taken place at Norddeutsche Affinerie (D).

Table 4: Refined copper
International comparison of production

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1994 shares (%)
Market economy countries	7 310	7 434	7 631	7 974	8 317	8 465	8 527	8 995	9 122	8 981	100.0
EU	1 216	1 229	1 192	1 226	1 222	1 227	1 219	1 303	1 386	1 333	14.8
Belgique/België	413	414	408	393	329	332	298	367	379	371	4.1
Deutschland	414	422	400	426	475	476	522	582	632	592	6.6
España	152	155	151	159	166	171	190	179	179	188	2.1
France	44	42	40	44	49	44	56	57	59	51	0.6
Italia	64	65	65	75	83	83	83	76	90	84	0.9
Portugal	5	5	5	5	0	0	0	0	0	0	0.0
United Kingdom	125	126	122	124	119	122	70	42	47	47	0.5
USA	1 435	1 480	1 542	1 853	1 954	2 017	1 995	2 144	2 253	2 220	24.7
Canada	500	493	491	529	515	516	538	539	562	550	6.1
Japan	936	943	980	955	990	1 008	1 076	1 161	1 189	1 119	12.5
Chile	884	942	970	1 013	1 071	1 192	1 228	1 242	1 268	1 277	14.2
Peru	227	226	225	175	224	182	244	251	262	253	2.8
Zaire	227	218	210	203	204	173	140	57	36	29	0.3
Zambia	510	487	509	448	470	479	424	472	425	370	4.1
Australia	194	185	208	223	255	274	279	303	309	336	3.7

Source: World Bureau of Metal Statistics, January 1996

Table 5: Copper semis
Main EU indicators by product line, 1994 (1)

(thousand tonnes)	Consumption (2)	Production	Net exports
Unalloyed copper, total	2 669.1	3 084.3	166.5
Wire	1 829.0	2 232.7	148.7
Rods, profiles	37.1	46.6	9.5
Rolled material	322.2	335.6	19.2
Tubes	480.7	469.4	-10.9
Copper alloys, total	1 405.3	1 528.6	115.2
Wire	67.3	76.6	7.7
Rods, profiles	896.9	920.4	24.3
Rolled material	338.0	403.2	65.3
Tubes	103.1	128.4	17.9
Total	4 074.4	4 612.9	281.7

(1) Excluding Denmark and Ireland.
(2) Sum of individual countries apparent domestic consumption data, excluding intra-EU trade.
Source: International Wrought Copper Council, London; Eurostat

In addition, Hüttenwerke Kayser (D) and Union Minière (B) refineries are currently being modernised. All are making use of the latest tankhouse technology.

Nevertheless, the structural shortage of EU refined copper output versus the manufacturing industry's requirements is expected to continue and the EU will remain a large net importer of refined copper. EU copper semis output, on the other hand, is large enough to adequately supply the EU consumer market towards which it is primarily geared. Excess capacity should enable the EU to remain a net exporter.

Prices

The London Metal Exchange (LME) quotations for Grade A copper cathode generally govern the pricing of copper transactions made by the industry. The evolution of the LME copper prices generally reflects the market balance at 5world level, although the influence of large investment funds is increasingly felt in the market and has been particularly significant in 1994.

INDUSTRY STRUCTURE

Companies

There are ten major refineries in the EU and it is estimated that the copper refining industry employed more than 5 000 people in 1994. Two companies have facilities of over 300 000 tonnes refined copper per year capacity: Union Minière (B) and Norddeutsche Affinerie (D). Two others, Hüttenwerke Kayser (D) and Rio Tinto Minera (E), produce more than 100 000 tonnes per year each but will reach a production capacity of 170-215 000 tonnes per year after investments are completed. Cost-saving considerations and economic efficiency were the decisive factors for these capacity expansions. Production capacity at the other facilities, in Spain, Italy, the United Kingdom, France and Belgium, ranges between 35 000 and 100 000 tonnes of copper per year.

Upstream integration into smelting operations, processing concentrates or low grade scrap, varies from one refinery to another. Some are fully or partially integrated while others have no smelting facility at all. Only one company has a smelting capacity which significantly exceeds its refining capacity (Metallo Chimique in Belgium). At the EU level, there is a deficit in copper smelting capacity.

There are many more companies in the copper semis manufacturing industry, where about 100 companies are involved throughout the EU, employing some 75 000 people. However, the industry is dominated by three large groupings: KMEEuropa Metalli (I), with manufacturing subsidiaries in France, Germany, Italy and Spain; Outokumpu (SF), with manufacturing facilities in Finland, Sweden, and Spain; and Boliden (S), with plants in Sweden, Netherlands, Belgium and the UK. Other major independent companies include Carlo Gnutti (I), Wieland Werke (D) and IMI (UK). The industry suffers from over-capacity, making it very vulnerable to cyclical movements in demand.

ENVIRONMENT

Recycling constitutes an important component of the raw material supplies of the copper refining and manufacturing fa-

Table 6: Copper
EU copper refineries, 1994

Country	Company	Location	Theoretical annual capacity (thousand tonnes)	Employment
Belgique/België	Union Minière	Olen	330	800
	Metallo-Chimique	Beerse	38	240
Deutschland	Norddeutsche Affinerie	Hamburg	365	2 000
	Hüttenwerke Kayser	Lünen	127	680
	MKM Mansfelder Küpfer und Messing	Hettstedt	55	230
España	ELMET	Bilbao-Berango	38	125
	Rio Tinto Minera	Huelva	150	600
France	Cie Générale du Palais	Le Palais	45	270
Italia	ENIRISORSE	Porto Marghera	60	200
United Kingdom	IMI Refiners	James Bridge	46	380

Source: International Wrought Copper Council, London, and industry statistics

cilities. Copper can be recovered from many of its applications and returned to the production process without loss of quality in recycling. Having very limited access to domestic primary sources of copper, the EU industry has traditionally given much attention to so-called "surface mines", relying to a large extent on scrap feed to reduce the large deficit of its copper raw materials trade balance. Altogether, secondary raw materials account for about 40% of the EU's use of copper, either by refineries as part of their feed and then by fabricators in the form of refined copper, or by fabricators directly. In some cases, such as brass rods, the product is made entirely from recycled copper and brass, with only a small input of primary zinc.

The EU copper industry has developed advanced technologies and made considerable investments so as to be able to process a wide range of copper scrap, including complex, low-grade residues, and to comply at the same time with increasingly stringent environmental constraints.

