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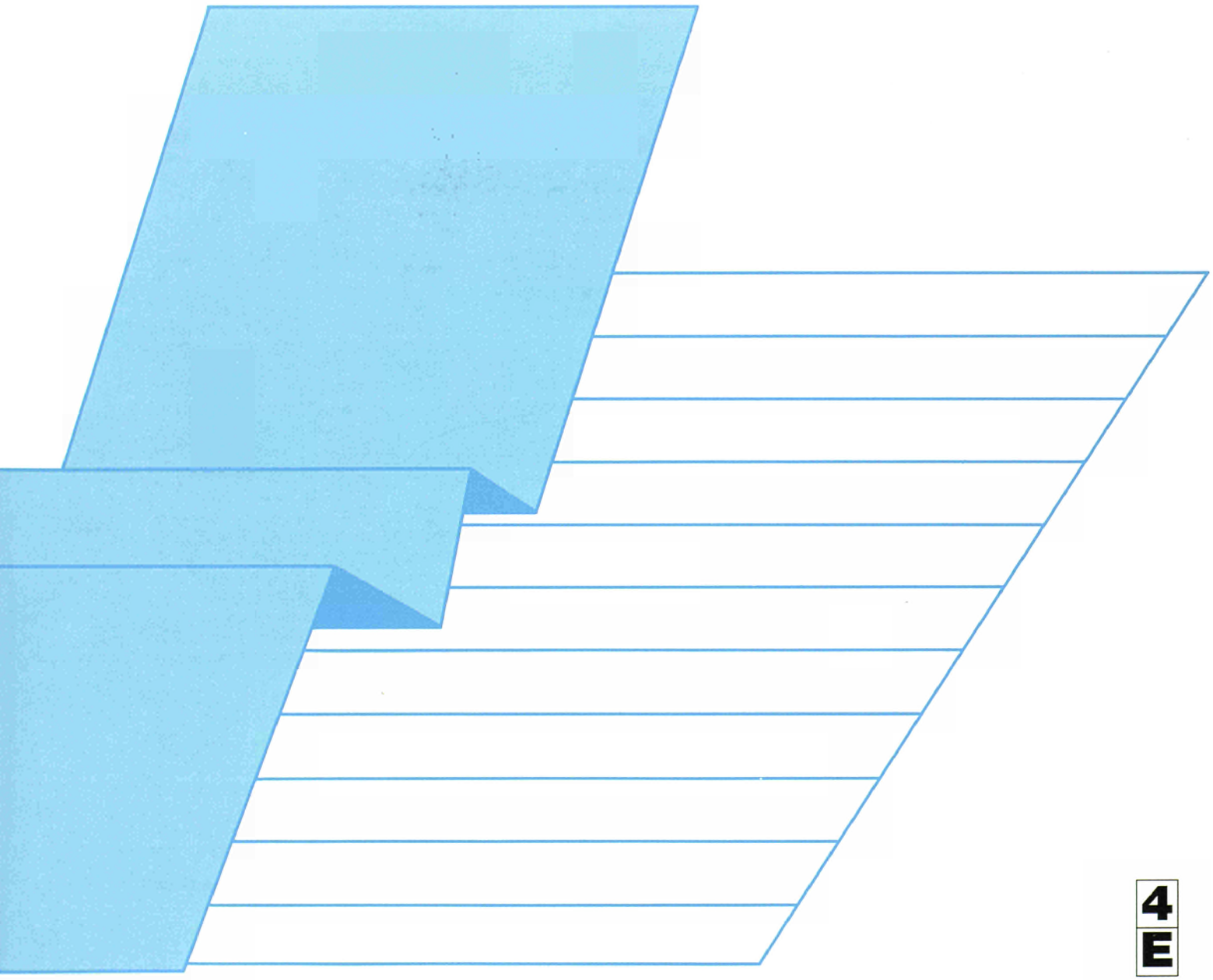
METHODOLOGY OF INDUSTRIAL SHORT-TERM STATISTICS

Rules and recommendations



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STATISTICAL OFFICE OF THE EUROPEAN COMMUNITIES
OFFICE STATISTIQUE DES COMMUNAUTÉS EUROPÉENNES

L-2920 Luxembourg — Tél. (352) 43 01-1 — Télex COMEUR LU 3423
B-1049 Bruxelles, rue de la Loi 200 — Tél. (32-2) 299 11 11

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Y. Franchet
Generaldirektor

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To ensure that the vast quantity of accessible data is made widely available, and to help each user make proper use of this information, Eurostat has set up two main categories of document: statistical documents and publications.

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The publications proper tend to be compiled for a well-defined and targeted public, such as educational circles or political and administrative decision-makers. The information in these documents is selected, sorted and annotated to suit the target public. In this instance, therefore, Eurostat works in an advisory capacity.

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Y. Franchet
Director-General

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Pour mettre à la disposition de tous l'importante quantité de données accessibles et faire en sorte que chacun puisse s'orienter correctement dans cet ensemble, deux grandes catégories de documents ont été créées: les documents statistiques et les publications.

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Les publications proprement dites peuvent, elles, être réalisées pour un public bien déterminé, ciblé, par exemple l'enseignement ou les décideurs politiques ou administratifs. Des informations sélectionnées, triées et commentées en fonction de ce public lui sont apportées. Eurostat joue, dès lors, le rôle de conseiller.

Dans le cas d'un public plus large, moins défini, Eurostat procure des éléments nécessaires à une première analyse, les annuaires et les périodiques, dans lesquels figurent les renseignements adéquats pour approfondir l'étude. Ces publications sont présentées sur papier ou dans des banques de données de type vidéotex.

Pour aider l'utilisateur à s'orienter dans ses recherches, Eurostat a créé les thèmes, c'est-à-dire une classification par sujet. Les documents statistiques et les publications sont répertoriés par série — par exemple, annuaire, conjoncture, méthodologie — afin de faciliter l'accès aux informations statistiques.

Y. Franchet
Directeur général

METHODOLOGY OF INDUSTRIAL SHORT-TERM STATISTICS

Rules and recommendations

Theme
Energy and industry
Series
Methods

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STATISTICAL DOCUMENT

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).

Cataloguing data can be found at the end of this publication.

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FOREWORD

The Single European Market and the approach of the Monetary Union have greatly increased the demand for Eurostat's short-term economic indicators on manufacturing industries and construction. In order to cope with new requirements for short term statistics, a new Council Regulation on short term indicators is about to be adopted.

These changes to the general environment in which statistics operate have led to repeated enquiries to Eurostat concerning the methodological basis of these short-term indicators, prompting Eurostat to produce a coherent methodological text. This publication makes available the results of this work.

The methodological manual has many authors, of which I will only mention some: Mr. Herbel (Production), Mr. Balk (Output Prices), Mr. Klusemann and Ms. Maquet (Turnover and Orders), Mr. Coyne and Ms. Martinez (Construction), Mr. Fischer (Seasonal Adjustment), Mr. Otmani (Prices in Construction), Mr. De Marcillac (Statistical Units), Ms. Zahino (Typing). In addition, extremely valuable comments of participants of Task Force meetings we held in the past three years on various methodological issues have also helped in writing this manual.

Finally, I accept sole responsibility for all remaining errors in the text. For any further information or critique please contact me, tel. (352) 430 13 44 01, fax 430 13 43 59, e-mail: berthold.feldmann@eurostat.cec.be

FOREWORD TO THE SECOND EDITION

Since the last edition, many discussions in seminars, bilateral debates with colleagues and serious negotiations in European Council working parties have taken place. Much of this has given valuable input for this second edition of the methodological manual. The book has been restructured and hopefully should be clearer now than before. Apart from the persons mentioned in the original foreword I am grateful for the contribution of Ms. Gabi Hano (Labour input variables and Investment), Ms. Merja Hult (Construction) and Mr. Simon Allen (verification). Comments for the third edition are always welcome.

Berthold Feldmann

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A. COMMON GUIDELINES

I. The Framework for a European System of Short Term Indicators

A

1. Introduction

The follow-up of the business cycle is indispensable for many actors in a market economy. For politicians, government agencies, bankers, business owners, consumers and trade unionists it is crucial for their decisions to know whether the economy grows, stagnates or declines and what will be the most likely development in the near future.

All these economic actors want to follow the business cycle movements as accurately and as rapidly as possible in order to draw well-founded conclusions. A key issue in this context is turning points, i.e. the moment when a boom turns into a recession and vice versa. Here the users want to be alerted in time of any signs of change in the progress of the economy.

For 25 years, European short term statistics have been based on a Council Directive[1] which after so many years no longer meets today's needs and possibilities concerning business cycle analysis. The **legal base** of the European system of quantitative Short Term Statistics is therefore at present being revised by a combined effort of Eurostat and the 15 National Statistical Offices of the Union.

The discussion on a new legal base started at the end of 1992. Five years later, in Spring 1997, the Commission approved a proposal which was submitted to the European Council.[2] We hope that the new legislation will be adopted in the beginning of 1998.

Parallel to the, often rather difficult, discussions about a new legal base for short term statistics, the methods of data collection, calculation of indicators, estimation methods, publication policy etc. are intensively checked and verified amongst European statisticians in order to decide on rules and recommendations which will improve the quality and the comparability of European

1) see Official Journal L 128 of 3/06/1972, p. 28. A Council Directive concerning the sector of construction followed in 1978 (Official Journal L 52 of 23/02/1978, p. 17).

2) See Annex V page 183 ff. Since the draft Regulation has not yet been adopted by the Council, the text might still change in the forthcoming months.

Short Term Statistics. The results of these discussions are laid down in this methodological manual.

In the past five years, many task force meetings and seminars were held in order to have an in-depth dialogue between the National Statistical Offices and Eurostat on methodological questions. First, task force meetings were organised during two years in order to write a first draft of this methodological manual. In general, two meetings were necessary for each topic:

Task Force meetings on methodological issues

Topic	1st meeting	2nd meeting
production index	March 1993	May 1993
labour input variables	May 1993	Nov. 1993
output prices	Sept. 1993	Feb. 1994
turnover and orders	April 1994	Dec. 1994
seasonal adjustment	July 1993	May 1995
construction	July 1994	Jan. 1995

At all of these task force meetings there were participants from Germany, France, Italy, the United Kingdom and two or three smaller EU Member States (often Spain, the Netherlands and Portugal).

During 1995 all Member States who did not participate at task force meetings were visited in order to take account of their views and methodological contributions. The first half of 1996, the first edition of the methodological manual was written.

After that, several "seminars" were held in order to discuss the **best practice** of National Statistical Offices for certain rather difficult topics. Here experts from the Member States explained their methods and outlined their experience in a comprehensive presentation, followed by a debate with the statisticians from other countries. The results of each seminar (including the presentations) have been published by Eurostat.

Seminars on methodological issues

Topic	Date
construction prices	Feb. 1996
orders statistics	May 1996
export prices	Oct. 1996
investment	Jan. 1997
labour input variables	Oct. 1997

This **second edition** of the methodological manual reflects the results of this **intensive European debate** among specialists of short term statistics.

This **first section** of the manual describes the **needs** for a harmonized and consistent system of short term indicators for the European Single Market, even though it is clear that the ideal of a "perfect" set of short term statistics will always be constrained by national traditions and habits and by financial constraints.

However, before we turn to the necessary compromises, it may be useful to picture the **long term aims** concerning European short term statistics.

2. Major changes in Europe

What will Europe look like in the near future? Of course nobody can foresee the exact political and economic structure of the European Union; such fundamental changes as the recent breakdown of communist regimes in Eastern Europe can be

predicted even less. However, three events are nearly certain to take place and should be taken into account when we reflect upon the needs for statistics:

- The European Union will soon have a **common currency,** the EURO, so that economic decisions which determine the business cycle, for example investment, pricing, employment, wages etc. will be taken in a monetary area similar to one single European nation today. This implies the existence of a **European Central Bank**.
- The European Union will probably have **more than 15 members**; some Central and East European countries are expected to join the European Union within the next ten to twenty years. This will probably not ease the task of harmonization of different statistical concepts.
- In addition, a major political tendency of the last years will get stronger: in the domain of public statistics - like in other domains of public administration - **cost/benefit analysis** of what we do will be increasingly important.

In the past decade financial support for the system of public statistics has already been cut and protests against the burden on reporting units have increased. Thus in the area of short term indicators there is now - and will be even more in the future - a need for justification and explanation of the work program. There can be little doubt that the discussions about privatisation of public tasks will not decrease in the coming years. Indeed the question has to be answered convincingly as to why the provision of statistics is a public good.

This challenge should be taken as a chance to improve the quality and adequacy of European short term statistics. The value for money of our information service needs to be constantly improved.

The main change in the coming years will be the creation of a European Central Bank and of a European currency in accordance with the Maastricht Treaty. The appearance of this new institution, responsible for the exchange rate and price stability, increases already today the demand for adequate harmonized short-term statistics.

Statisticians have to react to these changes and challenges. A milestone in this adaptation process was the Statistical Law which was approved by the European Council in February 1997.[3] The basic philosophy of this Statistical Law is that more and more the European statistical system will be devoted to the principles of

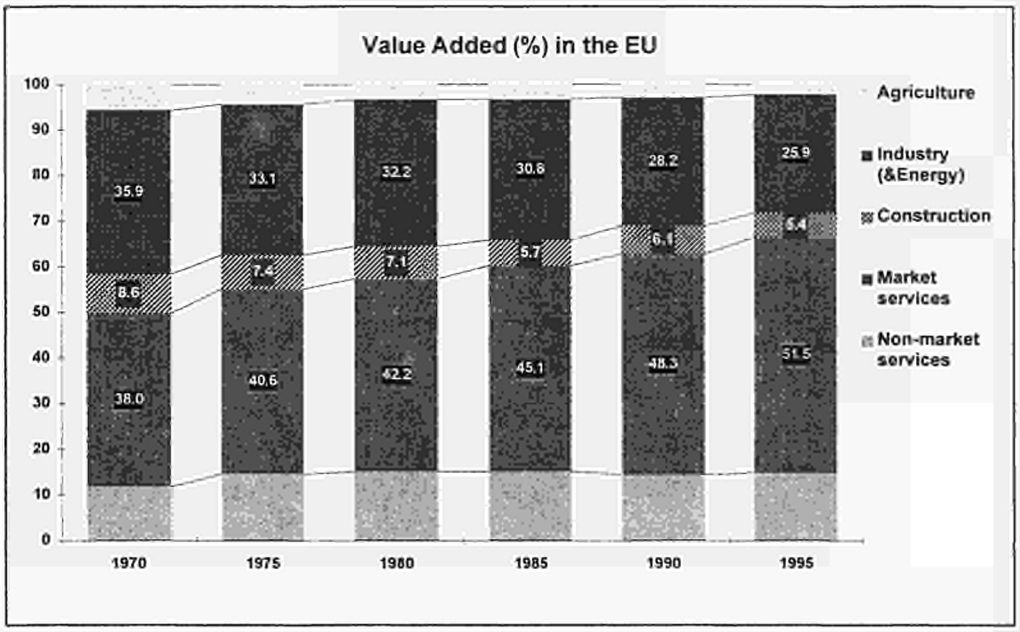
- **impartiality,**
- **objectivity,**
- **reliability,**
- **relevance** and
- **transparency**

A system of statistical offices similar to the intended system of **independent** central banks according to the Treaty of Maastricht can be conceived. This is an indispensable condition for supplying the public with consistent, comparable and trustworthy information.

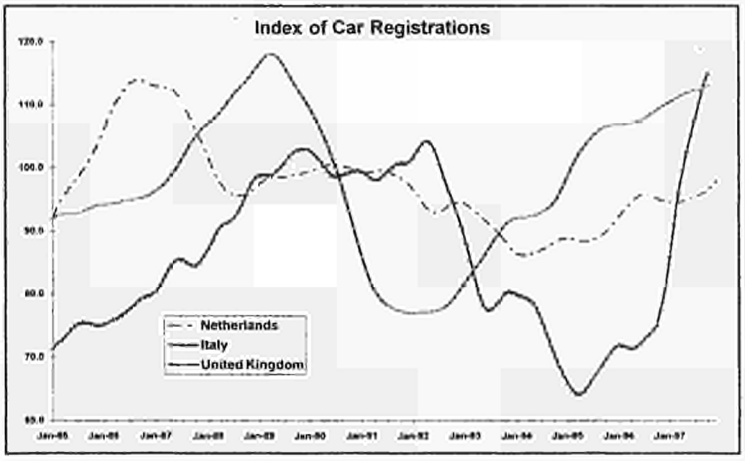
3. The service sector

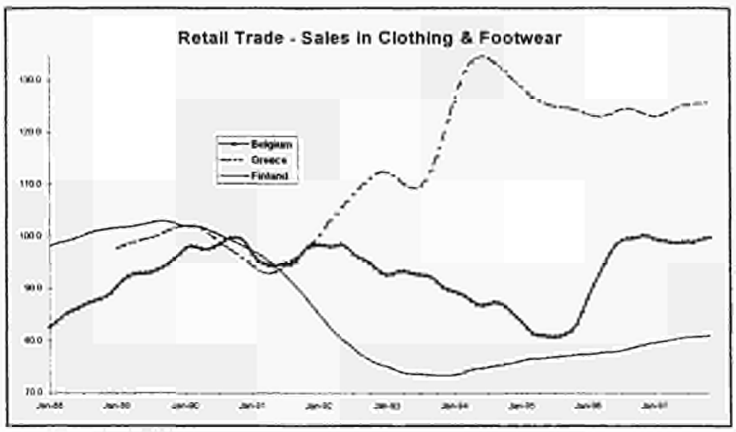
Undoubtedly, the importance of the market oriented service sector grows continuously, and it is expected to grow further in the future. The graph on the next page shows the evolution in time of the weight of different sectors of the economy for the European Union. For individual Member States a similar picture can be drawn.

3) Official Journal L 52 of 22/02/1997, p.1



Because of the undeniable growth of importance of market services, short term statistics that show the evolution of the business cycle in this sector seem necessary for the future. On the other hand it is sometimes argued that in services no business cycle can be observed, so that short term statistics are redundant.





The few statistics we dispose of show however that for example in retail trade and in the sales of cars fluctuations can clearly be identified. It would be worthwhile to check for other parts of the service sector, whether a business cycle exists or not. Experience in several Member States shows that there are many sectors where this does exist.

At the Community level, as a minimum, quarterly statistics on turnover and employment should be provided to the public for all parts of the service sector as soon as possible. This information is also a necessary base for quarterly National Accounts statistics.

4. The necessity of harmonization

Harmonization of concepts, norms, and standards is a prerequisite to the **comparability** of statistics. Historically the European statistical system has been developed by turning to existing national ones and thus methodological concepts were essentially concerned with the effort to translate national statistics into European ones. This is the so called "post harmoniza-

tion" approach which, especially in the area of business statistics, has given very poor results. In spite of the good will of national statisticians in the field of business statistics, long held habits, cultural and linguistic variety, differences in business structures and organisation, and finally differences in the perception of priorities under limited resource availability, have been conducive to a low level of comparability and a lack of harmonization.[4)]

The intensified construction of Europe we witness today needs an **intensification** of **statistical harmonization**, for at least two reasons:

- European monetary policy must be based on reliable European statistics which are fully comparable at all levels.
- With globalisation the logic of the business cycle will be more sector oriented than national. Therefore, short term analysis by journalists, businessmen, politicians, trade unionists and others will need trustworthy EU statistics.

It is mentioned in the Treaty of Maastricht that the Central Bank has the right and the obligation to organize the necessary tools to fulfil its tasks: "In order to undertake the tasks of the ESCB, the European Central Bank, assisted by the national central banks, shall collect the necessary statistical information either from the competent national authorities or directly from economic agents."[5)]

4) For a thorough discussion of the alternative concepts of international harmonisation
   - the uniform approach,
   - the meta-data approach,
   - the subsidiarity approach and
   - the modelling approach

   see Raoul Depoutot, Eurostat, 1997. This paper can be obtained on request.

5) See Treaty on European Union, Chapter II (Objectives and Tasks of the European System of Central Banks (ESCB)), Article 5 ("Collection of statistical information")

This **challenge** must prompt Eurostat and the National Statistical Offices to develop a program of short term statistics which is adequate to users' needs and at the same time cost-efficient.

In addition, at the national level the conditions for making economic policy will change. The balance of payments will no longer be a constraint for each country and new instruments of action will take the place of those which are being transferred to the Community level. In this perspective, the importance of statistics for individual industrial activities on employment and salaries will probably increase, even if harmonization in this area is particularly difficult.

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5. Multidimensional needs

What are the consequences of this political and economic scenario for industrial short term indicators? There is a need to follow business cycles as closely as possible in several dimensions:

- A very rapid assessment of the economic situation at a macroeconomic (i.e. very aggregated) level, where **timeliness** counts for all.
- A detailed **activity analysis** must allow political and economic decision makers to base their decisions on a precise knowledge of special economic short term events in each of the industrial activities.
- Taking into account the existence of a large single market with only one currency, political and economic decision takers will still be very much interested in **regional information**, i.e. facts con-

cerning a certain area like Catalonia, Lombardy or Wales as well as the territory of a present Member State like Denmark. For the large Member States Germany, France, Spain, Italy and the United Kingdom a break down of some business cycle indicators at the most aggregated level (total industry) into the largest regions inside the country would be desirable with a monthly or at least quarterly frequency.

- Since the European Union is characterized by many small and medium Member States with a substantial weight of small and medium sized enterprises, the importance of following closely the business cycle in **different size classes of enterprises** should not be neglected.

Apart from these needs for **detailed** information, there are **other demands** concerning short term indicators inside the European Union:

- Decision makers want to be able to analyse **several aspects** of the business cycle, i.e. not only the evolution of the volume of production (certainly the most important short term indicator), but also the evolution of output prices, of employment, of sales (turnover), of the climate of managers' opinion in a given region or activity, of unemployment, enterprise failures etc. Also the index of new orders is a vital piece of information for judging as early as possible the evolution of an industrial activity (leading indicator).
- Business cycle information must be absolutely **comparable** between Member States. Assuming the existence of a single currency in a large part of the European Union, it will be vital that the indicators which provide information on short term movements of the economy are collected and calculated with the same methods in all Member States. The strong wish for increased comparability has been repeatedly expressed by the European Monetary Institute.
- Industrial short term indicators should be **integrated** in the general framework of industrial statistics. For example the year to year growth rate of the monthly indicators must be coherent with the growth rate of the annual structural data insofar as the concepts are the same. This rule implies a goal of consistency between the different areas of industrial statistics and regular cross-checking of samples, methods and concepts between annual structural data and short term information. Likewise consistency should be aimed for between the indicators and the PRODCOM production statistics.
- Since political and economic decision makers need information on both the most recent past and on the anticipation of future developments, there must be a close link and co-operation between **quantitative** and **qualitative** information, in other words between the numeric indices treated in this manual and the business opinion surveys.

To summarise, the set of available indicators must give economic and political decision makers the elements they need to analyse quickly and accurately the economic situation.

The indicators must also enable people to test different forecast models as well as new theories concerning the business cycle.

6. Conflicting aims

One problem will always remain difficult to solve: where to draw the line concerning the trade-off between **costs** and statistical

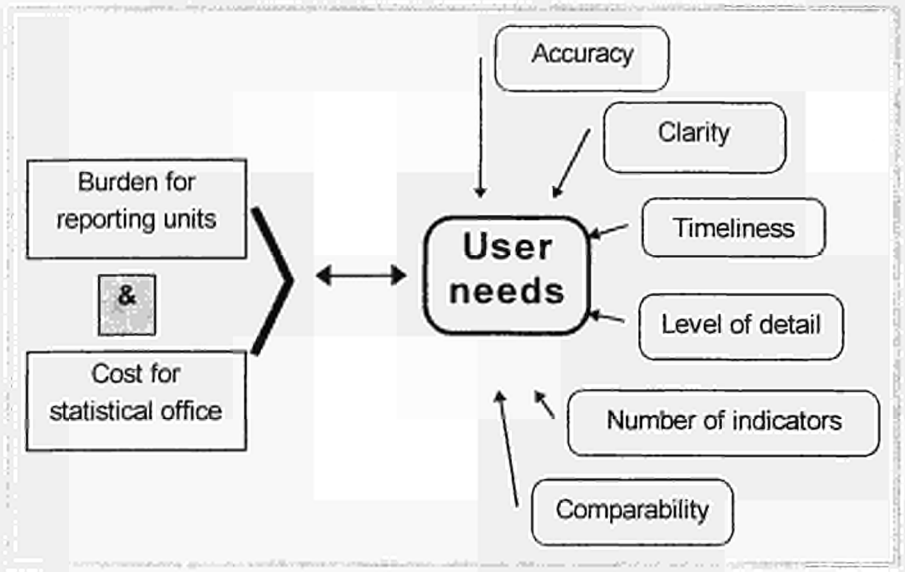
needs, in other words between what is desirable and what is possible.

There is a natural antagonism between the burden on reporting units and the costs for the statistical agency on one hand and user needs on the other.

However, the major user needs often conflict with each other. Satisfying one aim may be at the cost of one of the other goals, even if in the future all six major aims of

- accuracy (representativeness),
- timeliness (short delays),
- a high level of detail,
- a large range of different indicators,
- comparability of statistics between countries (harmonization) and
- clarity

will be satisfied more than today.[6)]



What should be the **priorities** among these goals? Intensive discussions with users have revealed that **timeliness** is regarded by far as the most important aim of short term indicators. But users also want internationally **comparable** data for their analysis. So these two goals should be attained first of all. The extent to which these two objectives are met at present is still far from satisfactory.

A

7. The set of indicators

If it is the aim of a system of industrial short term indicators to measure, analyse and forecast as detailed as possible all patterns of industrial activity, we therefore have to design the following set of short term statistics:

- a measure of (quantitative) activity: industrial **production**,
- an anticipation of activity: **orders**,
- the main factor of short term fluctuations: **investment**,
- the anticipation of investment trends: in a short term perspective, the concept of profitability approximated by the gross operating surplus. It means that we must have an indicator of **turnover** as well as one of **compensation of employees**,
- indicators of adjustments in different markets: **output price index**, stocks, utilisation of industrial capacity, **employment** and unemployment, productivity,

6) Contrary to common belief, the relation between costs and user needs might not always be antagonistic:
While certain variables change little from month to month so that a monthly data collection might be unnecessary, costs of a monthly data collection might be lower than a quarterly frequency if other variables are already collected from the same units on a monthly base anyway. This applies both to the reporting units as well as to the statistical office which processes the data.

- links to the rest of the world: foreign demand (exports) and competition from abroad (imports).

8. Conclusion

The basic improvements to the European system of Short Term Statistics have to encompass four aspects:

- **Timeliness**: in the future, EU wide short term indicators have to be available considerably faster than today in order to be useful to political and economic decision makers.
- **Harmonization**: data collection and calculation of indicators in the (more than fifteen) Member States of the future EU must be agreed upon in order to be suitable for reliable analysis.
- **Integration**: The results of short term indices must fit with other parts of the statistical system, for example National Accounts, but also structural business statistics. Only non-contradictory statistics deserve the trust the public shows in our statistics.
- **Larger coverage**: relevant parts of the growing service sector have to be included in the provision of short term information.

This long term program for short term statistics may seem difficult to materialize, but it is certainly worth the effort, since the demand for such statistics is unquestionably present and growing.

9. The legal framework

How can a Council Regulation be structured which takes account at the same time of **present constraints** and shortcomings, but which also enables us to foresee in fifteen to twenty years a **more ambitious** system of short term indicators?

The solution is a Regulation where the core legal text gives the **basic rules** which are applicable for the next twenty years. Specific modules for each economic sector give detailed rules which can be adapted over time to changing needs and possibilities by the Commission in accordance with the Comitology rules laid down in the draft Council Regulation. This structure gives the necessary **flexibility** which meets the demands both of National Statistical Offices and of the users of European short term statistics. The structure of the legislative base is given on the next page. The latest draft of the legal text is printed at the end of this manual.

The present methodological manual is an exhaustive compilation of rules and recommendations concerning short term indicators. The role of the manual is defined in article 11 of the draft Regulation:

"In co-operation with the Committee referred to in Article 17 (1), a methodological manual which
a) explains the rules set up in the annexes and also
b) contains guidelines concerning short term statistics,
will be published by the Commission.
This manual will be revised at regular intervals."

Overview

the role of body text, modules, committee and methodological manual in the Draft Regulation on short term statistics

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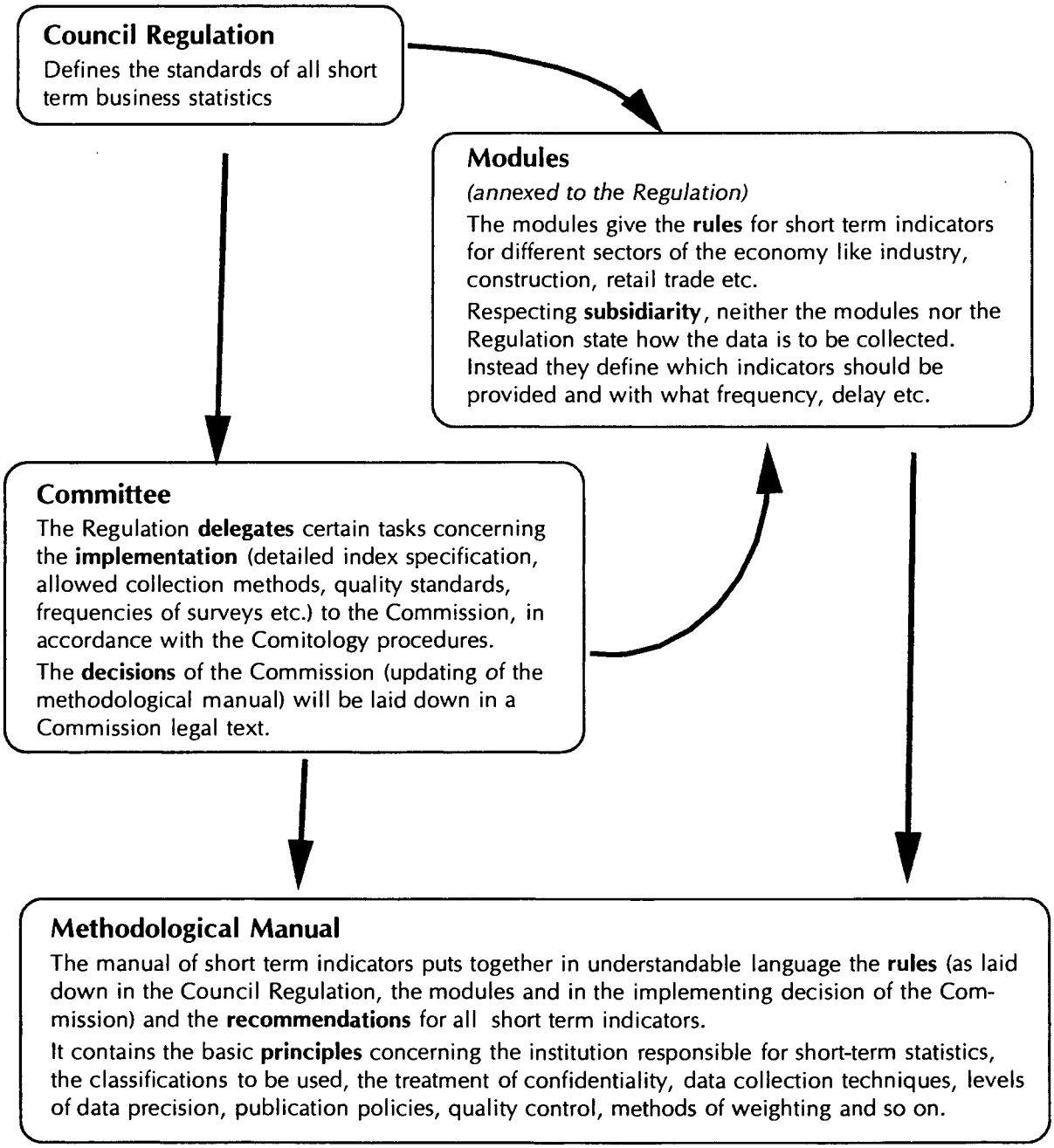

II. General Rules and Recommendations

A

1. Introduction

This manual for short term statistics gives the methodological framework for data collection and index calculation within the European Union; it thus contains the technical description of methods for data collection, index computation, data dissemination etc. The manual covers

- **industry** [7] (Part B) and
- **construction** (Part C).

For the **service sectors** no methodological handbook with rules and recommendations has been set up yet at a European level.

The text was written in the spirit of maximizing **comparability** of the business cycle indicators all over Europe. This objective becomes increasingly important in a world of large markets without frontiers, where politicians, industrialists, trade unionists, consumers and others need comparable statistics on the latest evolution of the economy.

At the same time the manual follows the basic principle of **subsidiarity** by leaving all possible freedom to the National Statistical Offices of the Member States to collect and calculate the necessary information in a way which is most appropriate to the situation in their country. Most countries possess well developed methods for collecting and calculating short term statistics. These methods should be retained as much as possible, as long as the principle of international comparability is not violated.

Eurostat already has established a rich electronic reference database on national methodologies, called MONA LISA (**M**ethods **o**f **Na**tional Statistica**l** Offices concerning **I**ndustrial **S**hort Term Indica**t**ors) which is constantly updated.[8] The contents of MONA LISA are also published at regular intervals.

This data base allows the users to check at any time how the rules and recommendations of this methodological manual are followed. It also allows them to understand to what extent the differences in the data are due to diverging concepts or methods used in the Member States.

7) The term "industry" includes in the context of this manual also mining and energy supply, in other words NACE Rev.1 sections C, D and E.

8) Information on this data base can be obtained from
tel. (..352) 4301 34401 or
fax (..352) 4301 34359 or
e-mail: berthold.feldmann@eurostat.cec.be

The methodological manual distinguishes clearly between fixed **rules** on one hand which exclude all alternatives and **recommendations** on the other hand. All rules (obligations) can be found in the body or module of the Council Regulation and are thus **legally binding**.

However deviations from recommendations have to be reported to Eurostat and in turn to the Committee specified in the draft Regulation on short term statistics. This creates the necessary **transparency** of methodology for the users of our statistics. Hopefully most recommendations will, over the years, become accepted rules which are followed by all National Statistical Offices of the European Union.

The present chapter of this handbook deals with the rules and recommendations which are applicable to **all** types of short term statistics, both in **industry** and in **construction**, in other words it contains the principles common to all indicators.

Rules and standards specific to certain indexes are treated in the subsequent parts of this manual, part B for Industry and part C for Construction. These specifications may in certain cases **override** the statements of this first general part.

2. Institution responsible

2.1. General competence

It is one of the central principles of public statistics that the data are **unbiased** and treated on all levels in an **objective** manner, free from any pressure from political or other interest groups. This should apply to collection techniques, definitions and data compilation. It also implies the same accessibility of statistics to **all** users.

For this reason, the national statistical offices of the Member States are in principal responsible for the data collection, the calculation of indices, and the data transmission to Eurostat.

They may delegate one or several tasks to subordinate institutes (for example regional statistical offices) provided that they work according to the rules and recommendations laid down in this handbook.

2.2. Exceptions

At present in some Member States data from ministries or from trade associations are used to compute short term statistics.[9] Following the principle of subsidiarity, this alternative option of data collection is **permitted** as far as the commissioned institutions observe rigorously the rules of this handbook, in particular, that they assure the quality and **objectivity** of the data, and that they respect strictly the **delays** of data availability.

It is nonetheless **recommended** that the statistical offices of the Member States should increasingly collect the required data themselves from the reporting units. The reason for this is that the statistical offices should have a direct and unrestricted control on coverage, methodology and quality of the basic information. At least the subsequent **data processing** should be independent of private interests and unbiased.

A Member State which does not follow this recommendation is obliged to spell out in written form the objectivity of its data col-

9) Construction statistics are for example collected by the appropriate ministry in Spain, France and the United Kingdom.

lection to Eurostat and to the Committee installed following the Council Regulation on short term statistics.

Since timeliness of business cycle information is also a very important topic, the quality of a Member State's short term indicators, and thus the concession of institutional exceptions, will also be judged on the respect for delays agreed upon.

2.3. Data transmission to Eurostat

In certain countries, some statistics like employment data or information on construction are not collected by the National Statistical Office but for example by different ministries. Following the draft Regulation on short term statistics, all different indicators have nonetheless to be sent to Eurostat **centrally** by one institution, generally the statistical office, which co-ordinates the data flow within the Member State.

Within each National Statistical Office Eurostat has to deal with several departments, divisions and sections simultaneously. In order to **facilitate communications** with 15 Member States, the draft Council Regulation stipulates that each statistical office should nominate one co-ordinating unit which is responsible for the dialogue with Eurostat.

3. Classifications to be used

Following the appropriate Community Regulations, all Member States shall

- use NACE Rev.1 for the data collection, the index calculation, and the presentation of activity indices in all transmitted and published series,[10)]
- use the CPA product classification[11)] or rather the more detailed PRODCOM list as far as queried units must report data by products or product groups.[12)]
- in the Construction industry (where appropriate) the statistics may be derived from information produced according to the classification of types of Constructions (CC).[13)]

For activities where the CPA product classification is not appropriate since it is not detailed enough, for example the textile industry (NACE Rev.1 division 17) where CPA-products cover **several** NACE Rev.1 4-digit activities, only the 3-digit level of the NACE Rev.1 can be used. These solutions shall in each case be made known to Eurostat and to all users.