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Nickel
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The nickel industry world-wide has developed a highly concentrated structure: about 60% of the metallurgical production of nickel in the market economy countries comes from only four companies. Nickel demand follows a rising trend, determined to a large extent by the increase of consumption in the stainless steel industry, especially in the newly industrialised countries. The 15 countries of the enlarged EU constitute the largest nickel consumption area in the world; they are also the third largest producing area for finished nickel products, with five companies operating on their territory. With regard to nickel mine production, the share of European producers is much more limited.

INDUSTRY PROFILE

Description of the sector

The EU nickel industry processes raw materials, either nickel ore or intermediate products, into nickel products. The range of products for nickel is wide: ferro nickel, produced by Eramet (F) in New Caledonia, Larco (GR) and Treibacher (A) for use as a charge product in the fabrication of stainless steels; metal, produced by Inco Europe (UK), Eramet (F) and Outokumpu (SF) for use as an alloying element in various applications (such as superalloys); salts, produced by Inco Europe, Eramet and Outokumpu for use mainly in the catalyst and electroplating industries.

Recent trends

Since the mid-1970s, nickel consumption in Western Europe has increased at an average annual rate of 2.6%. In 1990, EU-12 consumption reached a peak, at 240 000 tonnes, but it fell by 9% in 1991 and by a further 9% in 1992, as a result on the one hand of poor economic conditions, and on the other hand of a sharp increase in the use of secondary nickel units imported from the CIS. Since then, nickel consumption in the EU has picked up very strongly, thanks to the recovery of European stainless steel production. It reached 264 000 tonnes in 1994.

The metallurgical production of the EU grew steadily during the 1980s, reached a peak in 1988 with 89 000 tonnes, and decreased slowly thereafter down to 82 000 tonnes in 1992. The resumption of EU, and world-wide, nickel consumption fuelled a strong recovery in 1993 and 1994 when EU nickel production reached a record 94 000 tonnes.

Due to the deficit of production on consumption, the EU is a net importer of nickel for about two-thirds of its needs. A major structural change has taken place recently with a growing share of these imports being supplied by the CIS.

International comparison

Among the top four companies producing nickel in the market economy countries (see Table 3), one is an EU corporation, Eramet in France, another owns a factory in the EU, Inco (Canada) in the United Kingdom, and a third has production facilities in Norway, Falconbridge (Canada). Table 4 shows the estimated share of the EU in world production of refined nickel. If reference is made to the market economy countries only, the EU share has diminished significantly over the past 16 years. The Canadian share decreased even more during the same period of time.

In 1994, nickel consumption in the market economy countries reached 772 000 tonnes, with the EU representing 34% of the total consumption (see Figure 1). This share of approximately one-third has been relatively stable since the 1970s. Asia, however, increased its share of consumption from 24% in the mid-1970s to 35% in 1994, while the US consumption decreased from a 31% share in 1976 to 17% in 1994.

MARKET FORCES

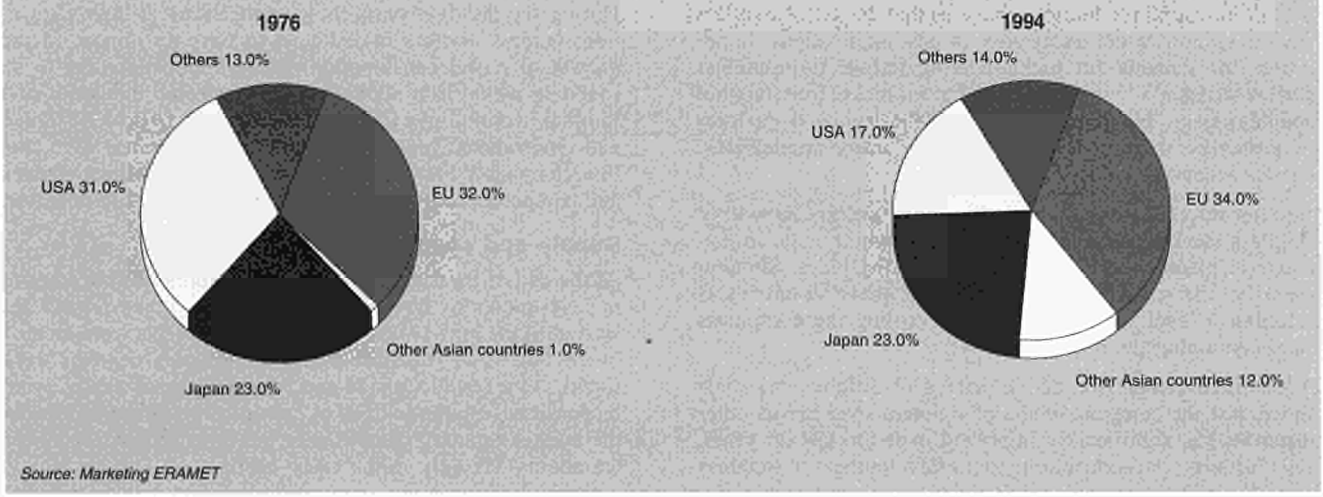
Demand

Nickel consumption in the market economy countries grew at an annual rate of 2.4% between 1970 and 1994. EU consumption increased by 2.6% per year during this period, while Japanese consumption rose by 3.3% per year, and consumption in the USA decreased by 1.2% per year. East Asian Newly Industrialised Countries (NICs) were the fastest developing area with an average annual growth rate of 17.3%. Consumption of nickel in this area today is four times higher than it was 10 years ago.

Stainless steel is by far the most important end-use for nickel. Nickel consumption for stainless steel represents nearly 65% of total nickel demand (almost 70% in the EU). It grew at a yearly rate of 4.4% between 1970 and 1995, while nickel consumption in other sectors remained stable.

The major end-use of stainless steel is in the equipment of process industries (e.g. chemical plants, pulp and paper mills,

Figure 1: Nickel
Market economy countries consumption by area



Source: Marketing ERAMET

Table 1: Nickel
Mine production in nickel content

(thousand tonnes)	1985	1990	1991	1992	1993	1994
New Caledonia (France)	72.4	85.0	99.6	100.5	97.1	96.7
Ellada	16.7	18.5	19.3	17.0	12.9	18.8
EU	89.1	103.5	118.9	117.5	110.0	115.5
World	827.7	981.5	945.1	894.8	899.3	871
Share of the EU in the World total (%)	10.8	10.5	12.6	13.1	12.2	13.3

Source: Marketing ERAMET

Table 2: Nickel
Main EU indicators in volume

(thousand tonnes)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Apparent consumption	174.4	193.4	204.7	226.6	225.5	240.0	216.5	197.4	219.0	264.0
Metallurgical production	77.7	83.5	75.9	88.8	88.5	82.9	86.4	82.1	86.8	94.0
Employment (units)	5 616	5 078	4 363	4 445	4 546	4 519	4 463	4 380	4 260	N/A

Source: Marketing ERAMET

Table 3: Nickel
Top 4 companies by production share (1)

(%)	1987	1988	1989	1990	1991	1992	1993	1994
Inco (all products)	37	35	34	31	29	32	30	27
Falconbridge	14	15	15	15	14	14	14	17
Le Nickel-SLN (ferronickel, matte and ore sales)	8	9	9	8	8	8	8	8
Western Mining (fiscal years, nickel in concentrates)	8	7	6	8	9	9	8	12
Total	67	66	64	62	60	63	60	64

(1) Former COMECON countries excluded.
Source: Marketing ERAMET

food processing, power plants). However, significant applications in consumer-oriented goods are developing quickly (e.g. automobiles, domestic appliances, buildings).