Territorial coverage

Several short term indicators like turnover, new orders and output prices are to be split into "**domestic**" on one hand and "**non-domestic**" on the other had. This split is very helpful for analysts since it gives valuable information on the short term evolution of different markets.

Traditionally, the definition of the word "domestic" was clear: it meant the territory of a Member State. This was the economic

10) See Council Regulation (EEC) No 3037/90, Official Journal No L293, 24.10.1990, p. 1, updated by Commission Regulation (EEC) No 761/93, Official Journal No L83, 3.4.1993, p. 1

11) See Council Regulation (EEC) No 3696/93 of 29 October 1993, Official Journal No L 342/1, 31.12.93

12) The terms 'product' and 'commodity' are treated in this manual as synonyms.

13) See Commission Recommendation (forthcoming) and Annex III page 177 ff.

market to be observed. There also were suggestions to split the export market into "intra-EU" and "extra-EU". This would allow the compilation of indicators for the Large Single Market that the European Union constitutes.

With the creation of **Monetary Union** from 1999 onwards, the definition of "domestic" has to be reconsidered.

Economically speaking, the territory of a Member State will no longer be the market for which enterprises develop a strategy. In other words, for an enterprise in Bordeaux the sales to Paris will be treated the same way as for Amsterdam, since both are likely to be in the Euro-zone. Only sales for example to London are "non-domestic" as long as the United Kingdom does not join the Monetary Union.

Thus the term "domestic" should be redefined as meaning "within the currency area of a given Member State". For countries outside the Monetary Union the definition will be identical to the traditional one, but for the Members of Monetary Union it will change.

Apart from the economic argumentation, there is also a cost element: Once Monetary Union is implemented, it will be an additional burden for reporting units to distinguish in the statistical questionnaire between sales inside their country and other members of Monetary Union, since for the enterprise there is no longer any difference.

Even if at present the National Statistical Offices are not yet ready for a new definition of "domestic", reality will provide pressure for a reconsideration, at least in 2002 when national currencies are abolished.

4. Confidentiality

For certain NACE Rev.1 activities the short term statistics can not be published on a national level for reasons of confidentiality. Publication of a variable requires that at the national level

(i) there are at least three different respondents in the survey for that activity;

(ii) there is information from at least two of these reporting units in a given month;

(iii) no single respondent accounts for 70% or more of the total sales of the activity;

(iv) no two dominant businesses together account for 85% or more of the total sales in the activity.

The points (iii) and (iv) are usually checked only once a year.

A variable that does not meet these standards can only be published if the responding units on which it is based give permission to publish.

If the information to be sent to Eurostat is confidential, the Council Regulation on confidentiality applies, namely that the data must still be collected and variables calculated in order to be able to transmit the confidential indices to Eurostat.[14)]

The national statistical offices must **mark** confidential data. This information is included in aggregated statistics as well as in the total EUR 15 figures calculated by Eurostat, following the appropriate disclosure policy decisions of the Commission.

14) See Council Regulation (EEC) No 1588/90, Official Journal L151, 15th June 1990.

5. The statistical units

5.1. Definitions

Following the definitions of the Council Regulation on statistical units of 15th March 1993,[15] the units of the production system which are relevant in the context of industrial short term indicators are

- the enterprise;
- the local unit;
- the kind-of-activity unit (KAU);
- the local kind-of-activity unit (LKAU).

The "enterprise" is defined as the smallest combination of legal units that is an organisational unit producing goods or services, which has a certain degree of autonomy in decision-making, especially for the allocation of its resources. An enterprise carries out one or more activities at one or more locations.

A local unit is an enterprise or part thereof situated in a geographically identified place and at which one or more persons work.

The KAU groups all parts of an enterprise contributing to the performance of an activity at class level (4-digit) of NACE Rev.1 and corresponds to one or more operational subdivisions of an enterprise.[16] A KAU may contain secondary activities which cannot be separately identified.

15) See Council Regulation (EEC) No 696/93, Official Journal L76, 30th March 1993.

16) The enterprise's information system must be capable to indicate or calculate for each KAU the relevant information necessary for the compilation of a fixed list of statistics specified in the Regulation.

The enterprise is closer to the administrative world than the KAU in that it consists of entire administrative units, namely legal units, while the KAU is defined in terms of its **purpose**, that is in terms of homogeneity.

The enterprises have to be registered at the statistical offices under a reference number and with some characteristics such as name, address, size class (persons employed) and classification to an activity (NACE class). These characteristics allow the preparation of statistics according to size classes or geographic regions if required. See the Council Regulation on business registers for statistical purposes of 1993.[17]

An important distinction has to be made between

⇒ the **reporting unit** and
⇒ the **observation unit**.

The reporting unit is responsible for the correct and punctual supply of all queried information, while the observation unit is the unit which we want to follow in its performance.

The following overview illustrates the different roles of units in short-term statistics:

Reporting unit	Observation unit
Enterprise (or legal unit)	Kind-of-activity unit
Local unit (or legal unit)	Local kind-of-activity unit

Following the principle of **subsidiarity**, the choice of the reporting unit falls entirely under the responsibility of National Statisti-

17) Council Regulation No 2186/93, Official Journal L196, 5th August 1993.

cal Offices. In the context of this manual we only deal with the appropriate choice of the observation unit.

5.2. Which observation unit?

All short term indicators treated in this manual refer to industrial **activities**, classified according to NACE Rev.1. However, in order to calculate activity indices, basic data have to be aggregated. In this context different **approaches** are conceivable:[18]

- Ideally for short term analysis we would observe units of **homogeneous** production (UHP). These are characterised by a single activity with homogeneous inputs, production process and outputs. Inputs and outputs are identified via a product classification.
- A substantial number of businesses are engaged in a combination of activities at the same time. They may be engaged in a principal activity and some secondary activities. If **kind-of-activity units** are chosen as observation units, this implies that homogeneity is aimed at, but if a separate identification of the secondary activities is not possible, several activities are included in one KAU.[19]
- **Sector** approach: in this case the activities are computed including all **secondary** production of the reporting units, which are in this approach normally (more or less heterogeneous) enterprises, classified according to their principal activity.

It has to be born in mind that in practice it is in most cases impossible to use the first approach, the UHP. Only if **product** information is collected as basic data, like for example in the case of the production index or price indices, automatically units of homogenous production are observed.

When are the secondary activities of an enterprise so important that a split into several kind-of-activity units becomes worthwhile?

An approach followed recently by several statistical offices seems very useful, since it combines realism (i.e. considerations of costs of data collection) with good results (i.e. user needs): For data collection purposes all enterprises of a country are classified into either **"simple"** or **"complex"**. "Complex enterprises" are all those with more than 100 employees in secondary activities, all others (with less than 100 employees in secondary activities, irrespective of their absolute size) are "simple enterprises".

For the purpose of short term statistics, only **complex enterprises** need to be split into several kind-of-activity units. This approach focuses on the most relevant cases of heterogeneous businesses. It should already be applied at the level of the **registers**.

6. Type of survey

All surveys for short term indicators have to be executed in such a way that the **sample frame** (= list of enterprises from the register which forms the survey population from which the sample for a particular survey is drawn) comprises at least 90% of the relevant characteristics (production, employment, turnover etc.) in a given NACE class, group or division at the national level.

18) See the European System of Accounts (ESA), chapter 2, paragraph 2.102 to 2.118.

19) In our discussions in expert Task Force meetings in the last five years, the second approach, using the **KAU** as the observation unit, was called **"branch approach"**. In order to avoid confusion, this terminology will not be followed any longer.

Normally the sample frame will be close to 100%; excluded are only

- **intentionally**: very small businesses if they are negligible with respect to their economic importance, and
- **involuntarily**: new enterprises which are not yet registered.

This rule assumes as a hypothesis that the excluded part of the universe follows more or less the same evolution in time as the included part. It serves to ensure the high quality of the indices and is in the interest of all parties concerned.

Out of this universe either **all** have to report (= **exhaustive** inquiry census) or a **sample** may be drawn.

6.1. Exhaustive inquiry

Though data collection is often restricted to reporting units beyond a certain threshold, for example 20 or more persons employed, some problems may arise in an exhaustive survey due to the fact that a high number of units must report, many of which may not contribute much to the total economic activity. Unreasonable costs emerge for the data collection not only in the small units but also in the statistical offices which examine and evaluate the reports. Furthermore, a large amount of educational work has to be done to encourage **all** units to report in time and correctly.

Nevertheless, exhaustive inquiries have proved to be successful in practice, for example in Germany and in Ireland. In addition, the burden of statistical reporting is equally shared in this case, although the relative burden of small enterprises is higher.

6.2. Samples

Sample surveys supply good results as well, provided that the **representativeness** is sufficient.[20)]

Stratified samples show in contrast to simple random samples results of high quality and, moreover, keep costs low. By providing different quota according to the units' size a high representativeness can be achieved with a relatively low number of inquiries. The strata have to be chosen in a way as to minimize the internal variance.

The following table gives an **example**:

type of units	employment	selected units in the sample
large	more than 250	100 %
medium-sized	50 up to 249	50 %
small	10 up to 49	20 %
very small	less than 10	0 % - 20 %

The proportions depend of course on the size of the country which determines the absolute size of a given activity. In a small Member State where in many industries there are no large units as defined here, the proportion has to be considerably higher for medium sized and small units. This may also be the case in larger countries where large units do not exist in certain industries. In this case the proportion of the medium-sized units must also be raised to obtain the desired representativeness.

Depending on national circumstances, the sample strata may also be formed using **turnover** instead of employment.

PPS-sampling is an alternative sampling method which leads to high quality results at low costs. Here the probability of a report-

20) See also chapter 10.2. below for rules of accuracy.

ing unit being included in the sample is proportional to its size (hence PPS method). In other words large units have a higher chance to be obliged to report than small units.

In the selection of the surveyed units regional aspects should also be taken into account in the sense that no region of a country should be neglected.

If a sample system is used, it should - where possible - be based on the method of rotation so that any unit of an activity will be part of the sample for a period of one, two or more years. However, during the course of a year the choice of the units should not be changed.

It should not be forgotten that the choice and application of sampling techniques falls entirely under the responsibility of the National Statistical Offices, in other words the principle of subsidiarity applies. Important for Eurostat and our users is the **accuracy** of the statistics.

See chapter 10.2. below for the **sample size necessary** to assure a good accuracy of results.

In order to increase **transparency** at a European level, the national statistical offices are **obliged** to inform Eurostat of their chosen sample sizes in all industries.

7. Data collection and control

7.1. Scope of survey

Data collection (including the use of existing data from other statistical or administrative sources) and the calculation of all types of short term indices is required

- for all economic activities of the NACE Rev.1 Division 10 to 41 (sections C, D and E), [21]
- for the total area of the Member States (No regions may be excluded),
- covering all size classes of units,[22]
- at monthly or quarterly intervals depending on the indicator.

If certain activities or regions have been excluded from the data collection until now despite the existence of an economic activity, these activities and regions must be considered in the future.

The actual data collection of basic information for short term statistics follows the principle of subsidiarity, in other words it lies fully in the responsibility of the national statistical offices. The following recommendations can nonetheless be expressed:

7.2. Electronic data transmission

Especially in the domain of short term indicators, it is strongly recommended to the National Statistical Offices to use more and more **electronic data transmission** for data collection in order to

- reduce the possibilities of data entry errors,
- minimize the burden on the reporting units and
- speed up considerably the data collection process.

21) For exceptions see the appropriate chapters below.

22) For data collection from very small units special rules apply. See chapter 6.2 above.

7.3. The questionnaire

It is advisable to collect several different basic data with the **same questionnaire**, in other words a whole set of short term statistics at the same time, because

- this practice reduces the burden on the reporting unit,
- it allows an easy control of the reported figures via plausibility checks,
- it assures that different variables are comparable since the same type of reporting unit is used.

An example of such a joint data collection would be the collection of turnover, new orders, the stock of orders and employment in one single questionnaire. This is already common practice in several statistical offices.

The basic data are collected monthly or quarterly (depending on the indicator) using questionnaires on paper or on electronic media designed by the statistical offices. The **general** part of the questionnaire comprises statements on the reporting unit like reference number and address, name and phone number of the employee responsible for the accuracy of the entries, as well as the classification according to NACE Rev.1 for the observation unit.

The **specialised** part of the questionnaire is to some extent class specific and in addition depends on the kind of basic information which must be given. Normally the questionnaires ask for the name and code number of the queried information (product, turnover, commodity price, hours worked etc.).

The reporting units return the completed questionnaires by mail or via electronic data transfer after a reasonable period following the end of the reference period;[23] this deadline should be based on a **legal obligation** in order to increase the urgency of data reporting. Experience in several statistical offices shows that such a legal obligation helps considerably to improve the response rates.

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7.4. Data control

The receipt of the questionnaires is controlled by the statistical offices; reminders are sent to those units that do not answer despite their obligation. Alternatively they are contacted by telephone or telefax messages. If necessary a second reminder must be sent to slow units explaining that even fines do not relieve the obligations on a unit to supply the required data.

A **selective** respondent follow-up strategy is recommended,[24] whereby the recontact effort is concentrated on total non-respondents and on providing questionable replies units which have a significant impact on the calculation of the indicator.

Incoming questionnaires or electronic reports must be examined by the statistical offices in order to ensure that the data given are complete and correct. This is in general done by comparing the data reported with those of the previous period. Entries which do not seem to be plausible have to be verified before they are passed on for tabulation.

As far as other methods are used for data collection, the statistical offices are obliged

23) This may typically be 10 working days for monthly statistics and 20 working days for quarterly information.

24) See J.M. Berthelot, M. Latouche, "Improving the efficiency of data collection", Journal of Business & Economic Statistics, 1993, no. 11, pp. 417-428

to inform Eurostat in detail of these procedures.

7.5. Level of precision

All indices are supplied to Eurostat with 1 decimal place precision. The calculation of annual average index numbers and of all aggregations is based on unrounded data; the indices are rounded to 1 decimal place at the final step only. When percentage changes are presented in association with index numbers, these changes are calculated on the basis of the published, rounded indices.

For absolute figures comparable solutions have to be found in close cooperation with Eurostat.

A national statistical office may wish to disclose certain indices rounded to whole numbers, when this corresponds to their internal precision. The indices must however be supplied to Eurostat with one decimal place precision as input to the EUR15 figures. The wish to publish these data as whole numbers must in this case be marked clearly.

8. Level of detail and aggregations

8.1. The case of marginal importance

Generally short term statistics for all classes of NACE Rev.1 (4-digit-level) should be calculated for all Member States where there is economic activity. It is in the interest of all National Statistical Offices to provide users not only with aggregated indicators, also information which allows an analysis of the business cycle for individual activities, which might be very different from the overall situation. All calculated series should be transmitted to Eurostat.

The provision of detailed statistics is a service expected by the **providers** of the information, so that they can identify their current market position.

The little table below shows how many series in section D are available to the public for the different levels of detail of Nace Rev.1:

Number of Activities in Manufacturing in Nace Rev.1

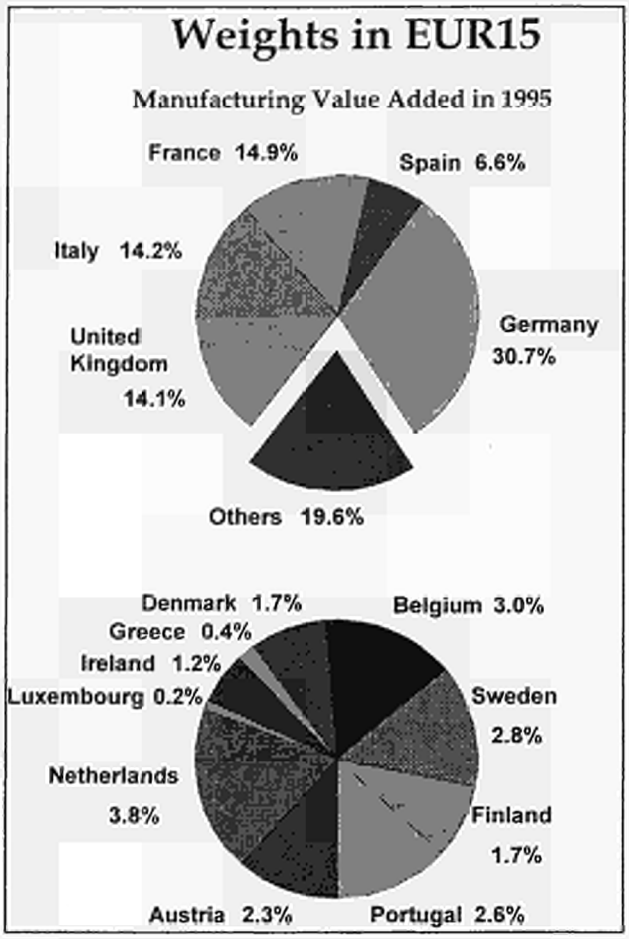
Detail	Number of Activities
2-digit	22
3-digit	99
4-digit	189

On the other hand the provision of detailed statistical information causes high costs since the sample size of data collection has to be rather large. Thus a careful cost benefit analysis is necessary.

Eurostat only asks for detailed information for the production index and output prices. All other indices such as turnover, orders, employment, wages & salaries etc. are only to be supplied at the 2-digit level.

But even for production and prices exceptions concerning the level of detail are possible. If in a given base year value added in manufacturing is less than five percent of the EU total, the National Statistical Office is not obliged to provide indices at this level of disaggregation.

At present, this obliges only Germany, Spain, France, Italy and the United Kingdom to transmit 3- and 4-digit short term statistics.



The rule for exemptions was formulated in order to minimize the burden on reporting units. These exemptions reflect the main purpose of Eurostat with regard to short-term indicators, namely to supply users with accurate and reliable **European** indicators. In this context the Member States can themselves be regarded as reporting units with drastically unequal size. A sample of the largest reporting units is in general sufficient for an index of good quality.

On the other hand there should also be sufficient information at the national level about the business cycle for all significant industrial activities.

The calculation and transmission of more detailed information - even if the rule of marginal importance is applicable - is strongly encouraged by Eurostat.

8.2. Aggregations

Aggregated indices are calculated by the national statistical offices for industrial activities resulting from the 3-digit (group), the 2-digit (division) and the 2-character (sub-section) levels of NACE Rev.1, as well as an index of the total industrial activity (NACE Rev.1 section C to E).

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Finally, for all types of indicators information for five main industrial groupings (MIG) has to be calculated:

- energy related industry,
- intermediate goods industry,
- investment goods industry,
- durable consumer goods industry,
- non durable consumer goods industry.

Following the work of classification specialists, the allocation of NACE Rev.1 groups and classes to the five main industrial groupings is defined in annex I.[25] This common allocation is necessary in order to assure European comparability of short term indicators and will be rendered binding using Comitology producers foreseen in the draft Regulation.

In order to calculate these MIG indices, information at the **4-digit level** has to be aggregated, using net value added as weights for the production index, employment for the employment index and so on.

For the production index and the output price index a calculation (aggregation) at the **product level** is theoretically possible. This should none the less **not** be done, as it would decrease **comparability** with other indices and between different countries.

25) See page 161 ff below.
Possibly the **definition** of Main Industrial Groupings, including the question whether there shall be four or five, has be be discussed again by the statisticians in order to assure that we **meet** really **user needs**.

Eurostat calculates the EUR15 main industrial groupings with the aid of the Member State aggregates.

9. Changes of the base year

The forthcoming Council Regulation for Short Term Statistics requires that every 5 years, in the years ending with a 0 or a 5, the basic weighting system must be updated. This must be done as soon as the necessary data becomes available. All exceptions from this rule must be communicated to Eurostat and the Committee referred to in the Regulation.

It should be clear to everyone that the older the weights are, the more the calculated indices are biased, that is the quality of the short term statistics for analytical purposes deteriorates.

Index numbers relative to the new base period must be published starting at the latest with those for January of the fourth year subsequent to the new base period.[26]

It is recommended that the samples of queried units (and of representative commodities in the case of the production and price indices), and the corresponding weights, be updated **regularly** in order to guarantee high quality indicators. In fact, **chain linked** indices is the preferred solution. This is already practised in several Member States.

In the standard case of a rebasing every five years, the indices relative to a new weighting scheme have to be calculated retrospectively for several years, so that the point where the two series are spliced is between two base years.[27] As a result the indices from 1988 to 1992 have 1990 weights, from 1993 to 1997 they have 1995 weights ans so on.

After a base period change has been performed, Eurostat is informed about it by a detailed report. This report must among other things contain the basic weighting system and a description of the procedure followed. This report should be available at the same time that the indices relative to the new base year are published.

10. Quality checks

Short term statistics are only useful to the users when they give a true picture of the evolution of value added, employment, hours worked, output prices and so on, in a given industrial activity. Even if quality checks are difficult in the domain of short term indicators, where the **rapidity of results** is the principle aim, constant efforts to improve the quality of the indices have to be made.

In the coming years, Eurostat will set up a task force which will work on rules for data quality for all types of European statistics.

10.1. Plausibility of the input

At first the incoming forms of the units must be checked with regard to the plausibility of the data reported. For this purpose, reported figures for period t are compared to

26) For example indices with 1990=100 must be published starting with those for January 1994.

27) For example when the new base year 1990 was introduced in 1993, the index with the new weighting scheme (1990) should in theory have been calculated back to January 1988.

corresponding figures of the same unit for the previous period t-1. Non-plausible entries have to flagged before processing the data; and the respondent must be asked for an explanation. Depending on the outcome an appropriate action must follow with respect to the flagged entry.

After the indices have been calculated a further checking of the results should take place. If the result does not seem to be plausible in respect of previous figures, the input should be checked again.

The national statistical offices have close contacts with the reporting units and if necessary should give advice to those which are not in a position to give good quality information. It is **advisable** and has proved advantageous in many cases to send from time to time **field representatives** from the statistical offices to the reporting units.

10.2. Accuracy of results

The quality of the indices can only be assured if the data collection errors are not too large. Therefore the following principles should be followed:

In most cases, **stratified** samples will be used in order to optimize the sample and reduce variability. In each stratum (or the whole activity, if no stratified sample is used) either

- a **random** sample is drawn: then the width of the 95% confidence interval for the index may not exceed 2%, i.e. **± 1% around the sample index**. Assuming a normal distribution this would imply that the standard error may not exceed 0.5%, or
- reporting units are selected with a deliberate choice (**judicious** sample): then the selected units have to account for **at least 80%** of the relevant characteristics in the stratum. Normally a judicious sample is chosen in a stratum with a small number of units, so that in general all of the units are chosen in any case.

At regular intervals, the Member States have to provide Eurostat (and users) with detailed quality reports, where coverage rates for all activities and all indices are listed. Approximations of standard errors for each activity will also have to be calculated.

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10.3. Minimized revisions of the indicator

Usually, the first published indices are to a certain extent still provisional. As more basic information comes in, slight revisions are undertaken. In order not to confuse the users, the first published information should also be of a correctness (= quality) that does not require **major** revisions.

The following rule applies: over a period of 12 months, the final unadjusted index of a given activity should on **average** (in absolute terms) not deviate from the first published information by more than κ%.[28]

This rule focuses on 12 months average deviations over 12 months and not each single deviation, because exceptionally a major revision might be necessary due to the occurrence of an input error or because something else in the complex index calculation procedure went wrong.

The maximum deviation coefficient κ which should not be exceeded on average over 12 months is:

28) If for example κ=3% and the first published index lies at 135.0, the final index has to be in the range of plus/minus 3% of 135.0, i.e. between 131.0 and 139.0.

Level of detail	Deviation
4-digit	3 %
3-digit	3 %
2-digit	2 %
Aggregates	1 %

If the deviation exceeds the above given rules on average over 12 months, the sampling and data collection technique has to be revised in order to improve the quality. Above all the response rate from reporting units has to be increased.

11. Data dissemination

In producing statistical information there is a trade-off between the timeliness with which the information is given and the quality of the published data. Quality here means not only the extent to which reality is reflected (accuracy), but also the detail to which this is done. On the other hand there is a desire for very quick information on changes in the business cycle.

The essential task for obtaining fast business cycle information is to **reduce** the average **response delay** of the reporting units, for example increase the response rate. The first publication should be based on a response rate of at least **80%**.

This can be obtained by increasingly using modern technologies like direct electronic (on-line) links between the statistical offices and the reporting units (EDI). If the necessary information is stored in a structured manner in an electronic format in the information system of the reporting unit and retrieved **automatically** by the statistical office, the burden on enterprise is minimized and the information is available within a few days at the statistical office.

The first published information is still provisional and will be revised as soon as more reliable information becomes available.

The time-table for publications is as follows:

- approximately 3 to 4 weeks are needed for the data collection by the national statistical offices,
- approximately 1 week is needed for examining the questionnaires and calculating the indices,
- approximately 1 week is needed by Eurostat to collect national indices, to aggregate them to EU indices and to prepare the publication.

The permitted delay for data transmission to Eurostat depends on the indicators. At present the following delays (in calendar days) are foreseen in the draft Council Regulation:

Variable	Maximal Delay (Industry)	Maximal Delay (Construction)
production index	45 days	60 days
new orders, persons employed	50 days	90 days
turnover, hours worked, wages & salaries	60 days	90 days
output prices	35 days	60 days

The delay may be up to 15 calendar days longer for countries where their share of value added in manufacturing in the European Community is less than five percent for a given base year.

These delays should be shortened in the coming decades.

The monthly publication by Eurostat will focus on EUR15 indices, seasonally adjusted and in the trend-cycle form. This does not exclude the publication of individual Member States series.

Eurostat will prepare an annual time-table with the **dates of release** fixed in advance.

The indices are corrected within 12 months, when the **final** index with a response rate of at least 95% of the questionnaires sent out is made available.

Certain short term statistics like employment and hours worked are only compulsory with a quarterly frequency, which means that for these figures the publication delays are longer than for monthly data.

Nonetheless it should always be kept in mind that short term statistics become worthless for the analysis of business cycles if they are made available too late. Timeliness has the highest priority of all objectives for short term information.

For this reason, the quarterly indices should be published not later than two months after the reference quarter, preferably earlier than that.

The possibilities of a monthly data collection of certain "quarterly" statistics should from time to time be reconsidered.

12. The Choice of Growth Rates

Short term statistics are often looked at in the form of **growth rates**. Growth rates are a natural tool of analysis in order to make statements about the development of economic events in time. Unfortunately, the possible selection of growth rates is large. Particularly for monthly data, there are many different types of growth rates to choose from.

What makes this confusing is that several **dimensions** (aspects) need to be considered:

- The form of the data: gross, working day adjusted, seasonally adjusted or trend-cycle ?
- The use of one single month or a moving average, in other words smoothed data. If the latter is the case, should two months, three months, six months or twelve months be used to smooth the series?
- The time horizon: should the comparison be made with the previous month (t/t-1), the previous quarter (t/t-4), or the same month in the previous year (t/t-12) ?

If we look at all of the alternative combinations regarding these three aspects, we have an array of possibilities with three dimensions.

12.1. Form

Should gross data, working day adjusted, seasonally adjusted or trend-cycle data be used for computing growth rates? Obviously for a comparison to the previous month, only the seasonally adjusted or trend-cycle data can be used, since the gross and working day adjusted series still contain the seasonal pattern which would make a growth rate from one month to the next meaningless. Normally for a comparison to the same month in the previous year gross or, where appropriate, working day adjusted data is used since it is not yet "manipulated" by time series decomposition. On the other hand since the quality of seasonal adjustment procedures are clearly improving, tests show that the differences in the annual growth rates are more of less marginal. So in general, seasonally adjusted or trend-cycle data can be used as a base for growth rates.

Trend- cycle data

But which one of the two? The difference between the two forms is that the seasonally adjusted series still contain the irregular component, while for the trend-cycle the one-off fluctuations have been eliminated.[29]

For the growth rates this means that those based on seasonally adjusted data jump quite considerably from one month to the other. Growth rates based on the trend-cycle give a clearer economic message to the analyst and should therefore be preferred.

12.2. Smoothing

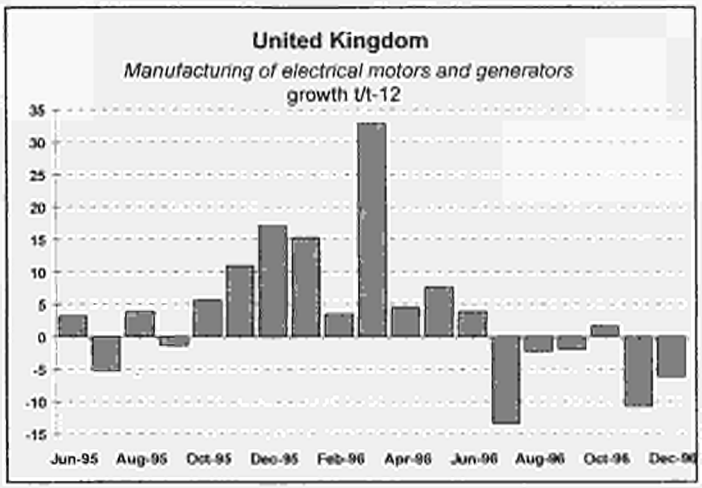
The next question is whether one single month or a moving average should be used. Which recommendations can be given? Growth rates using only <u>one month</u> are quite volatile and subject to <u>random</u> influences which make the economic interpretation of these growth rates rather <u>risky</u>. Many examples show that it has to be doubted whether the figures for each month are reliable and can be used for growth rates using one month only. There are always small outliers, registration mistakes, the wrong reference period, classification errors and so on. The data is quite "noisy". Therefore, any single monthly growth rate is to some extent misleading.

As a conclusion it has to be said, that a cautious three month average of the monthly growth rate seems more appropriate for a sound economic analysis, even if the latest events are watered down because of the smoothing process.

29) See part III. "Seasonal Adjustment" below.

Annualisation

Next there is the question of **"annualisation"**. Some analysts convert growth rates to the previous period, for example t/t-1, into annual growth rates,[30] so that they can be compared with annual growth figures from other sources. In addition, this allows the reader to get a feeling for the "true" size of the growth rate, since



most users can relate better to what is small and what is large for an <u>annual</u> growth rate.

Considering what has been said above about the random effects inherent in the data, this algorithm of annualisation shows too much confidence in the data. In most cases, the figures are not accurate enough to be extrapolated for the whole year.

12.3. "Period before" versus "last year"

If we conclude so far that the use of only one month for meaningful growth rates is

30) This is done either by multiplying the number of periods in the year (in our example t/t-1 by twelve) or, by multiplying the logarithm of the growth rate by twelve and then taking the anti-log of the values (which is mathematically more correct).

too risky and that instead moving averages of three months should be used, there is still one decision to be taken: whether the growth rate compared to the previous months (3m/3m-3) or to the same month of the previous year (t/t-12) should be published.

For this decision it is important to realise that for the growth rate compared to the same months of a year before, the evolution between the twelve months is not taken into account. Many things may have happened to the business cycle in the meantime!

For this reason a growth rate based on the previous months has more information content for the user of our statistics.

12.4. Summing up

Following the arguments put forward here the choice of growth rate should be clear:

- Time horizon: a comparison with the most recent months is closer to the present state of the economy. Comparisons to the same period last year may be very misleading, if the economic situation is close to a turning point.
- Form of the index: the trend-cycle is to be preferred since one-off fluctuations are excluded. This assumes that a high quality trend-cycle computation is available.
- One single month or a moving average: an average always dampens the latest evolution, but on the other hand it is less volatile against distortions.
- Annualisation of growth rates cannot be recommended.

Considering the large choice of options for growth rates, **clarity** in the published data becomes essential. The reader has to be told what has been done in a clear way. In addition, too many different growth rates published alongside each other confuse the reader and should be avoided.

13. Conclusion

A

So far the general rules and recommendations which are applicable to all types of short term statistics have been explained and clarified.

Standards for coverage, confidentiality, reporting units, sampling, quality control, seasonal adjustment, levels of detail, aggregations and data dissemination have been set up.

One of the most important messages of this methodological manual is the idea that any deviation from the rules described above should be reported to Eurostat so that users of short term statistics can be informed about deficiencies of international comparability of the statistics in order to avoid misinterpretations of the results.

Index specific rules and recommendations for the production index, output price indices, turnover, orders, employment and so on, are treated in the following parts of this manual (Part B for industry and part C for construction).

All parts should be regarded together as **one system** of rules and recommendations which have to be observed scrupulously in order to obtain harmonized European short term indicators of high quality.

III. Seasonal adjustment

1. Introduction

To examine the extent to which a change in the original short term data indicates the "real" development of the business cycle, the statistical offices must consider the influence of seasonal fluctuations. Without this adjustment of the raw series no proper analysis can be made concerning **upswings** and **downswings** in the economy.

It is vital that this seasonal adjustment is done at a high quality level, so that users are not mislead in their interpretation of the data.

2. Background

The idea that an **observed** time series consists of **unobserved** components was originated by work in the area of astronomy and meteorology and was used for economic time series already in the middle of the last century. The normal decomposition is the decomposition into trend, cycle, seasonal variation and irregular fluctuations. They are usually defined in the following way:[31)]

- **Trend** is a slow variation over a long period of years, generally associated with the structural causes of the phenomenon in question. In some cases, the trend shows a steady growth, in others, it may move downward as well as upward.
- **Cycle** is a quasi periodic oscillation characterised by alternating periods of expansion and contraction; in most cases it is related to fluctuations in economic activity.
- **Seasonal variation** represents the effect of climatic and institutional events that repeat more or less regularly each year (for example: summer holidays or Christmas sales).
- **Irregular fluctuations** represent movements which can not be predicted and which relate to events of all kinds. In general they follow a stable random pattern. In some cases, **outliers** may be present. These outliers have identifiable causes, such as strikes, floods, persistent changes in economic behaviour or changing circumstances in the data collection process.
- Some series like the production index might also have a **calendar component**, due to the varying number of working days in the different months of the year and different structures of a month in different years.

31) See for example Kotz, Johnson, Read (1988) Encyclopedia of Statistical Sciences, Vol. 8, p 321, John Wiley & Sons, USA

Economic theory does not provide an **exact definition** of the components and as they are not observable, seasonal adjustment methods must make some arbitrary assumptions. The question how smooth a trend or how stable a seasonal component needs to be cannot be answered "correctly".

Unfortunately economic theory gives only a few guide-lines (for example in the case of inflation related time series) to which way the components are **related**. In practice, models with an additive decomposition, a multiplicative decomposition or with a mixed decomposition are used. Again the choice of one model for a particular time series is often arbitrary.

These problems led to the evaluation of several seasonal adjustment methods in the fifties and sixties, which were all of the **ad-hoc type**. As seasonally adjusted series were produced and published by official agencies and newspapers, and different methods showed different behaviour, the question naturally arose about which method was the "superior" one. As most of the methods like X-11 were ad-hoc methods even without explicit assumptions in the model and with the described problems above, it is no surprise that empirical comparisons are very difficult if not impossible.

After the pioneering work of Box and Jenkins,[32] several new approaches were introduced, based directly or indirectly on **ARIMA** models. This was very important for the empirical comparison of different seasonal adjustment methods, because it helped in understanding the properties of the criteria chosen. Now it is in general possible to approximate the ad-hoc methods with ARIMA models in order to examine the **implicit assumptions**.

32) See Box, G.E.P., Jenkins, G.M. 1970, Time Series Analysis: Forecasting and Control, San Francisco, Holden Day

3. Criteria of choice

Instead of an empirical comparison ("**how** do the seasonal adjustment methods work?") we should however ask at the beginning "**what** do we **want** to estimate and what do we estimate?" It is astonishing that most of the methods do not give a precise answer to this question. This explains a lot of the confusion in current discussion about seasonal adjustment methods.

Ideally, a well founded method should give the following information:

- exact assumptions made for the estimation of the model,
- a precise definition of the components,
- a clear estimation concept, given optimisation criteria,
- The method should be flexible enough to adapt to different circumstances in various economies,
- The methods should provide the users additional useful information on the time series as well as on the quality of the adjustment.

In addition to these theoretical requirements, there are practical needs and further requirements: As the number of time series is very high in the domain of short term indicators, it is impossible to check every time series by hand. Furthermore the different character of the series (for example stock and flow series) make different pretreatments necessary. A good method should therefore have the following features:

1. high degree of automation,
2. reasonable execution time,
3. possibility to receive updates,
4. outlier detection and correction methods,
5. trading day corrections (incl. Easter corrections),

6. tests to check the quality of the chosen decomposition,
7. automatic choice of an adequate filter for seasonality and trend.
8. a test to find the adequate transformation of the data (multiplicative or additive model).
9. pre-adjustment possibilities (e.g. user defined regressors).

4. Outliers

A very important point related to the quality of seasonal adjustment is the detection and correction of outliers prior to the seasonal adjustment.

For a sophisticated treatment of outliers it is essential to distinguish between the treatment of different types of outliers:

- **errors** in the data or
- **true** special events.