The consumption of stainless steel world-wide has been increasing at an average rate of 5.5% per annum since 1975. This increase, which is significantly higher than that of the overall industrial production, confirms that the use of stainless steel is gaining wider acceptance in new applications. In addition, the demand for nickel-bearing (austenitic) stainless steel is rising at a higher rate than that for nickel free (ferritic) stainless steel. This is mainly due to the technical qualities of austenitic stainless steel, which, for many applications, has no acceptable substitute.

Another major driving factor is the above average growth of stainless steel consumption in the NICs, where huge investments in plants and infrastructure are taking place. Simultaneously, the growing middle-class in those countries is reaching a level where it can afford to buy more stainless steel containing durable goods.

A historical comparison of the pricing of different materials shows that the competitiveness of stainless steel versus other materials has significantly improved over the last 20 years. This factor is also contributing to the development of stainless steel consumption. Besides, the growth of nickel demand for stainless steel is supported by the improvement of the yield in stainless steel production, due to technological progress. As a result, there is still a higher rate of growth for primary nickel consumption than for secondary (recycled) nickel in the stainless steel sector.

During the last few years, new applications in high-growth, non-stainless, sectors have begun to have an impact on the growth of nickel consumption. These applications are to be found in nickel-iron alloys for the electronic industries and in other nickel alloys for liquefied natural gas (LNG) storage and environment protection applications. The use of nickel in rechargeable batteries for devices such as cellular phones and computers is a smaller but extremely high-growth sector.

Supply and competition

At the end of the 1960s, scarce nickel supplies led to a boom in investments by newcomers. Production, however, did not start until the mid-1970s. Most of these projects were located in the NICs and Australia where large nickel deposits were found. As a result, Canada and New Caledonia, which were responsible for around 75% of the nickel mine production in the market economy countries in the early 1970s, accounted for about 45% only in the early 1980s.

Table 4: Refined nickel
World production, 1994

	(thousand tonnes)
EU	94
World	802.6
Share of the EU in the World total (%)	11.7

Source: Marketing ERAMET

Up to 1970, about a dozen firms were engaged in nickel production, and increases in output were the result of expanding and modernising existing installations. At that time, all producers were working at near capacity level. Maximum capacity was reached at the beginning of the 1970s, but because of low demand, and subsequently very low nickel prices, producers had to significantly reduce their level of activity after 1975, bringing about a decrease in the rate of use of production capacity. Several facilities closed after 1984, as production costs were too high to enable firms to survive the depressed period of the first half of the 1980s. Real capacity also decreased due to a lack of maintenance at most of the plants still in use.

Considerable progress in productivity has been achieved since the 1980s, including a significant reduction in energy consumption. This has enabled some companies to reduce production costs so that they are in a better position to cope with the economic ups and downs which are affecting the capital and consumer goods sectors, the major driving forces of nickel demand. Many companies still suffered heavy losses, however.

Production costs decreased in constant terms, and the average break-even price for low cost producers, which was over 6.5 USD per kg at the end of the 1970s, decreased to a level between 4.5 USD and 5.5 USD per kg by the mid-1980s. The most competitive producers remained the sulphide producers in Canada and Australia which were less affected by the high price of oil at that time. After 1985, production costs increased significantly. Producers treating sulphide ore (e.g. Inco) faced increases in wages and social benefits for their workers and lower ore content in their mines due to the lack of extensive mining development work.

Producers processing lateritic ore, including the EU companies Larco and Eramet, also suffered an increase in costs, but to a lesser degree. The decrease in the price of oil and the depreciation of some currencies in Indonesia, Columbia and the Dominican Republic helped these producers to reduce the gap with the sulphide producers, and in some cases to take the lead in terms of costs.

As nominal production capacity was increasing in the market economy countries, net imports from former planned economy countries began to increase very sharply in the early 1990s, particularly from the Russian Federation. This change was triggered by the collapse of local consumption on the one hand, and by a dire need for hard currency revenues on the other hand. As a consequence, the nickel supply-demand balance of the market economies was severely affected, causing inventories of nickel to pile up, until the end of 1994, when sharply increasing demand helped to absorb them. The market share of net imports from former planned economies rose to 24% of Western consumption in 1994, or 185 000 tonnes. The future trend of deliveries from the CIS will have a critical influence on the world nickel supply/demand balance over the coming years.

A significant side effect of the sudden increase of supplies from the former planned economies was the postponing of investment by Western producers. The recent pick-up in nickel consumption, and the resulting market deficit that became obvious in 1995, have triggered new nickel projects; however, these will only come on stream at the turn of this century. These projects are located mostly in the main traditional nickel mining areas (e.g. Canada, Australia, New Caledonia, Indonesia), and they naturally aim at lower costs of production.

It is important to bear in mind that a major factor weighing on the relative competitiveness of nickel producers is the evolution of the currency exchange rates of their respective countries relatively to the US dollar. In this respect, the recent depreciation of the Australian and Canadian dollar vis-à-vis the US dollar has translated into lower local production costs for these two countries.

INDUSTRY STRUCTURE

Companies

The leading four companies in the market economies in 1994 are Inco (Canada), Falconbridge (Canada), Eramet (France) and Western Mining (Australia). Together they account for 49% of the total output of finished nickel products however, when taking into account intermediate products, these four producers represent 64% of nickel production.

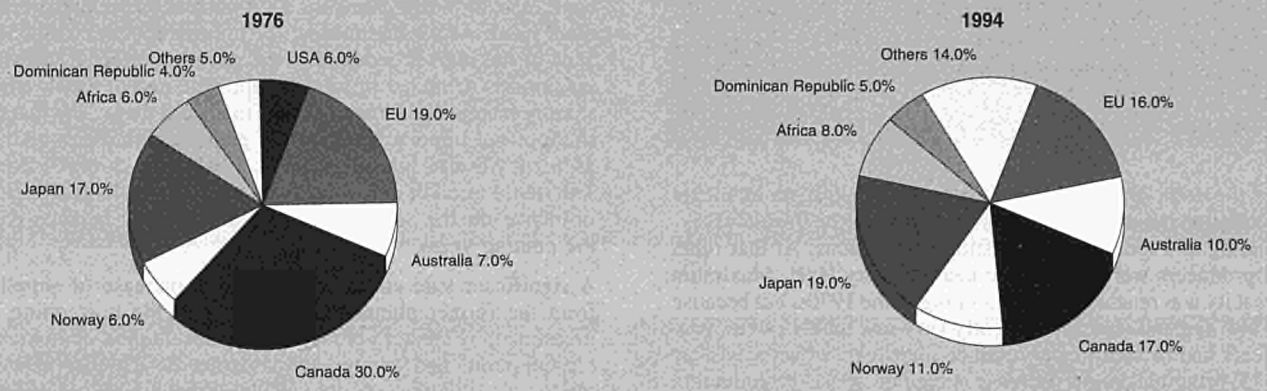
In the EU in 1994, only three companies are operating nickel production facilities. Inco Europe Ltd., a subsidiary of Inco Ltd. of Canada, the largest Western producer of nickel, processes nickel oxide, an intermediate product supplied by its parent company, into pure nickel and nickel salts. Inco Europe Ltd. markets its production throughout the world, although Europe is its most important market owing to its proximity. The American market is primarily supplied by Inco Canada.

Table 5: Nickel
Major EU producers, 1995

Country	Company	Location	Process	Products	Annual capacity (tonnes Ni)
Ellada	Larco	Larymna	F (1)	ferronickel	25 000
France	ERAMET	Sandouville (Le Havre)	ER (2)	nickel metal, salts	13 000
	Le Nickel-SLN	Doniambo (New Caledonia)	F (1)	ferronickel, matte	50 000
Österreich	Treibacher	Treibach	F (1)	ferronickel	3 500
Suomi/Finland	Outokumpu	Harjavalta	F-L/AC (3)	nickel metal, salts	32 000
United Kingdom	INCO Europe Ltd.	Clydach (Wales)	VT/CO (4)	nickel metal, salts	54 000

(1) F= Smelting facilities for ore.
(2) ER = Electrolytic refining.
(3) L/AC= Acid Leaching.
(4) VT/CO= Carbonyl process.
Source: Marketing ERAMET

Figure 2: Nickel
Market economy countries production by area



Source: Marketing ERAMET

Eramet is a 56% subsidiary of ERAP which is the holding company of the French state-owned company Elf Aquitaine. Since September 1994 Eramet has been listed on the Paris stock exchange. Eramet is the mother company (90%) of Le Nickel-SLN in New Caledonia which produces nickel matte and ferro-nickel. Matte shipped from New Caledonia is processed in Le Havre-Sandouville into high purity nickel and salts. Eramet's sales programme world-wide therefore includes a wide range of products, including high purity metal, ferro-nickel and nickel salts.

Larco, currently a state-owned company in Greece, was founded in 1963 for the mining of local nickel ores and their processing into ferro-nickel. Due to the very small size of the Greek market, production is almost entirely destined for export. The EU market is the prime outlet for the Greek producer.

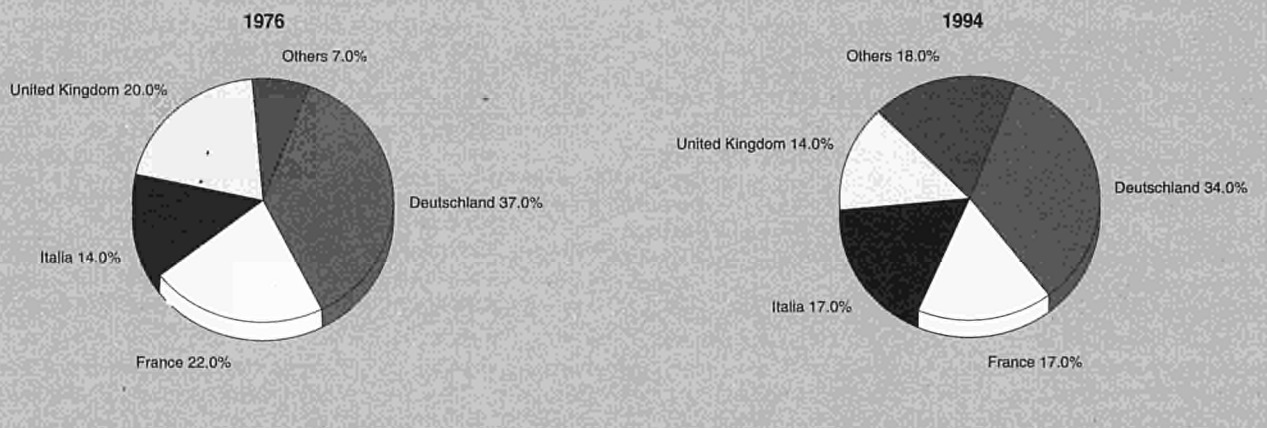
With the enlargement to 15 Members States, the EU includes two additional nickel producers. Outokumpu in Finland operates a smelter in Harjavalta. Although some of the feed is mined locally, the bulk of raw materials are supplied by non-European sources, mainly from Australia. Outokumpu produces nickel metal and salts. Treibacher in Austria produces ferronickel, partly from recycled material.

Strategies

Nickel demand grows steadily and such growth must be met by a corresponding sustained increase in nickel supply. To allow for such a development, investment in additional capacity at the lowest possible production costs must take place. Expansion at the existing mining and smelting facilities and improvements in the productivity are generally lower cost options but the opening and building of new mines and processing plants are also required.

Apart from economic considerations, long term stability of adequate supply can best be provided by giving priority to investments in integrated operations. Integrated nickel producers are not dependent on an external supply of nickel ore, and have their own refining facilities with a diversified range of products. They are therefore less dependent on cyclical market developments and are better able to withstand periods of recession. The nickel producers must keep abreast of market developments: close co-operation between the nickel producers and consumers is necessary for both industries.

Figure 3: Nickel
EU apparent consumption



Source: Marketing ERAMET

REGIONAL DISTRIBUTION

The nickel market is a global one, but to a large extent, nickel mining areas do not correspond to nickel consuming areas. Major nickel consuming countries are net nickel importers, either in the form of nickel ore and intermediate products or in the form of finished products.

Nickel consumption in the EU represents approximately one-third of consumption in the market economy countries, but the production of the three EU nickel companies accounts for only 16% of the corresponding output.