The first purpose of any outlier analysis is the detection of plain data errors. These have to be corrected.

In a second step, the most important types of "true" outliers can be described as follows:

- **additive outlier:** effect on one particular value of the time series (for example due to a strike),
- **level shift**: sudden change in the level of the series (for example due to a modification in sampling technique or a changed legal framework),
- **transitory change**: outlier effect on several consecutive time points in the time series (for example due to a natural disaster like an earthquake), where the effect dies out exponentially,
- **seasonal change**: effect that can be seen for a specific month or quarter (for example changed Christmas sales).

It is most often possible to detect and correct these effects in time series in an automatic way for the historical part. Nevertheless, for the most recent values, a sophisticated automatic correction is not possible. The type of correction can only be chosen with the help of economic or other background knowledge.

All these considerations have to be thought about when a particular method is chosen.

5. Recommendations

Different methods are used at present in the Member States and by Eurostat for seasonal adjustment, for example Census X-11, X-11-ARIMA, TRAMO/SEATS and the Berlin method (version 4).[33] Several National statistical offices and central banks are at present also testing the new release from the US Bureau of Census, X-12. All of these methods have been thoroughly tested both theoretically and empirically by Eurostat; the results show quite substantial differences of performance.[34]

The most commonly used method in the Member States is Census X-11 or its ARIMA versions.

Eurostat recommends the use of **TRAMO/SEATS**, developed by Víctor Gómez

33) Among these methods, all are of an ad-hoc type except TRAMO/SEATS which is an ARIMA model based approach and the Berlin method which is based on local models.

34) A (final) detailed report will be published by Eurostat in January 1998.

and Agustín Maravall,[35] because of the excellent performance in our tests. For criteria like orthogonality, idempotency, forecast ability, sophisticated outlier detection and last but not least theoretical foundations it always ranked highest.[36]

TRAMO/SEATS has been used by Eurostat for its short term statistics for over three years with good results. The program has been considerably improved since the first version, taking into account the critiques of various users inside and outside of Eurostat.[37]

Co-operation should be achieved not only between European National Statistical Offices and with the US Bureau of Census, but also with the future European Central Bank in order to use the same method and apply it on the same way.

It is essential to seasonally adjust **each** of the available NACE activities. Seasonally adjusted aggregated indices may also be obtained by calculating the weighted mean of the seasonally adjusted components. This approach is currently used in some Member States.

In some statistical offices the **seasonal factors** are calculated only once a year; these factors are then applied during the year on all new monthly (or quarterly) data. The alternative practice is **concurrent adjustment**, in other words the calculation of the seasonal factors each time when new data arrive. Even if this is more work, it clearly assures a higher accuracy of the latest figures. On the other hand, this practice leads to (slight) revisions of the figures each month, which might confuse some users. Nonetheless, for short term indicators accurate information on the business cycle is the main objective and in general the most recent raw figures are revised anyhow. Thus Eurostat recommends the concurrent adjustment of seasonal figures.

Statistical offices which do not yet seasonally adjust the lowest level of raw data or do not seasonally adjust certain indicators like employment, hours worked or turnover should introduce this important analytical tool as soon as possible if the time series are long enough for a decomposition.

Additionally, some flow indices like the **production indices**, but also hours worked, have to be adjusted for the different number of working days in a month. This topic is treated in the next chapter.

Price indices are at present habitually not seasonally adjusted. Efforts to calculate seasonally adjusted price indices are strongly encouraged by Eurostat. Tests are being run at present concerning the significance of seasonally adjusted of price series.

6. The Trend-cycle

There is still an open debate as to what should be used for analytical purposes and thus published: seasonally adjusted series or the **trend-cycle**, in other words series where not only the seasonal component but also the irregular component has been removed.

35) See V. Gomez, Agustin Maravall (1996) Programs TRAMO AND SEATS INSTRUCTIONS FOR THE USER, Documento de Trabajo no 9628, Banco de Espana, Servicio de Estudios, Madrid.

36) In fact X-11 with its different options can be approximated quite well with a model based approach using ARIMA models for the components with fixed parameters (additive model).

37) The program can be obtained free of charge from Eurostat, including a user friendly interface for Windows.

Until the seventies it was not possible to calculate the trend-cycle in a convincing and timely way, especially for the latest data. Moving averages of the seasonally adjusted series were only unsatisfactory proxies. Due to powerful computers and new analytical tools, the trend-cycle can today be estimated much more accurately. This presentation is more and more used by statistical offices and central banks.

Eurostat recommends the use of trend-cycles,[38] both in graphical presentations and in tables, because

- the trend-cycle gives a much clearer picture of the business cycle evolution than seasonally adjusted series where the understanding of underlying trends is distorted by the irregular component,
- it can be shown both theoretically and empirically that the trend-**cycle converges much faster** to its final value than seasonally adjusted series even if the first revisions are higher than for the seasonally adjusted series.

7. Practical Application

The choice of a sophisticated method does not guarantee automatically a high standard of seasonal adjustment. The knowledge of the user and the care when using a program are very important for a successful time series decomposition. In addition, some practical problems have to be solved by the users. Problem areas to be checked carefully are:

38) For a recent comparison between revisions of the trend and the seasonally adjusted series see R. Pauly (1997) Analysis of Economic Variables at the Current End of the Series: How Reliable Are They?, Beitrag Nr. 54, Institut für empirische Wirtschaftsforschung, Universität Osnabrück

pre-adjustment

A very important point in producing seasonal adjustment of high quality is a sophisticated pre-adjustment. Effects from changing sample periods, moving holidays and knowledge about other changes in the series should be incorporated in a pre-adjustment.

transformation of the data

Many empirical tests at Eurostat have shown that the wrong choice of the transformation parameter (multiplicative or additive mode of adjustment) can lead to heavy distortions in the components, especially at the current end.

time aggregation problem

If time series are adjusted monthly and quarterly, the monthly seasonally adjusted figures do not necessarily add up automatically to the quarterly figure which can lead to some confusion of users.

aggregation problem

If time series are aggregated to a total, one can either use direct or indirect adjustments. If direct adjustment is used, that is the total is directly seasonally adjusted, the aggregation of the seasonally adjusted subseries only adds up under very special circumstances to the seasonally adjusted aggregate. If indirect adjustment is used on very disaggregated series, the aggregated seasonally adjusted series is often of inferior quality.

outliers at the actual end

No automatic outlier adjustments can work in a sophisticated way at the current end. It is therefore recommended to perform another outlier check at the current end like the REGARIMA forecast with sigma limits and the comparison of the forecast with the

recent figures. Economic knowledge is necessary for judging about the type of outliers and the distribution to the different components.

model check

The model choice and some quality criteria should be checked continuously to ensure high quality adjustments.

8. Correction for trading days

Several monthly short term indicators, such as the monthly production volume index and the index of hours actually worked have to be corrected for the different number of working days in a given month. In most cases this correction is a (mandatory) first step in the process of seasonal adjustment. Only when growth rates to the same month in the previous year are analysed, the series corrected for trading days are treated as an end product.

The correction of trading days has to take account of

- the different length of month,
- the number of Saturdays and Sundays in a month,
- public holidays (**national** as well as **regional**),[39]
- differences in the importance of certain working days, if these differences are statistically significant.

The following items should **not** be considered in the correction for trading days:

- holidays of individuals or firms,
- changes in the number of shifts per day or week,
- overtime or short-time work, even if this occurs on Sundays or official holidays,
- the reduction of working hours per week due to collective agreements,
- hours lost due to strikes.

The traditional method to calculate indices per working day is based on **adjustment coefficients**. These show the relation between the real number of working days of a month and the number of working days of a standard month which results from distributing the total number of the yearly working days among 12 equal standard months of the base year. This approach is not recommended by Eurostat.

More sophisticated methods of **regression modelling** and time series analysis (ARIMA and intervention analysis) should be preferred since they show more realistic results and are capable of taking trading day effects into account. It has been shown that the simple proportional method overstates the effect of working days on the series.

The correction for trading days **must** be done **for each activity**, but it may be the case that no corrections are necessary if production runs continuously throughout the year.

Some Member States have not calculated indices corrected for trading days until now. They should **introduce** the proposed method with the beginning of the new base year 1995. Other Member States which partially apply rather simplistic methods should also **switch** to the method described.

The focus of national statistical offices should be on improving the **quality** of the indices for analytical purposes, and on increasing **comparability**.

39) The most difficult public holiday to cope with is **Easter**, which sometimes is in March, sometimes in April. This is known as the "Easter effect" which needs very careful treatment.

B. INDUSTRY

I. The Production Volume Index (PVI)

B

1. Introduction

The production volume index is certainly the **most important** of all industrial short term indicators. Its **aim** is to measure at a monthly frequency the ups and downs of production output, with a special focus on detecting as early as possible the **turning points** of the business cycle.

Since production is the key index of all short term indicators, the utmost attention should be paid to a **harmonisation of methods** of data collection and index calculation in order to increase the transparency for the users.

As long as harmonisation can not yet be achieved completely, statistical offices should allow everybody to gain **knowledge** and **comprehension** of the differences in methods used. For this reason, Eurostat should have detailed and up-to-date information on the methodological framework of the production volume index in the Member States. This background information has to be sent to Eurostat at regular intervals in order to update our methodological reference data base MONA LISA.[1)]

Guidelines concerning

- the institution responsible,
- the classifications,
- the treatment of confidential data,
- the observation units,
- the coverage of the enquiry,
- the sampling techniques,
- the delays in data collection,
- aggregations,
- seasonal adjustment,
- quality checks of the indices and
- data dissemination

have been laid down in Part A. above. Considering the importance of the index, these principles should be observed as scrupulously as the following specific rules and recommendations for the production volume index.

2. The ideal index

The term "production" has different possible meanings:

- On the one hand "production" means the **activity of manufacturing**, that is transforming goods.

1) See chapter A. II. 1 (page 13) above

- On the other hand "production" is interpreted as the **result** of this activity, i.e. the **output** of manufactured goods in a fixed period.

It is generally accepted that the **ideal** production volume index shows the evolution of value added at factor cost.[2] The formula for this index Q is a standard Laspeyres volume index

$$[1] \quad Q_t^L = \frac{\sum_{i=1}^{N} p_{i,0} \times q_{i,t} - \sum_{j=1}^{M} \alpha_{j,0} \times \delta_{j,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,0} - \sum_{j=1}^{M} \alpha_{j,0} \times \delta_{j,0}}$$

with q = quantities
p = prices
α = material prices
δ = material quantities
i = commodities and
j = materials used as input

This ideal index (Geary index) of net output at constant prices should take account of

- variations in types and qualities of the products and of the input materials,
- changes in stocks of semi finished goods,
- changes in technical input-output relations (processing techniques) and
- services like the assembling of production units, mounting, installations, repairs, planning, engineering, creation of software etc.

2) The common practice of understanding the term "production index" as "evolution of value added" contradicts the exact definition of "production" in the framework of national accounts, but nonetheless the term "value added index" is never used in practice. This convention is therefore followed throughout this text.

3. Practical problems

The practical difficulties in realizing this are however great. Generally, the outputs q will be confined to final products (in fact only to principal products) and the information on raw material consumption will be limited to the main materials. In addition, it is rather difficult to take account of changing work in progress or of the use of business services. Even so, the data required for compiling the formula are unlikely to be available. In practice, the series may be available **annually**, and after some time lag. It might be approximated crudely on a quarterly basis, but it cannot be expected to be available either promptly or as frequently as monthly.

Even if all elements of the formula are available, problems arise in coping with the three demands mentioned above. Each of these factors affects in different ways the outcome of our compilation.

Firstly, the **quality** or type of product may change without showing up in the physical units (e.g. better cars over time). The solution here turns on using different series for varying qualities and types, i.e. attention should be directed to the definition of the product.

Secondly, there may be changes in the amount of **work in progress** during a reporting period (i.e. the work in progress at the end of the period may differ from that at the beginning) which would not show up in the output series. This will not cause difficulty if the change in one period is the same as that in another. It is not the existence of stock-piling which causes the trouble but **changes** in the rate of stock-piling relative to output. The difficulty is partly overcome, but not completely, by taking "output" data at various points in the production process. This makes possible the inclusion of stock-piling at the selected points but ignores

changes in intermediate work in progress. If significant changes in work in progress are to be expected, as in construction, shipbuilding and engineering, then other solutions must be sought.

Thirdly, the amount of **processing** applied to **materials** per unit of product may change quite apart from variations in the quality of type of product. Materials of a greater or lesser degree of fabrication can be used or outside services can be used to a greater or less extent. In the car industry, for example, there is a choice between producing the engine in-house or buying it from suppliers.

4. Possible approximations

To summarize, volume production in the sense of value added at factor cost cannot be measured directly by the reporting units, but only **approximated**. So the statistical offices must **convert** the information available from the reporting units in a particular industry, using more or less complex calculations.

In practice, two types of substitute series are used as basic information:

⇒ **input data**

(1) consumption of typical raw materials (in quantities)

(2) consumption of energy, in particular electricity

(3) employment or hours worked

⇒ **output data**

(4) production of (selected) products in quantity

(5) deflated values of selected commodities

(6) (deflated) sales data

Whatever kind of basic data is used, the choice of information must ensure a close correlation with the evolution of value added at factor cost, but the **costs** of data collection must be considered as well.

5. Comparison of different types of basic information

B

In the following passage the advantages and disadvantages of different kinds of basic data are presented in detail:[3)]

5.1. Consumption of raw materials

The clear advantage of using material series as a proxy for the production index is that it is easy to measure so that collection costs are low.

To use series of input of materials involves the **assumption** that net output is constant per unit of materials used. This is not plausible where many different materials, together with fuels, packaging and business services have to be taken into account. It can be accepted only for an industry where one homogeneous material (or, at most, a few materials) accounts for the bulk of materials used. The series should represent the amount of the material consumed (not purchased), measured in physical units. A good example is the consumption of paper (in tons) in the printing industry. If several material inputs are used some adjustment

3) For an early and comprehensive exposé of methods see "Index Numbers of Industrial Production", United Nations New York 1950

needs to be made for changes in the proportions used in production.[4)]

The disadvantage of materials input series is that, unlike labour input series, they may be far from a direct representation of work done in an industry. The **timing** of materials input, even if measured as consumption and not purchase of materials, is not that of work done. Such a series may allow to some extent, but by no means completely, for changing qualities of products. A series of material inputs does not make a correct allowance for changes in work in progress; in fact, while output series err in one direction, input series tend to err in the other direction. For example, if there is a growth in work in progress in a recording period (e.g. stock-pilling of intermediate products) then some part of the materials used is being "locked-up" in partly finished product. In such a case, the materials input series rises more, while an output series rises less, than work done.

Materials input is also an imperfect proxy for work done when there are changes in the amount of processing applied to materials for a given product. For example, if cruder materials or less fabricated components are purchased by an industry and more work done on the materials and components in the industry itself, then more work is done and less materials are used for a given output. Hence, when work done is increasing, it may be found that an output series remains uncharged and a series of materials input actually declines. In addition, material input series will ignore technical substitutions of minor for major materials if it is confined to a few of the more important materials. Changes in the amount of wastage of materials may not be adequately allowed for in a series of materials recorded as used or consumed.

5.2. Consumption of energy

A series based on consumption of energy would appear to have some advantages. In particular the most common case, electricity consumption, is easy to measure and thus causes only low collection costs.

Energy series of a single type can be constructed for diverse industry groups and there is a convenient and standard unit of measurement. The timing of the series would be better than materials series though probably not as good as labour series. The energy series used must be total consumption of energy, whether purchases or produced on the spot. There is a difficulty here, since the available data are often confined to purchases.

The main difficulty, however, is that the relation between consumption of energy and output is peculiarly liable to change. The introduction of new machinery, for example, will often have a much greater effect on energy consumed than on labour and material inputs. If no other series is available energy series can be useful in interpolating between quarterly more reliable data. Special care must be taken however to observe and allow for technological changes affecting energy consumption.

5.3. Employment or hours worked

The most generally available statistics in all countries are labour series such as the number of employees or hours worked. Between these two preference is to be given to a series of man-hours worked, since it takes account of short-time and overtime working.

4) One possibility would be to take a series of values of all materials used in the industry, deflated with an index of the materials' prices.

Even if hours worked are used, however, there may be need for some adjustment to allow for changes in the proportions of men, women and juveniles employed.[5)]

The advantage of labour input series is that they are fairly direct approximations of work done. In general the timing of labour input and of work done agrees.

The main difficulty, and the one which prevents a general use of labour input series, is that they do not take account of changes in labour productivity (output per hour worked). Such series can only be used as an approximation to a series of work done if it is known that changes in labour productivity in an industry are small.

If labour input series are employed as a proxy of the production index, the index cannot be used for the purpose of assessing changes in the productivity of labour. This is very serious since one of the uses of an index of production is to throw light on this important question. It follows that, as a general rule, limited use of labour input series may be justifiable in the short-run.

Over a longer period they would though need to be adjusted for changes in labour productivity. For this, first the past productivity evolution is calculated (or approximated) and then extrapolated to the present time.

5.4. Physical quantities of output (gross production)

In this most classical case, the standard Laspeyres formula is used, without trying to take account of material inputs:

$$[2] \qquad Q_t^L = \frac{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,0}}$$

For an easier application this formula can be transformed to [6)]

$$[3] \qquad Q_t^L = \sum_{i=1}^{N} w_{i,0} \times \tilde{q}_t$$

with $w_{i,0}$ = the weight (production share) of commodity i in the base year and

$\tilde{q}_t$ = the quantity increase in period t since the base period.

If output is measured in physical terms, there are various alternative units which can be used. A choice can be made quite often between the number of pieces, volume, area or length measure, and the weight. There may be other measures, such as horsepower and engine capacity for machinery or vehicles.

None of these measures is the exact volume series required because they do not take account of **quality changes**. It may be that the output in some cases is so nearly homogeneous and free from quality changes that any physical unit will give the required volume series. In general, the product is so variable in type and quality that no one physical unit can be found to serve as a volume series.

5) In order to overcome lack of hour data, some statistical offices take a series representing the aggregate wage bill in an industry and deflate it with an index of wage rates. This is not of general application, however, since changes in overtime work as a proportion of total hours worked would create distortions in the derived index.

6) See appendix a page 52 below

The solution to this difficulty is to separate the different types and qualities and use separate series or (what amounts to the same thing) to devise some quantity index to cover the varying qualities.

If an industry is characterized by a rather long production cycle, for example shipbuilding, a measure of output is not appropriate as a proxy for changes in value added in a given period.

5.5. Gross production in value

The alternative is to take the value of various types and qualities of products and to deflate with an index representing changes in the level of prices of output.