Germany is by far the largest nickel consumer market in the EU, representing 34% of total EU demand in 1994, but it has no domestic production. France is the second largest market, with a share of around 17%. Other major nickel consuming Member States are Italy with 17%, the United-Kingdom with 14%, Spain with 10% and Belgium with 8%. The other EU countries are not substantial consumers of nickel. With the enlargement to 15 Member States, the EU includes two additional significant consumers, Sweden and Finland, which both have stainless steel industries of substantial size.

Since the mid-1970s, nickel consumption in the EU has grown by 2.4% per year on average, although growth rates vary widely among the various Member States. Belgium with a 14% increase per year and Spain with a 5.8% increase per year experienced the highest expansion in consumption, while demand in France increased by only 0.8% per year and in the United Kingdom demand increased by only 0.3% per year.

ENVIRONMENT

Although nickel itself does not create environmental problems, some nickel compounds have properties which are dangerous to the environment and/or dangerous to humans. Most of the nickel producer and user industries have already reduced their emissions to an environmentally acceptable level. At the EU level, atmospheric emissions have been controlled and reduced by means of the installation of efficient filter systems. Liquid effluents have been under control for many years now, and their levels comply with regulatory limit values. Solid waste containing water-soluble compounds such as nickel-bearing metallic hydroxides is still a concern. In most cases, however, it is disposed in controlled landfills. Nickel-bearing recyclables (e.g. stainless steel and alloy scrap, spent catalysts) are not an area of concern with respect to their nickel content.

REGULATIONS

In spite of minimum specific risks for the general environment, nickel and some of its compounds are facing increasing regulatory pressure at the EU level. Skin-contact allergy is a clearly established risk linked to direct and prolonged exposure to nickel in some common products. The European nickel producers have contributed to the definition by the European Commission of a directive for managing this risk which touches a fraction of the population (Directive 94/27/EC of 30 June 1994 amending for the 12th time Directive 76/769/EEC). Nickel is suspected of inducing respiratory cancer in workers in certain nickel refining processes. In addition, the classification of some nickel compounds as human carcinogens (Directive 67/548) will have a serious impact on industry and will require protective measures for workers exposed to these substances (Directive 90/548).

Like the rest of the non-ferrous metals industry, the nickel industry is concerned with the implementation of the EU regulation on trans-frontier shipments of waste. Too many uncertainties regarding the definitions and classification of wastes and essential administrative provisions of this legislation present a severe threat to the entire recyclables trade.

The attitude of a growing number of industrial sectors which are potential users of nickel is extremely worrying in their way to select raw materials by using lists of dangerous chemicals as a reference. The so-called "tyranny of lists" could lead to the sectorial phasing out of nickel, although no risk assessment has actually been performed.

OUTLOOK

Nickel consumption should continue to grow at a relatively sustained rate in the medium and long term, although it will continue to fluctuate due to cyclical variations in general economic activity.

The following factors should result in the continued development of nickel consumption: first, the growth of nickel consumption in the industrialised countries in connection with the development of new high growth applications, most of them linked to the protection of the environment; second, a booming demand for nickel and nickel-containing products such as stainless steel in the NICs, especially in Asia and in some Latin America countries, due to the construction of new plants and the growing need for durable goods; and third, the reconstruction and reshaping of a civil industry in the former COMECON countries.

The recent creation of the "International Nickel Study Group" has improved the availability of reliable statistical information on the market thanks to the increased co-operation of the participating governments. This should help the decision process at all industry levels and significantly contribute to the transparency of the market.

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Cobalt
NACE (Revision 1) 27.45

The EU cobalt industry is the world leader in cobalt powder and oxide production, as well as a supplier of cobalt salts world-wide. The "cradle" of special cobalt products (i.e. powders, oxides and salts) is Belgium, where considerable production expertise has been developed since the beginning of the century in the treatment and processing of cobalt metal and raw materials originally coming from the Shaba copper mines in Zaire. Today, cobalt special products are a world-wide business with products from the EU, North America, China, the CIS, Australia, South Africa and others. However, the EU still retains a large proportion of the capacity to satisfy the market, (40% to 45%), with plants operating in Belgium, Germany, France and the United Kingdom, directly involving at least 9 companies. With Finland joining the EU on January 1, 1995, this proportion should increase to 55% to 60%.

INDUSTRY PROFILE

Description of the sector

Cobalt metal is shiny, grey and brittle with a closely-packed hexagonal (CPH) crystal structure at room temperature, which changes at 421 °C to a face-centred cubic form. Cobalt is supplied to the end-users either as a metal in the form of pieces or powder or as a special product in the form of fine powders, oxides, or salts. The metal is not used as a structural material in its pure form, but always as an alloy or a component of another system.

As the central component of Vitamin B12, cobalt is one of the 27 elements essential to humans. It has unique properties which make it extremely valuable in many industrial applications. It has a high melting point, 1 493 °C, and retains its strength to a high temperature. It is ferromagnetic; only nickel and iron share this property. It is multivalent and easily enhances catalytic action.

As there are no longer any viable cobalt bearing ores in the EU, cobalt processors rely entirely on imported cobalt feed supplies, be these metal, mining or metallurgical residue or scrap.

All EU special products producers have to source cobalt outside their own business. Previously, cobalt supplies in the market economy countries, were dominated by Zaire and Zambia, indeed, 70% of metal production came from these two sources in 1990. This situation has drastically changed during the last few years due to the political turmoil in Zaire and the production problems in both Zaire and Zambia. Other factors such as net exports of Russian metal or the US Defence Logistic Agency (DLA) releases have resulted in Zaire and Zambia's share falling to less than 40%.

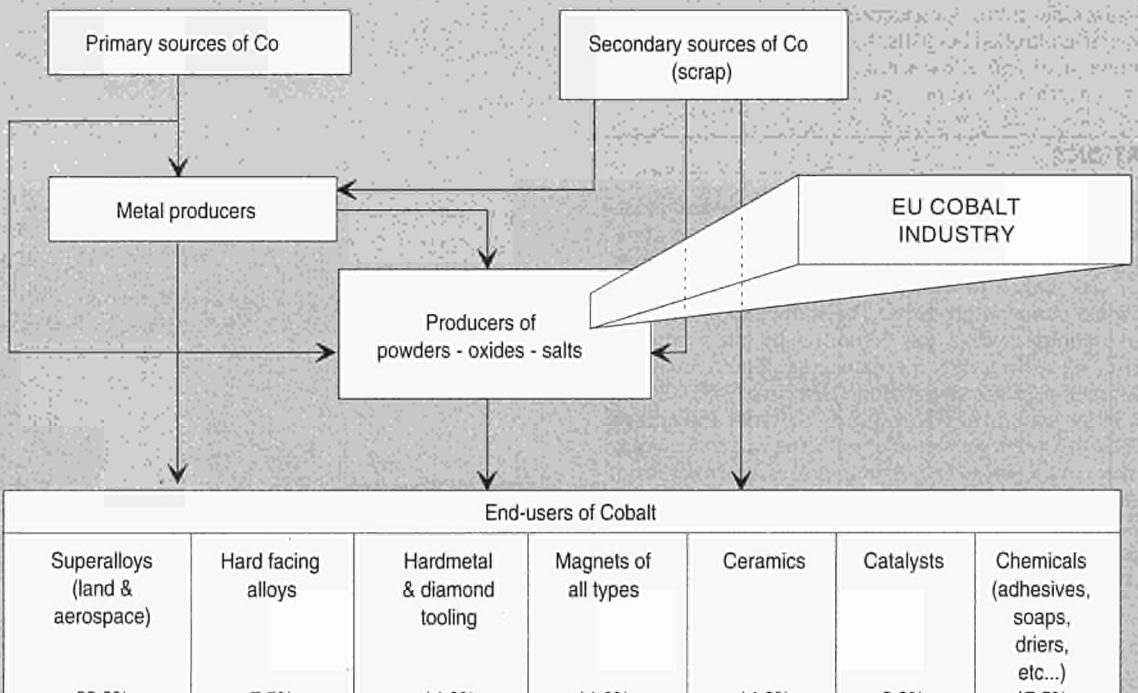
Europe is a major market for EU cobalt special products producers, but they must also compete in export markets as capacity far outweighs European demand. The main markets are the USA, Japan, Taiwan, South Korea and Pacific Rim countries. There are domestic competitors in these markets but other international companies compete there as well, as they do in Europe with the EU suppliers.

Figure 1 shows the overall cobalt market structure and the EU industry within it. Consumers of cobalt use the metal, as well as cobalt special products, to produce magnets, alloys (super alloys and hard facing), soft magnetic materials, hard materials, catalysts, specialty chemicals etc.

Recent trends

Due to a fundamental change in the supply structure, prices of cobalt metal and special products have doubled since 1992

Figure 1: Cobalt
Structure of the cobalt market



Source: Eurométaux, Cobalt Development Institute

Table 1: Cobalt
Products and applications

Forms/Products / Applications	Metal (cathodic or powder)	Powders		Oxides	Inorganic salts					
		extrafine	mesh		hydrate	sulfate	chloride	carbonate	acetate	nitrate
Special steels and alloys	x		x							
- high strength steels										
- high t° alloys										
- tool steels										
- Implant alloys										
- other special purposes alloys										
Magnetic materials										
- permanent magnets	x		x							
- soft magnetic alloys	x		x							
- recording tapes treatment						x				
Hard materials										
- cemented carbides		x	x							
- diamond tools		x	x							
Catalysts				x	x	x	x	x	x	x
Pigments/ceramics				x	x	x		x		
Enameling				x						
Metallic Soaps	x				x	x	x	x	x	x
Animal feed/ fertilizer additives						x		x		
Advanced electronics				x						

Source: Union Minière

and, very likely, pricing will remain quite volatile in the foreseeable future. While cobalt metal was the major feed material up to the late eighties, today's cobalt supply is much more diversified. There has been a trend towards the use of lower grade metal - especially of Russian origin or from the DLA's releases - as well as towards by-products, scrap and residues.

The importance of the trade is growing significantly and is interfering more and more with the traditional supply channels (direct producer-consumer relationships). Pricing is no longer dominated by the African Producer Price, but by the published prices of the Metal Bulletin (London) and Metals Week (New York).

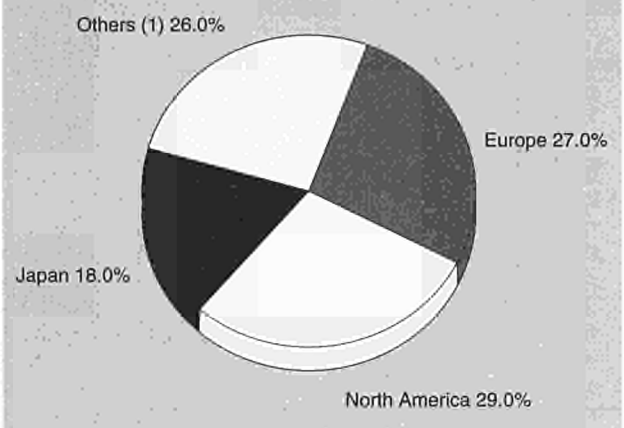
Users of cobalt metal have been increasingly creative in switching to lower grade metal to compensate for the lack of availability of high grade metal. Either quality restrictions have been relaxed or additional refining steps have been introduced in order to cope with the lesser quality of the input material and henceforth remain price competitive.

International comparison

Demand for cobalt essentially arises in the industrialised countries. Europe, North America and Japan take the lion's share of the total market economy countries' demand which was estimated at 20 900 tonnes cobalt in 1994. The emerging markets in the Far East (Korea, Taiwan) and China are slowly but surely becoming large users of cobalt. Today's geographic distribution of demand is shown in Figure 2.

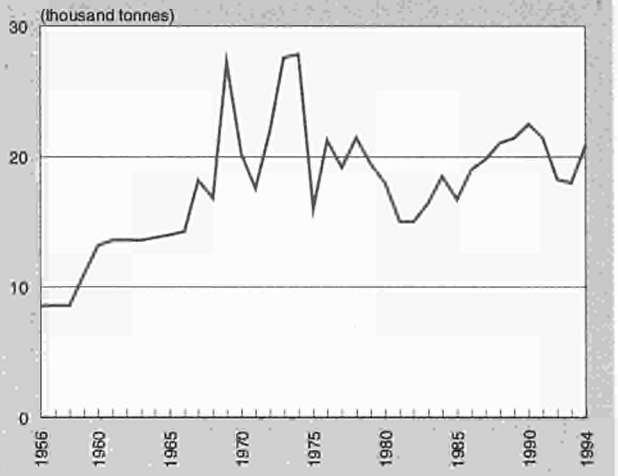
The cobalt market is a mature one. For 4 000 years cobalt has been used for ceramics; over the past 50 to 60 years, it has been used in superalloys and magnets. There are many new uses in electronic recording, anodising, batteries, and amorphous soft magnets. However, these do not currently generate a large tonnage demand. The consumption curve, in recent years, has been hovering around 20 000 tonnes per year, as shown in Figure 3. To some extent, fluctuations are due to technological rather than economic developments. To some degree, one must blame the uncertainty about supply which resulted from the late 1970s turmoil in Zaire. Demand has fallen in some areas due to the development of substitute

Figure 2: Cobalt
Estimated geographical breakdown of demand, 19941994



(1) Market economy countries only.
Source: Union Minière

Figure 3: Cobalt
Estimated demand in the market economy countries



Source: Cobalt Development Institute

products which is illustrated by the following examples: nickel superalloys, albeit cobalt-containing, replaced cobalt alloys, cobalt-free high speed steels were developed, Alnico magnets were replaced by ferrites, etc. On the other hand, sometimes fast growth patterns are being observed in newly industrialising countries or in some specific end uses, counterbalancing reduced consumption observed elsewhere.