The practical difficulty, however, may be to obtain **the necessary price data**. It may be difficult to obtain price quotations completely appropriate to the value series, especially for products intended for export.

The output series used, whether in physical or deflated value terms should represent production or completed items at the end of a stage of production, e.g., production of finished clothing or cars. The figures needed have to represent the result of current production, whether for sale or for stock. Deliveries, however, are made both from current production and from stock and they represent the result partly of current and partly of past production. If the timing of production figures is right, then the timing of deliveries is wrong.

5.6. Sales data [7]

An **alternative** approach if changes in the quality of goods occur or if the combination of products in one group changes (for example a growing share of exports), is to calculate the index based on the value of **sales S** (for all observations **v** in the activity concerned). This new index includes such changes, while the price index p^L (type Laspeyres) for the deflation of sales values does not (or should not) express qualitative and structural changes.

The corresponding formula is:

$$[4] \qquad Q_t = \frac{\sum_{v=1}^{V} \frac{S_{v,t}}{p_t^L}}{\sum_{v=1}^{V} S_{v,0}}$$

This index Q_t, derived from deflating sales with a Laspeyres price index, is itself a **Paasche** volume index, as can easily be proved.[8]

Paasche and Laspeyres indices show quite different results; in general the level of the Paasche index is **higher** than that of the Laspeyres index. Users may draw false conclusions if two Member States are compared, one using a Paasche, the other a Laspeyres type production index. Member States are therefore strongly discouraged from using this approach.

If, instead of the Laspeyres price index, Paasche price indices p^P are used, the deflation of turnover causes no more problem, since the resulting volume production index is of type Laspeyres.[9]

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7) In the context of this manual, the words "sales" and "turnover" are used as synonyms.

8) See appendix b page 53 below

9) See appendix c page 53 below

Another problem of deflating turnover (sales) is that price indices used for deflation are in general only available for **domestic** prices.[10]

On the other hand, sales also include exports. Therefore export price indices are needed. A more sophisticated method may be derived from values of total domestic sales of an activity S^D and total sales abroad S^E. Using the appropriate price indices for domestic and export sales p^D and p^E, the formula for the index calculation becomes:

$$[5] \qquad Q_t = \frac{\sum_{v_d=1}^{V_d} \frac{S^D_{v_d,t}}{p^D_t} + \sum_{v_e=1}^{V_e} \frac{S^E_{v_e,t}}{p^E_t}}{\sum_{v=1}^{V} S_{v,0}}$$

When this formula is applied, changes in the quality of products and changes in the relative importance of markets where the goods are sold are treated like changes in the volume of the production.

What are the advantages of this method? It is surely **easier** and **faster** to collect industry sales than selected individual products. Since speed is a very important priority for short term indicators, this aspects counts to a large extent. As a questionnaire asking for sales is identical for all reporting units, while a product questionnaire has to be adapted for each unit, the method of using sales data as a proxy for the production index is in general also considerably **cheaper** than other methods.

Finally, with this method all effects from quality changes are incorporated in the index compilation, including changes of product mix and processing techniques.[11]

The disadvantages of using deflated turnover are also apparent and have already been discussed in part:

- between production and sales may lie a considerable time-lag, so that the (so called) production index calculated with this method gives a warning about a turning point in the business cycle several months too late;
- sales from stocks are included, production for stock is ignored; both effects give a false picture of true production;
- merchandise and work of subcontractors is included and might be counted a second time by the true producers of these goods;
- deliveries which are not invoiced (but have been produced) are excluded;
- all intermediate production of finished or semi-finished goods for subsequent treatment in the same enterprise is ignored;
- possible delocalization of the manufacture of semi-finished products, for example to low wage countries, is not taken account of;
- secondary activities of enterprises are included in the data collection, unless kind of activity units are chosen as the reporting units;
- deflation with price indices might be inappropriate, especially for exported sales and in areas with strong variations of prices;
- the result is a Paasche production index if deflation is done with conventional Laspeyres price indices.

For some of these deficiencies there are remedies: changes of stocks can be taken account of, and this is in fact often done by the statistical offices; care can be invested in using high quality price indices for deflation, approximating Paasche type price indices.

10) This problem has already appeared for method 5.5. (deflated product values).

11) Of course this only holds if the price indices used are of high quality.

6. Evaluation

6.1. Member State Practice

The following table shows the present diversity of methods in the EU Member States concerning the production volume index. It highlights the basic information principally used at present. Further details can be checked in the methodological reference data base of Eurostat, MONA LISA.

Methods used in 1997

Country	Dominant type of basic information	Second type of basic information
Belgium	quantities	
Denmark	deflated sales	
Germany	deflated product values	quantities
Greece	quantities	
Spain	quantities	
France	quantities	
Ireland	quantities	deflated sales
Italy	quantities	
Luxembourg	quantities	deflated product values
Netherlands	deflated sales	quantities
Austria	quantities	
Portugal	quantities	
Finland	quantities	hours worked
Sweden	quantities	hours worked
United Kingdom	deflated sales	quantities
Norway	quantities	
USA	electricity consumption	quantities

Apparently two thirds (11 out of 15) of all Community countries use quantity information on products or commodity groups as the base information for their volume production index.

In Germany individual product (or commodity group) information is used as well, but in the form of deflated values. The statistical offices of Denmark, the Netherlands and the United Kingdom use deflated sales of complete industrial activities as their basic input for the production index. Portugal might change in this direction in the near future.

Outside of Europe, the United States rely very much on electricity consumption for their estimations of the monthly production index.

It should not be forgotten that the choice of the basic information depends very much on the **specific situation** of a given industrial activity. This may also vary from one Member State to another. In certain cases more than one method might be applied inside a given industry, for example quantities for the large enterprises and deflated sales for the small ones.

6.2. Preferences

After studying the advantages and disadvantages of the different types of basic data and taking into consideration the actual practice of Statistical Offices in many industrialized countries, a list of **preferences** can be established. When doing so, it has to be kept in mind that there is a trade-off between low **costs** on one hand and the **quality** of the final index on the other hand. Neither of these two dimensions can be neglected.

- Information on products or commodity groups in quantity or in value are the

most appropriate in order to follow the "true" evolution of production.

- Deflated turnover of total industries - which has the advantage of being the least costly - would come next in priority.
- Using material, energy or labour input as basic information should only be applied if all other methods fail, since here the disadvantages outweigh the advantages of the methods.

6.3. Choice of basic products

In the case of using quantities or values of products, a basket of representative goods (or commodity groups) must be observed for each activity in order to calculate a good quality basic index. The products should be identifiable with the aid of the CPA classification or the more detailed PRODCOM list of products. They must be **typical for the evolution of the activity** that can be derived from their share in the total production volume or from a long-term comparison between the product and the activity evolution.

The following principle should apply: At the NACE Rev.1 2-digit level, the selected products should **on average** have a proportion in the total output of 70 percent (or more). If in a given 4-digit activity this proportion is lower than 40 percent, this low representativity must be reported to Eurostat and explained.

In some activities showing a homogeneous product structure or in insignificant industries in smaller Member States it may be reasonable and less expensive to observe the production of the activity as a whole instead of deriving indices from representative products.

The basic information to be collected from the reporting units depends on several factors, such as the

- nature of products (homogeneity)
- variety of the production program common in the units (activity in more than one industry)
- production time for the products observed (more or less than one month)
- rate of technical progress (diversification, replacement of goods, rationalisation of the production process)
- possibilities to alter the work done, the energy consumed or the consumption of other inputs to changes in demand.

Intermediate products should not be neglected. They might change (or influence) considerably the short term evolution of production. [12]

Given the advantages and disadvantages of the different kinds of basic information described above, a matrix has been set up showing which basic information can be **recommended** for the 4-digit-NACE classes.[13]

In order to increase transparency to the users, the list of chosen products should be transmitted to Eurostat every 5 years.

Obviously the selection of representative product groups can be omitted if the reporting units report their total production within a NACE Rev.1 activity or if hours worked are used as base information.

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12) Imagine for example a car manufacturer who needs engines for the cars he sells. Until now, these engines, which contribute 20 percent to the value of the cars, were constructed by the enterprise itself. From now on they are imported. As a result value added of the enterprise is much **lower** than before, overall production and employment sink considerably, but the quantity and value of his sales (the finished cars) are unchanged and thus **no change** in production volume is measured, although it should be the case.

13) See annex II page 171 ff

6.4. Comparability

Unfortunately the list of priorities of methods established above does not solve the fundamental problem of **comparability** of series across countries. As we saw, two major methods predominate:

⇒ information on selected products or
⇒ deflated sales.

Quantity measure of output do not take account of quality changes so the evolution of production is **underestimated**, maybe the true growth rate of value added at constant prices in a country over one year was ½ or even 1 percent higher than measured by the statisticians. Consequently the derived productivity index is equally underestimated.

Sales, deflated with Laspeyres price indices, give a Paasche measure at constant prices, which generally **overestimates** the true evolution.

Thus an analyst compares country A (which uses product quantities) with a productivity growth of 2% with country B (which uses deflated sales) with a productivity growth of 4% and concludes: "Country B performed significantly better than country A". Far from the truth.....

In addition we saw that sales lag production. An analyst who concludes that country B shows its tuning points always later than county A and thus the economy of country B is clearly influenced in its performance by country A is again mistaken.

Thirdly we saw that often in sales secondary activities are included in the measurement. This will again lead to wrong conclusions in detailed analysis of activities, if countries that apply different methods are compared.

6.5. Transition period

The Member States will hopefully adjust their basic information as much as possible to the recommendations of this manual, as they are laid down in the annex.

The long-term aim is that all Member States will use uniform **activity-specific** basic data according to the annex, in other words that the applied method is the same in all Member States for a given industrial activity. To achieve this, quite a lot of changes must be carried out which refer both to the kind of basic information as well as to the calculation methods. Of course the principle of subsidiarity has to be respected. However, the aim of **comparable** indices should never be forgotten.

A first step in this direction is a greater **transparency of methods** used in the Member States. All national statistical offices are **obliged to inform** Eurostat of the methods they use. This information is published at regular intervals.

7. Methods of weighting

Production volume indices are calculated in two steps:

➔ summing up basic information inside a given Nace Rev.1 activity and

➔ aggregating indices between industrial activities.

For each step, it is the aim of the calculation to cover the activity in question as **exhaustively** as possible, keeping in mind the costs of data collection as well.

7.1. First stage calculation

Generally the indices of the NACE Rev.1 **activities** at the lowest level are calculated by applying the Laspeyres-formula (formula [2] above) to baskets of **representative** products (commodity groups) for each activity.[14]

Ideally, the weights applied at this stage consist of **value added**, since we want to measure the evolution of value added (at constant prices). In practice, this information is not available at the product level. As a **proxy (assuming a fixed ratio** between value added and sales inside a given industry), the weights used at this stage can be obtained from the PRODCOM statistics in the base year or other sales statistics.[15]

If the basic information for the production volume index consists of deflated sales data of industries, this first stage of index calculation is not necessary.

7.2. Second stage calculation

To compile composite indices Q_A for activities (3- and 2-digit level of NACE Rev.1) or for main industrial groupings (MIG), the indices computed for classes (4-digit level) have to be aggregated. This aggregation is done by weighting the computed activity indices Q_b with the share of the appropriate class according to the **value added** at factor cost (=VA_b) in base year 0.

$$[6] \qquad Q_{A,t} = \frac{\sum_{b=1}^{B} VA_{b,0} \times Q_{b,t}}{\sum_{b=1}^{B} VA_{b,0}}$$

The value added at factor cost for the NACE Rev.1 4 and 3 digit level comes from kind of activity information of the annual structural survey or, for the 2-digit level, from national accounts of the base year. Various sources may be used.

The **adaptation** of the weighting system is done every five years.

7.3. Treatment of missing industries

Occasionally, data are available for most industrial activities, but are completely lacking for some.[16] For example for mining of uranium (Nace Rev.1 12.0) or for manufacture of articles of fur (Nace Rev.1 18.3) or for publishing (Nace Rev.1 22.1) no production index can be calculated. This gap has to be filled by some sort of imputation. The weight of the activity not covered has to be added to the (closest) weights of an activity which is assumed to have parallel movements.

The same applies in fact to the first stage calculation, i.e. within a given industry, if the activity is so diversified in its products that no single series will suffice to represent value added. Instead, two or more series have to be selected and combined into an indicator for the whole activity. Here also an important element may be missing. For example, for Nace Rev.1 27.43 (lead, zinc and tin production), input data for lead and zinc may be available, but no suitable series can be devised for tin, although it represents a non negligible part of the activity. Many more examples could be found.

The problem remains to decide between two alternative approaches: either to take the limited but good indices and to "blow up" to

14) The **rule** for a minimal **representativity** of products in an activity was given above.

15) See also chapter 4.1. "Weight data" in part IV. "the Output Price Indices" below

16) In fact this occurs in nearly all EU Member States for the production index.

complete coverage, or to use the inferior but comprehensive and readily available set of production indices. This has to be decided scrupulously case by case.

When the weight is imputed to the total weight of the production index, the activities not covered can be omitted altogether though they are conceptually included. Otherwise there is a serious problem of aggregation.[17]

Of course, Eurostat has to be informed about any such imputation (approximation) so that the users of our European short term indicators can be made aware of these "shortcomings".

7.4. Chain indices

Several statistical offices do not rebase their production index every five years, but use **chain indices** instead, as for example Belgium, Ireland, the Netherlands and Sweden. Also the **US** production index has recently been changed to a chain index. Often the monthly indices are adapted as soon as possible with the information of the last available structural survey, so that the weight structure has a time lag of only one or two years.

These alternative methods should be looked at from the perspective of **quality** of results. Any attempt to include up-to-date (weighting) information more often than every five years is very much welcome and should be applied by other statistical offices as well.

8. Periodicity and data availability

All production volume indices are without exception **monthly**. This rule is justified by the great importance of this index.

At least 80% of the value of total production in the sample in each industry should be available at the statistical offices 15 working days after the end of the reference month. This percentage is regarded as necessary to calculate a good quality **quick** (*provisional*) index.

In each case, **non-responses** must be estimated by using growth rates *(gr)* of the known average *(av)* of a given industry multiplied with the value of the previous month **or** the same month of the previous year, i.e. for non-response X:

$$X^{e}_{i,t} = gr^{av}_{t-n} \times X_{i,t-n}$$

with n =1 or n=12

The returned questionnaires should represent more than 90% of total production after a month in order to avoid subsequent corrections of the index on a large scale.

The statistical offices will have to do a large amount of educational work to induce the queried units to report punctually and correctly.

9. Special breakdowns

The classification of units according to **size classes** also makes it possible to observe trends in enterprises and units taking ac-

17) See appendix d page 54 below

count of the different number of employees, if the method of deflated industry sales is used. To calculate and publish such indices can be expensive and responsibility lies fully with the Member States.

There are no objections if national statistical offices calculate and publish indices for the **product groups** for which data has been collected as basic information (in quantity or deflated value). The observation of product groups is not a matter for the attention of Eurostat.

Some Member States also calculate regional production indices. For larger countries like Germany, France, Spain, Italy and the United Kingdom such a regional breakdown clearly improves the utility of this index to the users.

All these possibilities of special sub-totals of the production index might also be of interest to users in other Member States. It is therefore strongly recommended to inform Eurostat of the existence of such indices.

10. Quality changes and new products

The general rules for the adaptation of the baskets of representative products and the weighting systems are based on the assumption that industrial structures do not change rapidly. This is true for most activities.

In some activities though which

- show a high share of product diversification or
- are affected by rapid changes in product engineering,

this method leads to increasing inaccuracy in the calculated indices. It has to be considered that the baskets of representative goods and the weighting systems can be up to seven years old. Therefore, very fast growing industries are increasingly under-represented; declining industries become over-represented.

These disadvantages can be reduced by adapting the baskets of representative goods and weights at shorter intervals, although this should only be done in exceptional cases. If one or several national statistical offices feel the need for such a special action for a particular industry, Eurostat should be contacted in order to achieve a **harmonized** action in all Member States.

The important topic of **working day adjustment**, which is surely applicable for the production index, has been treated in part A.III.8 above.

11. Mark-up with PRODCOM statistics

At the European level, the detailed production statistics PRODCOM are only mandatory at an **annual** frequency. For the textile, clothing and chemical industry a limited number of PRODCOM statistics are to be supplied quarterly.

Six EU Member States dispose though of a complete set of PRODCOM statistics at a quarterly (or even monthly) frequency: Belgium, Denmark, Germany, Luxembourg, the Netherlands and Austria. This source of quarterly production statistics is a very valuable source for **improving the quality** of the monthly production volume index. Its information, based on an exhaustive survey,

can and should be used to correct (mark-up) the production index.

For this, first a quarterly index is calculated as an average of the monthly indices.

[7] $$Q_q^{av} = \frac{1}{3}\sum_{t=1}^{3} Q_t$$

Next a quarterly index with the complete PRODCOM information is calculated $\left(Q_q^{Pc}\right)$.

The ratio between the two indices constitutes the mark-up factor MUF:

[8] $$MUF = Q_q^{PC} \Big/ Q_q^{av}$$

For each industrial activity, the monthly production index is always multiplied with the latest available MUF.

An example

The January production index is to be published. For a given industry it was computed as being 104.2. The latest available MUF dates from the third quarter of the previous year, it was 0.982. This is the best estimate of the bias of monthly indices we dispose of at present. Thus, the January production index is multiplied with the MUF, and is published as 102.3.

For the February figures the MUF for the fourth quarter becomes available, it is 0.985. Now for all monthly production indices since October of the previous year (beginning of the fourth quarter) the new MUF is applied, up to the February figure. The production index for January is now corrected to 102.6. When a few months later the MUF for the first quarter of this year is known, the January production index is corrected a third (and last) time.

The method described implies that the monthly production volume index takes the maximum possible account of the actual development in each industrial activity. It is strongly recommended for all National Statistical Offices that dispose of quarterly PRODCOM statistics. It would be desirable if more countries start the collection of quarterly PRODCOM statistics in order to improve the follow-up of the business cycle. At least for the activities where quarterly PRODCOM statistics are already now compulsory, the described method can be applied.

12. Comparison with annual statistics

The production volume indices have to be compared with the results of

- the annual structural inquiry,
- the annual PRODCOM statistics,
- the figures of National Accounts where appropriate.

If the growth rate of the **annual** production volume index of a given NACE-4-digit activity deviates by more than **10%** from the **growth rate** of the comparable annual figures (deflated value added of the structural enquiry or National Accounts where appropriate, volume output of production statistics), then both the monthly and the annual statistics in question have to be checked for inconsistencies. This should be carried out in order to find explanations for the major deviation. If necessary, improvements have to be made.