MARKET FORCES

Demand

Until the 20th century, cobalt was only available or used as an oxide to produce blue colours. Its modern uses developed with Elwood Hayne's work on heat and wear resistant alloys (Stellite), the development of aluminium-nickel-cobalt (ALNICO) permanent magnets in Japan, and the use of cobalt as a binding agent in tungsten carbide production in Germany.

Cobalt is consumed in various forms and in many different applications, which are summarised in Table 1.

About 20 000 tonnes of cobalt are consumed each year in the market economy countries. At present, demand from EU customers for special cobalt products is about 3 500 tonnes cobalt per year (estimation based on the early 1990's, 36% in the form of oxides, another 36% in the form of salts, and the remaining 28% in the form of powders. This demand mainly comes from the hard materials industry consuming powders, the pigments and ceramic industry consuming oxides, the metallic soap manufacturers consuming salts, the animal feed and fertiliser sector also consuming salts and the catalyst industry consuming salts and oxides.

It should be noted that cobalt demand in the EU includes an additional estimated 3 000 tonnes cobalt per year, consumed in the form of metal by the steel and alloy industry, the permanent magnet industry and some segments of the chemical industry. As there are no cobalt metal producers in the EU, these requirements have to be imported in full.

Table 2: Cobalt
EU special products manufacturers

Company	Country	Product
Harcros	UK	Salts/Organics
Chemcat (Shepherd)	UK	Salts & Oxides
Eramet	F	Chloride
Eurotungstène	F	Powders
Hermann C. Starck	D	Powders & Salts
Rhône Poulenc	UK	Organics
Shepherd Mirecort	F	Salts
Union Minière	B	Powders & Oxides
Vasset (OMG)	F	Organics

Source: Union Minière

Supply and competition

Competition between special cobalt product manufacturers is fairly strong in all three areas, (salts, oxides and powders); the EU companies are world leaders in powders and oxides.

A summary description of the cobalt market at large helps to assess the relative position of the EU cobalt industry. It emphasises the diversity of its expertise out of consideration for the diversity of manufactured products and their industrial uses; it stresses the international "spread" of its enterprises, which import their feed materials from remote countries and export their products not only within Europe, but also to all parts of the world; and it brings to light the challenges which it must face in order to maintain its leadership and market share when competition is tough and demand has basically reached full maturity.

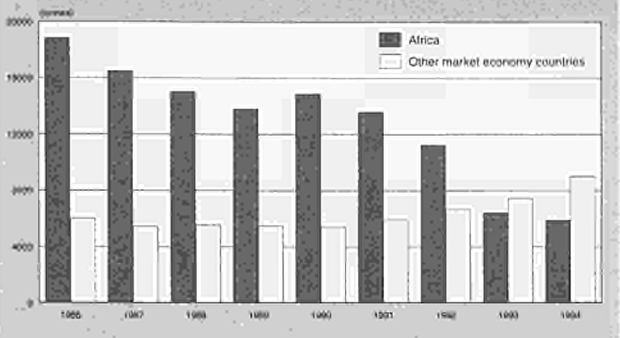
Production process

Mine Production

Cobalt essentially arises as a by-product from the processing of copper and nickel ores, but it can also be associated with platinum or other non-ferrous metal ores. It only occurs as a major extracted element in the arsenide ores of Morocco (currently exported to China). African mines were historically by far the largest suppliers of fresh cobalt units from the ground, accounting for nearly 63% of the market economy countries' total output. The bulk of mine production is offered directly to the market in the form of metal which is produced in the integrated operations of Gecamines (Zaire), ZCCM (Zambia), Inco and Falconbridge (Canada). However in recent years a significant portion of the African output has been exported as low grade material (e.g. white alloy or slag). The balance of the output is supplied by other mining concerns, either in the form of oxide or salts, or in the form of cobalt-bearing primary raw materials. Figure 4 shows the development of cobalt supply in market economy countries from 1986.

Metal production

Figure 4: Cobalt
Primary production in the market economy countries



Source: Cobalt Development Institute

There are five major cobalt metal producers in the market economy countries. Their 1994 capacity and output are outlined in Figure 5. In 1993 the Canadian company, Sherritt, started treating cobalt nickel sulfides produced at the Moa Bay plant of Cubaniquel in a long term arrangement. Since 1992, Russia has become a significant supplier of metal to the market economies; however, its actual output, arising at four different refineries, is difficult to assess. About 65% of metal output is directly supplied to end-users in the special steels and alloys industry, the permanent magnet industry, and some segments of the chemical industry. The remaining 35% are supplied to cobalt processors(i.e. producers of powders, oxides and salts).

Production of powders, oxides and salts

The market for special cobalt products (i.e. fine powders, oxides and salts) ranges from 9 000 to 11 000 tonnes cobalt content per year in the market economy countries. More than 50% of supplies result from metal processing, some 9% are the direct cobalt output of mining concerns (Inco's oxide, Eramet's chloride and Rustenburg Plat's sulphate), and the balance (41%) is produced from cobalt-bearing scrap, mining by-products or metallurgical residues.

More than 25 companies are active in the special cobalt product sector, though not necessarily supplying the full product range, and competition is fierce. Total installed capacity is estimated at 13 000 tonnes cobalt content per year, of which 34% for powders, 37% for salts and 29% for oxides.

Prices

Cobalt has for many years been a producer priced material as shown in Figure 6, with Zaire and Zambia traditionally setting the quoted level (African Producers price).Free market prices are quoted by trading companies, some of which have become deeply involved in cobalt in the early 1990s. This phenomenon is largely due to the emergence of significant quantities of Russian cobalt, and, recently, to large sales of DLA material (i.e. the US strategic stockpile). The volume of free market traded cobalt is difficult to assess but is probably around 20% to 25% of total supply.

INDUSTRY STRUCTURE

Companies

Although the EU has no cobalt mines or cobalt metal production, its industry is extremely strong in the processing of cobalt metal and of cobalt-bearing raw materials into special cobalt products (i.e. powders, oxides and salts). The rated capacity of the EU cobalt processing plants can be estimated altogether at about 6 500 to 7 000 tonnes per year.

All the companies listed in Table 2, with the exception of Eramet (F) which processes its own mining by-products from New Caledonia, rely on feed supplies purchased on the international markets, be they metal, mining or metallurgical residues, or scrap. Their output is not only intended for EU customers but also for export, since their combined production significantly exceeds EU customer requirements. Until January 1, 1995, the EU cobalt processors had only one major competitor in Europe, the Finnish plant of the OM Group. The OM Group was formed by Outokumpu (SF) and has three operating plants, Vasset in France, Kokkola in Finland and Mooney Chemicals in the USA. OMG's production is not yet taken into account in the 1994 figures subject of this review, but starting from 1995, the EU's cobalt processing capacity should be revalued to over 9 000 tonnes per year as a result of OMG's integration in the EU industry picture.

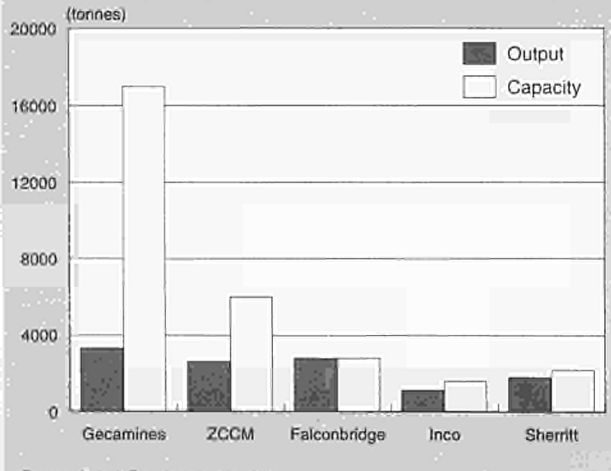
Although there are not many competitors with international scope, those that do operate internationally are fairly significant. Some of them supply special cobalt products as a by-product of other base metal activities: for example, Inco's cobalt oxide is a by-product of nickel-ore processing in Canada, and Rustenburg Platinum's cobalt sulphate is a by-product of platinum-ore processing in South Africa. On special products, the EU producers compete in foreign markets against strong local producers, especially in the USA and in Japan.

ENVIRONMENT

Cobalt is classified as non-carcinogenic in the EU (15th Modification to Directive 67/548/EEC). Material safety data sheets describing cobalt products are commonly available to the users from the suppliers, on request. Cobalt metal, oxides, sulphides and carbonates in the form of powder, are listed in the Seveso Directive (82/501/EEC), but are withdrawn from this list in the proposed new version of the Directive. Current legislation, in force or proposed, regarding Health and Safety is closely followed by the industry, especially with regard to the setting of occupational exposure standards.

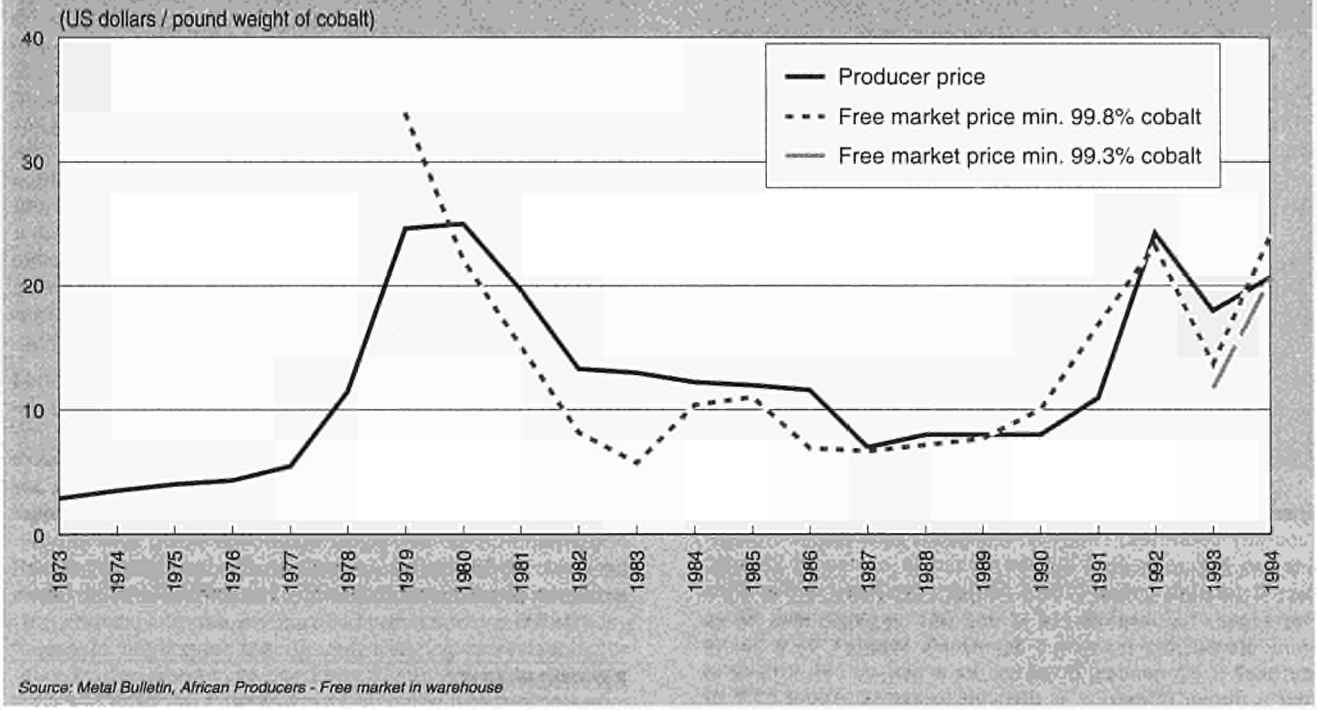
Cobalt metal and oxide (CO_3O_4) are on Annex I of Regulation 793/93/EEC on existing substances and the industry has collected data for submission, via a leading producer, to the Commission of the European Union in July 1994.

Figure 5: Cobalt
Metal production in the market economy countries, 1994



Source: Cobalt Development Institute

Figure 6: Cobalt
Prices (annual averages)



Source: Metal Bulletin, African Producers - Free market in warehouse

OUTLOOK

The EU cobalt industry faces several challenges. Feed stock must be imported due to the lack of indigenous cobalt sources. These sources are changing as the political scene shifts. Currently, the industry must rely on Central African countries (Zaire and Zambia), Canada/Norway (the Norwegian refinery is linked to Canadian mining operations) and Russia (CIS). This source is not new but consumption in Russia has fallen dramatically and surplus production plus stockpiles have rapidly appeared on western markets. To some extent, the new Russian material availability together with the DLA releases have made the industry less vulnerable to African instability. It appears, however, that uncertainty in supply and speculative trading, together with renewed growth in consumption, have had and will continue for some time to have a significant impact on pricing.

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