Do you now need explanations concerning classifications, scope of the survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A above.

13. Appendix: Formulae

a. Transformation

Starting with the classical Laspeyres-formula, with the quantities q of commodities i in period t being weighted with the prices p of the base year 0, we obtain the volume index Q^L_t

$$Q_t^L = \frac{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,0}} \times 100$$

Multiplying the numerator by the vector q_0/q_0 (=1) the formula is transformed to

$$Q_t^L = \frac{\sum_{i=1}^{N} p_{i,0} \times q_{i,t} \times q_{i,0}/q_{i,0}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,0}} \times 100$$

This equals

$$Q_t^L = \sum_{i=1}^{N} \frac{p_{i,0} \times q_{i,0}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,0}} \times q_{i,t}/q_{i,0} \times 100$$

Now the formula consists of summing up

a) the production share of commodity i in the base year 0, i.e. the weight $w_{i,0}$, multiplied by
b) the quantity increase in period t since the base year 0 ($\tilde{q}_t$)

$$Q_t^L = \sum_{i=1}^{N} w_{i,0} \times \tilde{q}_t$$

This form (version) of the production volume index can be applied in practice without major difficulties.

b. Deflation of Sales

If the production volume index Q_t is defined as deflated sales S (for all observations **v** in the activity concerned) and the deflator is of type Laspeyres (p^L), i.e. the formula is:

$$Q_t = \frac{\sum_{v=1}^{V} \frac{S_{v,t}}{p_t^L}}{\sum_{v=1}^{V} S_{v,0}} \times 100$$

it can easily be shown that this index is itself a **Paasche** volume index:

If we use again **i** as a symbol for the commodities in the activity concerned, we have for the Laspeyres price index:

$$p_t^L = \frac{\sum_{i=1}^{N} p_{i,t} \times q_{i,0}}{\sum_{v=1}^{V} S_{v,0}}$$

substituting this formula in the formula for the production index Q_t we obtain:

$$Q_t = \frac{\sum_{v=1}^{V} S_{v,t} \Big/ \left(\frac{\sum_{i=1}^{N} p_{i,t} \times q_{i,0}}{\sum_{v=1}^{V} S_{v,0}} \right)}{\sum_{v=1}^{V} S_{v,0}} \times 100$$

eliminating $\Sigma S_{v,0}$ gives:

$$Q_t = \frac{\sum_{v=1}^{V} S_{v,t}}{\sum_{i=1}^{N} p_{i,t} \times q_{i,0}} \times 100$$

Since the sum of sales is equal to the sum of all quantities multiplied by their prices, we can express this equation also as:

$$Q_t = \frac{\sum_{i=1}^{N} p_{i,t} \times q_{i,t}}{\sum_{i=1}^{N} p_{i,t} \times q_{i,0}} \times 100$$

So we have quantity changes q_t/q_0 weighted with the prices in period t instead of the base period 0, i.e. a Paasche volume index.

q.e.d.

c. Deflating with Paasche price indices

If, instead of the Laspeyres price index, Paasche price indices p^P are used

$$p_t^P = \frac{\sum_{i=1}^{N} p_{i,t} \times q_{i,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}} \equiv \frac{\sum_{v=1}^{V} S_{v,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}}$$

then the deflation of turnover S_v causes no more problem:

$$Q_t^L = \frac{\sum_{v=1}^{V} \frac{S_{v,t}}{p_t^P}}{\sum_{v=1}^{V} S_{v,0}} \times 100$$

Here Q^L_t is the **Laspeyres** volume index in period t, since the formula can be rewritten to

$$Q_t^L = \frac{\sum_{v=1}^{V} S_{v,t} \Big/ \left(\frac{\sum_{v=1}^{V} S_{v,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}} \right)}{\sum_{v=1}^{V} S_{v,0}} \times 100$$

which after elimination of $\Sigma S_{v,t}$ gives

$$\frac{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}}{\sum_{v=1}^{V} S_{v,0}} \equiv \frac{\sum_{i=1}^{N} p_{i,0} \times q_{i,t}}{\sum_{i=1}^{N} p_{i,0} \times q_{i,0}}$$

So this time the quantity changes q_t/q_0 are weighted with the prices in period 0, the volume index is of type Laspeyres.

q.e.d.

d. Weights in the case of missing activities

Imagine there are only 3 major activities A, B and C in manufacturing. All have an equal weight of 100. For activity A there are two sub-groups A.a and A.b with weights 60 and 40. For the industry A.a no production index can be calculated; industry A.b has to represent the whole activity A. All other sub-groups are computed.

	A	B	C
a+b	100	100	100
a	(60)	30	50
b	40	70	50

If the index for manufacturing is calculated, it is important that activity A is also weighted with 100, **not only with 40**, otherwise this activity is under-represented compared to the other activities and the index for manufacturing is biased.

II. The Turnover Index

B

1. Introduction

For short term analysis, **turnover** information is of particular significance. While the index of production provides information on trends in volume concerning value added at factor cost, turnover is used to assess current developments in sales and thus to trace **market fluctuations** and the meeting point where supply equals demand.

It is sometimes believed that the deflated turnover index and the production index are the same, but in reality the differences are considerable: [18]

- production which is not sold but increases stocks is counted in the production index, not in the turnover index,
- sales from stock on the other hand are included in turnover but do not influence production,
- sales data will often include the output of secondary production, while the production index (based on a list of products) is homogeneous,
- deflation of turnover is at present only possible with the price index of the domestic market, not with export prices. This is a source of distortions.

Turnover is sometimes also referred to as "sales", "shipments" or "deliveries". In the context of this manual these terms are used as synonyms.

Turnover determines the market growth and monitors trends in industries supplying input or using the firm's output for further manufacturing processes. Investors find useful information in industries under scrutiny and national and international authorities use the data to assess repercussions arising from the implementation of policy measures. Enterprises calculate their market share on the basis of the development of the branch turnover and thus control their relative success.

Trends in turnover (as a base for estimations of up-to-date annual sales data) provide information about **future prospects** and the need and possibility to finance considered investments and operating expenses.

Last but not least turnover is a fairly elementary concept in accounting which hence exists not only in manufacturing but also in other market oriented sectors like construction, retail trade, transport, communication, hotels and other services. The turnover index is therefore the link for short term comparisons of business cycle movements in various parts of the economy.

18) The following differences are of course not manifest if the production index is calculated from deflated sales statistics. See page 44 f above.

Binding principles concerning

- the institution responsible,
- classifications,
- the treatment of confidential data,
- observation units,
- the coverage of the enquiry,
- sampling techniques,
- delays of data collection,
- aggregations,
- seasonal adjustment,
- the level of data precision,
- quality checks of indices and
- data dissemination

have been laid down in part A. above. These principles should be observed as carefully as the following specific rules and recommendations for turnover information.

2. Definition of the index

For EU statistics in the future, it is vital that all Member States use the **same definitions** of turnover in order to dispose of **comparable** data. Indicators which cannot be compared internationally are of little use in the context of a large single European market.

Turnover shows the results of business activities as far as the goods manufactured and the services rendered are sold to customers and subsidiary companies. It indicates the future flow of money towards the units for the activities observed and hence is an indicator for future investments. Movements in these value indices of turnover cannot be split into those caused by quantity changes or those caused by price movements.

Turnover (or sales) comprises the total of products and services invoiced by the observation unit during a reference period.

In a task force meeting on short term turnover statistics it was decided that turnover excludes all taxes which fall on products and services when they leave the factory. This definition follows the rules of the world wide system of National Accounts SNA of 1993. Since this new turnover definition would imply some rather complex estimations in most statistical offices, the definition should maybe be reconsidered in the near future.

Turnover also excludes value added tax invoiced by the producer to his client. On the other hand, turnover includes also all other charges, for example expenses to transport and packaging.

Price rebates and discounts and allowances for returned goods or packaging have to be deducted, but not cash discounts. Price reductions, rebates and bonuses conceded later to clients, for example at the end of the year, should not be taken into account.

In detail the **components** of turnover are:

(a) sales of manufactured products
(b) sales of products manufactured by subcontractors
(c) sales of by-products
(d) invoiced charges for packaging and transport
(e) invoiced hours worked to third parties for job orders
(f) invoiced mounting, installations and repairs
(g) invoiced development of software

Not included should be the following components which are not directly linked to the production process:

(a) sales of supplied electric power, gas, heat, steam and water
(b) sales of waste and scrap materials
(c) leases and rentals
(d) leases for own production units and machines if used by third parties

(e) leases of company-owned dwellings
(f) receipts for license-fees
(g) commissions
(h) receipts from staff facilities (for example from a factory canteen)
(i) the supply of products and services to other not legally independent units of the reporting enterprise
(j) sales of own land and fixed assets
(k) sales of leases for own properties
(l) sales of shares and interests
(m) interest receipts and dividends
(n) other extraordinary income

Since one of the important purposes of the monthly turnover index is the possibility to "now-cast" the annual sales figures of structural statistics, the definitions should be **as close as possible** to the structural business statistics.

Some statistical offices may wish to use turnover data from other administrative or statistical sources, so that a separate enquiry is not necessary. This is encouraged as far as it **reduces the burden** of data collection on enterprises. It is imperative that in this case both the definition of index and the delays of data availability are respected as much as possible.

Any deviation in the definition of turnover (due to data collection constraints) have to be reported to Eurostat in order to assure transparency of methods for the users.

3. Index calculation

The calculation of value indices I^v for a given activity **a** is not complicated: we compare the turnover T of all observations i of the month under review t with the turnover of the base period T_0:

$$[1] \qquad I^{v}_{a,t} = \frac{\sum_{i=1}^{N} T_{i,t}}{\sum_{i=1}^{N} T_{i,0}} \times 100$$

In order to compile **composite** turnover indices for manufacturing as a whole or for main industrial groupings, the indices of turnover calculated for different NACE Rev.1 activities have to be aggregated. This aggregation is done by weighting the computed partial activity indices with the **turnover share** of the relevant activity in the base year. The source of this information is the structural business statistics.

Alternatively, for each activity at the lowest level the **absolute** turnover figures are calculated (estimated) by **grossing-up** the **sample results** with the ratio of total turnover to sample turnover in the base year. Then the aggregation consists simply of adding up the absolute activity figures and computing an index of the total series.
If certain industries are **missing** in the total turnover index of a Member State, this has to be reported to Eurostat. The degree of coverage of all Member States will be published by Eurostat.

4. Basic information

4.1. Observation unit

The basic information to be collected from the **reporting units**, generally the **enterprises** in the case of turnover information, must correspond to the definitions given above.

The **observation unit**, i.e. the unit for which actual turnover movements are recorded, was intensively (and with some

controversy) discussed with experts from the Member States. There are arguments both for the *enterprise* and for the *kind-of-activity unit*:

- If future investment prospects because of present flows of money are to be measured, **enterprises** are the correct units of observation.

  Additionally data from enterprises is much easier to obtain than from KAUs. This is a particularly valid argument if administrative sources like the VAT register are used.

  Finally comparisons to turnover indices in other sectors (like trade, services etc.) only make sense for data following the sector approach, i.e. collected for enterprises, since the short term statistics in these parts of the economy will follow that approach.
- If the main purpose of the turnover index is its comparison to the production index, employment and prices in the same industries, **KAUs** should be the observation unit. In this case the index is also valid for updating quarterly National Accounts, which is a further important role of short term turnover information.

A large majority of National Statistical Offices opted for the second approach, i.e. to apply the kind-of-activity unit for **all** indices in manufacturing, including the turnover index. This is now the mandatory requirement in the forthcoming Council Regulation.

If a Member State in contrast to this methodological rule nonetheless uses the enterprise as observation unit, for example because the administrative sources they use do not allow a breakdown of enterprises into KAUs, this has to be reported to Eurostat. The Regulation on short term indicators will give the possibility to grant methodological exceptions for cases like this.

4.2. Periodicity

The basic data for turnover are collected on a **monthly** basis, using paper questionnaires or electronic media designed by the statistical offices.

4.3. The distinction between domestic and export

In some Member States information on domestic sales on one hand and on sales for **external markets** on the other hand are already collected. Following the new Council Regulation, this break-down is from now on an **obligation** for all.

As turnover is used to monitor market fluctuations, the distinction between domestic and external short term evolution is very useful for the economic **analysis** of business cycles, especially close to turning points. In fact it is one of the main **justifications** of having a turnover index at all, since this index is only interesting if it can be split into several analytical aspects.

The following table gives an overview of the available series in the Member States in manufacturing:

Turnover Indices in the EU

	Total	Domestic / Export	Intra / Extra EU
B	✓		
DK	✓	✓	
D	✓	✓	
GR			
E			
F	✓		(✓)
IRL	✓		
Ita	✓	✓	✓

	Total	Domestic / Export	Intra / Extra EU
L	✓	✓	✓
NL	✓	✓	
A	✓*	✓*	✓*
P	(✓)		
FIN	(✓)		
S	✓	✓	
UK	✓	✓	

(✓) = under study

* =since 1997

With the creation of a large single European market and the beginning of a single European currency the definition of the term "domestic" will certainly change. This was discussed above in chapter A.II.4 page 15 f.

5. Level of breakdown

5.1. Calculated activities

As a general rule, turnover indices of all divisions, i.e. the NACE Rev.1 **2-digit-level** have to be calculated if there is any production in the Member State. All calculated indices have to be transmitted to Eurostat. The national statistical offices must mark confidential data.

The Member States are strongly **encouraged** to collect and publish turnover indices at a more detailed level than divisions. Any more detailed indices which are available in the Member States should be transmitted to Eurostat on a voluntary basis in order to make them available to a larger public.

5.2. Breakdowns by size class

The classification of units according to **size classes** also makes it possible to observe trends taking account of the different number of persons employed or of the amount of turnover. To calculate and publish such indices at an exhaustive level can be expensive and lies at present in the responsibility of the Member States.

However, a turnover index for **small and medium sized enterprises** would be desirable at the Community level. For this purpose Member States whose 2-digit activity represents more than 10 percent of EC turnover should transmit to Eurostat quarterly information broken down into four size classes:

- 10 to 19 persons employed
- 20 to 99 persons employed
- 100 to 499 persons employed
- more than 500 persons employed

In order to achieve good quality information and at the same time minimize data collection costs, this breakdown should only be supplied at the two digit level of NACE Rev.1 and with quarterly instead of monthly periodicity.

It is left to the Member States to break down the calculated turnover indices by region.

6. Comparison with other statistics

The turnover indices have to be compared with the results of

- the annual structural business statistics,

- the figures of National Accounts where appropriate.

If the growth rate of the **annual** turnover index of a given NACE Rev.1 activity deviates by more than **5 %** of the **growth rate** of the comparable annual figures, then both statistics in question, short term indicators and the annual figures, have to be checked for inconsistencies in order to find explanations for the major deviation. If necessary, improvements have to be carried out.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination?
These topics and several more are treated in part A. above.

III. Indices of Orders

B

1. Introduction

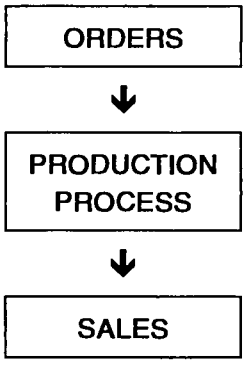
Quantitative information on orders in the form of **new orders** received and the **stock of orders** are short term indicators of outstanding interest. While industrial production indices provide information on trends in volume concerning value added at factor cost, data on new orders and the stock of orders are used to assess the **future** evolution of demand and production possibilities. For many industries these key indicators reflect changes in the economic climate at an early stage.

The main users of Eurostat statistics have confirmed their continuing interest in these variables. A survey of European Industrial Federations' needs, run in Spring 1996, has shown that both indices of new orders and stock of orders were after production the most used indicators for short term analysis.

At the same time the European Monetary Institute (EMI) has ranked the quantitative index of new orders as one of the "essential" (first priority) variables necessary for the economic analysis of industrial sectors to be carried out by the future European Central Bank.

Orders, which are the production and turnover of tomorrow, determine the market growth and monitor trends in industries supplying materials or using the firm's products as inputs to further manufacturing processes. Investors find useful information in industries under scrutiny; enterprises monitor their relative success in acquiring new orders.

Quantitative order information cannot be substituted by qualitative **business surveys** (opinion polls). These are valuable in its own right, giving a snap-shot indication of future tendencies, but an exact quantitative assessment is also needed.



The figure indicates the sequence in time of orders, production and sales. The interval between each step can range from days to several months.

New orders arrive in many industrial activities considerably before the production process is started. New orders give insight into the level of production and hours worked in the following months. Accordingly, new orders are the earliest indicator showing the fluctuations of the market.

The economic situation of an industrial activity is also characterised by the size of the stock of orders which indicates how long the

activity of the enterprises and factories is secure. The stock of orders enables estimates to be made of the date at which fluctuations in the trend of new orders come into effect for production, labour input and turnover.

The forthcoming Council Regulation only stipulates the provision of the **new orders** index; however, Eurostat **strongly advocates** the collection of the **stock of orders** for two main reasons:

Firstly, from the point of view of economic analysis, the stock of orders complements the information on sales and new orders by giving an indication of how the production system reacts over time to the fluctuations of demand. The combined information on new orders and the stock of orders show when orders are received and when they are fulfilled.

Secondly, from the statistician's point of view, the availability of the three variables, new orders, turnover and stock of orders allows **valuable quality checks** in the absence of structural statistics on orders. The practice in several National Statistical Offices shows that these plausibility checks improve notably the reliability of short term order information.

The following table gives an overview of the quantitative orders information available for manufacturing industries, in the EU Member States and main partners:

Data Collection of Orders 1996

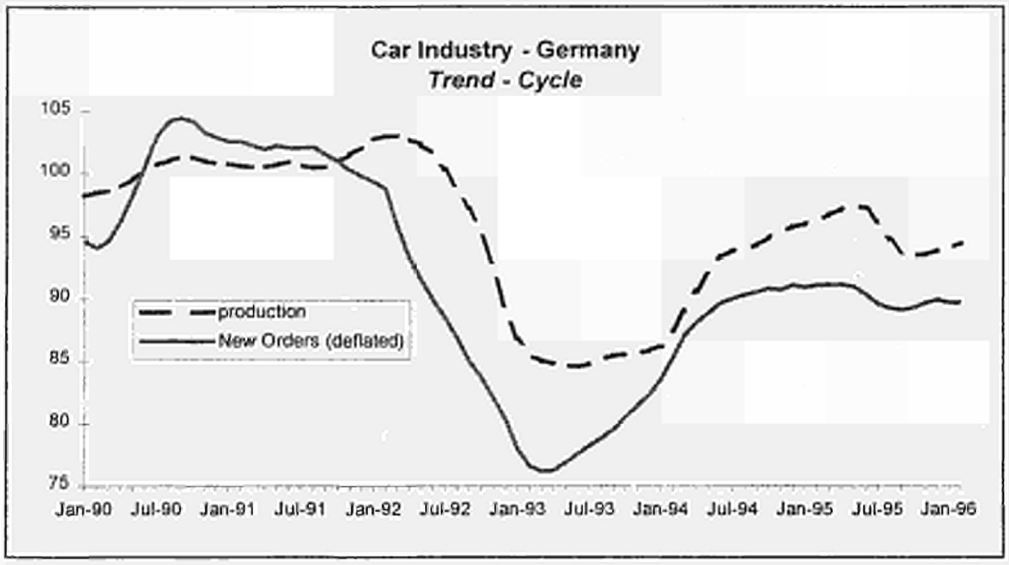
	New orders	Stock of orders
B	col	
DK	col	col
D	col	
GR		
E		
F	u.s.	u.s.
IRL		
I	col	col
L	col	
NL	der	col
A	col	col
P	u.s.	
FIN	u.s.	u.s.
S	col	col
UK	der	col
N	col	col
JAP	col	
USA	col	col

col = collected
der = derived (calculated)
u.s. = under study

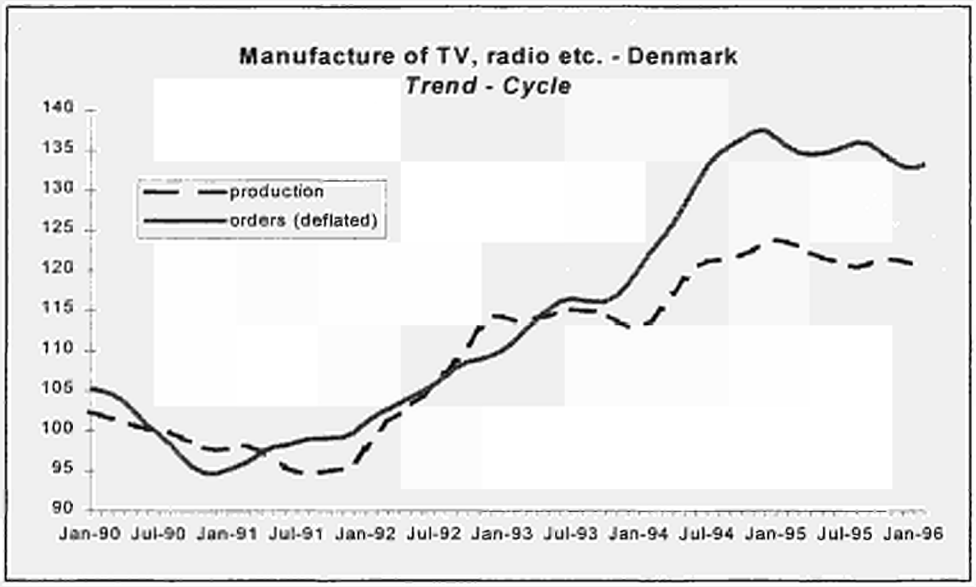
The expenditure for collecting and calculating indices of orders is justified for activities

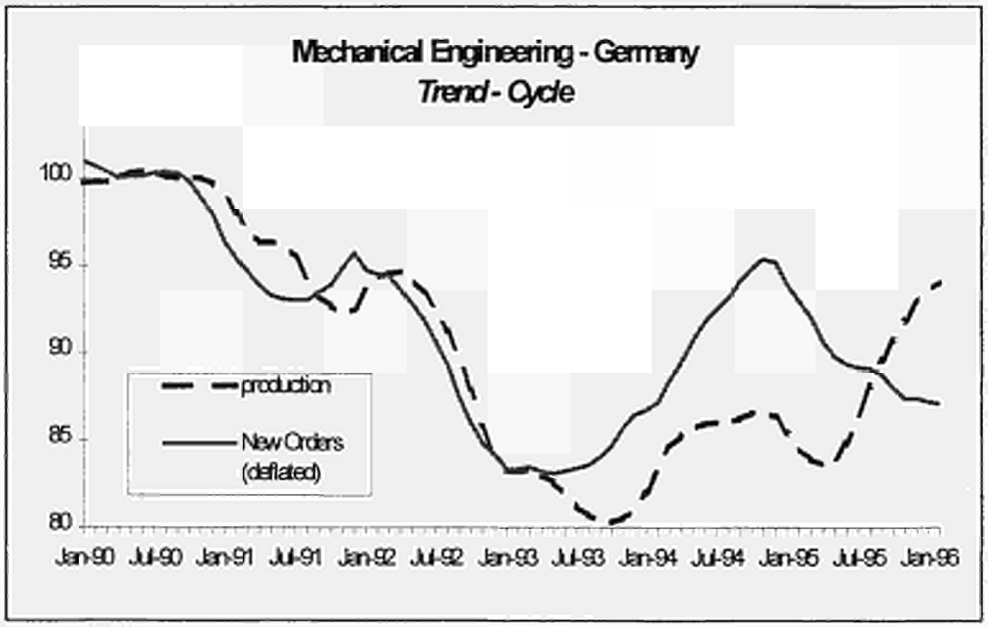
- producing mainly to order,
- having a long production time, or
- normally having high stocks of orders.

The index of orders makes sense if it gives **leading** information on the business cycle, especially on the turning points.


Car Industry - Germany
Trend - Cycle
105
100
95
90
85
80
75
production
New Orders (deflated)
Jan-90 Jul-90 Jan-91 Jul-91 Jan-92 Jul-92 Jan-93 Jul-93 Jan-94 Jul-94 Jan-95 Jul-95 Jan-96

B


Manufacture of TV, radio etc. - Denmark
Trend - Cycle
140
135
130
125
120
115
110
105
100
95
90
production
orders (deflated)
Jan-90 Jul-90 Jan-91 Jul-91 Jan-92 Jul-92 Jan-93 Jul-93 Jan-94 Jul-94 Jan-95 Jul-95 Jan-96


Mechanical Engineering - Germany
Trend - Cycle
100
95
90
85
80
production
New Orders
(deflated)
Jan-90 Jul-90 Jan-91 Jul-91 Jan-92 Jul-92 Jan-93 Jul-93 Jan-94 Jul-94 Jan-95 Jul-95 Jan-96

These preconditions are prevailing not only in investment goods industries, but also for several industries making intermediate and durable consumer goods of high quality.[19]

Binding general principles have been laid down in part A. above. These principles should be observed as carefully and accurately as the following specific rules and recommendations for new orders received. They apply as well to the variable "stock of orders".

2. Definition of orders

For European statistics in the future it is vital that all Member States use the **same definitions** of variables in order to have really **comparable** data. Indicators which cannot be compared internationally are useless in the context of a large single European market.

2.1. Link to production or turnover ?

New orders and the stock of orders are observed with regard to future **production** activity. However, from the enterprise's point of view orders represent future **sales** and are directly related to turnover. A unit can fulfil an order by producing the goods or services itself, by sub-contracting the work or through resales.

The statistician is facing a trade-off between the **practical constraints** of data collection and the **ideal definition** of orders that would correspond to the goods produced by the enterprise.

A unit is clearly not involved in the production of goods it **resells** without further processing and most countries have excluded these from their definition of orders. Including resales in the definition of orders would pull the information away from the concept of production.

The case of **sub-contracting** is more intricate, as the enterprise can be partly involved in the processing of the final product or be the owner of the raw materials supplied to the sub-contractor (contract processing). All countries agree on including subcontracting in the definition of orders.

The following definition is the result of the above mentioned trade-off:

2.2. Basic definition

"Orders" are defined as the value of all legally binding contracts linking a producer and a consumer and relating to the future deliveries by the producer of goods and related industrial services.

2.3. Inclusions / Exclusions

Included in orders are

- orders for goods and related industrial services to be manufactured in the different KAUs (kind-of-activity units) of an enterprise,
- orders for goods and related industrial services to be manufactured partially or totally by subcontractors.

Deducted from the value of orders have to be:

- all taxes directly linked to the products such as VAT,
- rebates and discounts when they are given at the moment of contract.

19) For an inventory of applicable NACE Rev.1 divisions see page 67

Excluded from the value of orders are resales without further processing.

2.4. New orders

New orders correspond to all orders received in the course of the reference month minus the cancellations that occurred during the same period.[20]

2.5. Stocks of orders

Stocks of orders correspond to all orders in hand at the end of the reference period. Orders are removed from the stock of orders when they are invoiced.

2.6. Cancellations

During a recent seminar on orders with experts from National Statistical Offices, the question of cancellations was discussed. Cancellations of orders are part of the information on the market conditions indicating that part of the demand is withdrawing. Ideally, they should be recorded as a separate series. If this is not the case, cancellations should be recorded in the month when they occurred. The variable "new orders" accounts for the state of demand during the reference period and thus should also record the signs of withdrawal.

In addition, it is not enough to record cancellations in the stock of orders because a diminution of this variable can either be due to a fall in the demand (less new orders) or to a concentration in time of production (higher number of orders fulfilled during the reference period). Hence, information on the withdrawal of demand and the timing of this withdrawal are lost.

20) This implies that if cancellations are very high, new orders for a given month can be negative.

3. Type of index

The indices of orders indicate the future flow of money towards the units of the activities observed. These value indices do not express to what extent their development is caused by quantity changes or price movements.

Indices for new orders NO^v and the stock of orders SO^v can be calculated as simple value indices, comparing information i of the month under review t with the observations of base period 0:

$$[1] \qquad I_{a,t}^{NO} = \frac{\sum_{i=1}^{N} NO_{i,t}}{\sum_{i=1}^{N} NO_{i,0}} \times 100$$

For the stock of orders, the base equals the **end** of the base year:

$$[2] \qquad I_{a,t}^{SO} = \frac{\sum_{i=1}^{N} SO_{i,t}}{\sum_{i=1}^{N} SO_{i,0}} \times 100$$

Volume indices, i.e. deflated value indices are only to be supplied to Eurostat for the new orders received. Here a "volume" index is very useful for comparisons with the production volume index (leading indicator). This comparison is still valid even if the deflated new orders index is of the Paasche type.[21] The corresponding formula is:

$$[3] \qquad Q_{a,t}^{NO} = \frac{\sum_{i=1}^{N} \frac{NO_{i,t}}{p_{i,t}}}{\sum_{i=1}^{N} NO_{i,0}} \times 100$$

21) Concerning the problem of Laspeyres versus Paasche indices see the appendix of part B.I. (Production index), page 53

In fact such **deflated** new orders series are used more than the original value indices. They are published for each country by Eurostat.

If in a selected activity one or more units do not work on orders, **turnover** should be reported and used instead. This assumes that in observation units which do not work to orders, (fictive) orders are equal to sales.

In order to compile **composite** indices of orders (for total manufacturing or for main industrial groupings), the orders information (I^{NO} or I^{SO}) calculated for NACE Rev.1 activities have to be aggregated. This aggregation is done by weighting the partial indices with the orders **share** of the relevant activity in the **base year 0** or by grossing-up the partial results of the activities and adding up the estimated absolute figures (similar to the turnover index aggregation).

In most cases no total orders information will be available for the base year, since this data is not collected in the structural business survey. In this case, the total orders (NO or SO) are **estimated** by applying the ratio of orders to turnover of the **sample** in the base year to **total** turnover T:

$$Orders_0^{estim} = \frac{Orders_0^{sample}}{T_0^{sample}} \times T_0^{total}$$

For calculating the **total index** of orders for all manufacturing industries, only the selected activities which work to order are used! Otherwise the signal we want to measure would be watered down.

4. Basic information

4.1. Data collection and periodicity

The basic information to be collected from the reporting units must correspond to the definitions given in chapter 2 above.

Like for all other short term indicators in manufacturing, The **observation unit** has to be the **kind-of-activity unit**.

The basic data for new orders and the stock of orders are collected **monthly**, using paper questionnaires or electronic media designed by the statistical offices.

4.2. The distinction between domestic and export

At present, in some Member States quantitative information on domestic orders on one hand and on orders for **external markets** on the other hand are already collected. Following the forthcoming Council Regulation, this break-down becomes an **obligation** for all. This distinction between domestic and external short term changes is a powerful analytical tool for increasing our knowledge about business cycles.

The following table gives an overview of the available series in the Member States in manufacturing:

Order Indices in the EU

	Total	Domestic / Export	Intra / Extra EU
B	✓		
DK	✓	✓	
D	✓	✓	
GR			
E			
F	(✓)	(✓)	
IRL			
I	✓	✓	✓
L	✓	✓	✓
NL	✓	✓	
A	✓	✓	✓*
P			
FIN	(✓)	(✓)	
S	✓	✓	
UK	✓	✓	

(✓) = under study

* = since 1997

With the growing importance of the single European market and the creation of monetary union in 1999 the definition of the term "domestic" will have to change. This was discussed above in chapter A.II.4, page 15 f.

4.3. Transition period

As far as Member States do not yet collect data of new orders at present, they should start as soon as possible, but in any case not later than in the year 1999 when the single European currency (EURO) is implemented. The transition period for this essential variable has to be shorter than for other new projects in the domain of short term statistics. The same is valid for the break-down into domestic and external orders.

4.4. Scope of survey

Data collection and the calculation of indices are only mandatory for a selection of industrial activities of NACE Rev.1: [22]

17: Manufacture of textile,
18: Manufacture of wearing apparel; dressing and dyeing of fur;
21: Manufacture of pulp, paper and paper products
24: Manufacture of chemicals and chemical products
27: Manufacture of basic metals
28: Manufacture of fabricated metal products, except machinery & equipment
29: Manufacture of machinery and equipment n.e.c.
30: Manufacture of office machinery and computers,
31: Manufacture of electrical machinery and apparatus n.e.c,
32: Manufacture of radio, television and communication equipment,
33: Manufacture of medical, precision & optical instrum., watches & clocks,
34: Manufacture of motor vehicles, trailers and semi-trailers,
35: Manufacture of other transport equipment.

This list is the result of a compromise reached after several task force meetings and a seminar dedicated to the subject of quantitative orders information that were held in the presence of Member States who all collected or planned to collect these variables.

Member States are free to collect information on orders for **more industries** than those listed above. The additional series should also be regularly transmitted to Eurostat.

22) The titles of the industrial activities given here are only indicative, they are a shortened version of the official labels.

5. Level of breakdown

As a general rule, indices of new orders received and of the stock of orders have to be calculated for divisions, i.e. the NACE Rev.1 **2-digit-level**. All calculated indices have to be transmitted to Eurostat. The national statistical offices must mark confidential data.

The Member States are strongly **encouraged** to collect and publish order information at a more detailed level than divisions. Information at the 3-digit level of NACE Rev.1 should be achieved. Any more detailed indices available in the Member States should be transmitted to Eurostat on a voluntary basis in order to make them available to a larger public.

The classification of units according to **size classes** also makes it possible to observe trends taking account of the different number of persons employed. To calculate and publish such indices can be expensive, but it is encouraged by Eurostat since it increases significantly the analytical value of short term orders information. It is also left to the Member States whether to break down the calculated indices by region.

6. Plausibility check

Order information cannot be compared with annual statistics since no such data exist for orders.

But an internal plausibility check can be performed, the following calculation should be done at regular intervals:

[4] $$SO_{t-1} + NO_t - T_t = SO_t$$

SO_{t-1} : stock of orders at the end of period t-1
NO_t : new orders received in period t
T_t : turnover in period t
SO_t : stock of orders at the end of period t

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A. above.

IV. Output Price Indices

B

1. Introduction

This manual provides the methodological framework for the computation of monthly industrial **domestic** and **export** output price indices by the Member States of the European Union. It has, unless indicated otherwise, the status of a set of recommendations. In the interest of the users, it should be the aim of all statistical offices that all Member States calculate these indices in a co-ordinated, methodologically justified, manner. Of course, country-specific circumstances should be taken into account. If these circumstances are such that, in a Member State's opinion, a deviation from the framework laid down in this manual is justified, this Member State should explain its position in detail to Eurostat and the Committee created by the new Regulation. This need for a justification serves the purpose of transparency of methodology in the European Union.

Binding principles concerning

- the institution responsible,
- the classifications,
- the treatment of confidential data,
- the observation units,
- the coverage of the enquiry,
- the sampling techniques,
- the delays of data collection,
- aggregations,
- the level of data precision,
- quality checks of the indices and
- data dissemination

have been laid down in part A. above. Considering the importance of the index, these standards should be observed as scrupulously as the following specific rules and recommendations for the output price index.

2. Basic concept and exceptions

2.1. Basic concept

The **domestic** output price index for an economic activity measures the average price development of all commodities produced by that activity and sold to the domestic market.[23] Parallel to the domestic price index, the **export** price index shows the average price development (converted to local currency) of all commodities produced by that activity and sold abroad. The purpose of these indices is to provide rapid information on **business cycle movements** rather than to serve as a deflator. But the

23) For the **practical** definition of output prices in the data collection process see chapter 4.4. below.

alternative purposes of a **deflator** have to be kept in mind.

At present, 'domestic market' means inside the Member State and 'abroad' means outside the Member State. When the European Monetary Union (EMU) is in full operation, following the Maastricht Treaty, the definition of 'domestic market' will change. This is discussed above in part A.II.4, page 15 f.

2.2. Exceptions of coverage

Domestic and export output price indices have in principle to be computed for all NACE Rev.1 3-digit groups belonging to sections C, D, and E.

Exceptions are

12.0	mining of uranium,
22.1	publishing,
23.3	nuclear fuel,
29.6	weapons and ammunition,
35.1	shipbuilding and
35.3	aircraft.

However, attempts to compute indices for these groups are encouraged by Eurostat and should be discussed with other Member States. Pilot studies will be initiated in order to study these problem areas in depth.

3. Type of index

By definition an output price index refers to a group of enterprises.[24] It is a so-called group price index.

When the population model and the sampling strategy are developed for the **domestic** output price index (the model for the **export** output price index being equivalent), it can not be avoided to use some mathematical notation. In order not to disrupt the readability of this manual, this slightly difficult part is in appendix 1, page 76 to 79.

Summarizing the clarifications of appendix 1, it is recommended that the domestic (and in parallel the export) output price index for an industry group is calculated as a weighted average of commodity group price indices. The weights are the base period domestic (or export) sales values. The commodity group price indices are calculated as **chained** price indices, based on samples of enterprises and samples of representative commodities. These samples and the associated weights can be adapted whenever necessary. The foregoing applies mutatis mutandis to all cases where output price indices for industry classes are required.

If instead of chain indices classical Laspeyres indices are used, the weighting system has to be renewed as often as possible, at least every 5 years. This is discussed above in part A.II.9, page 24.

The domestic or export output price index for **higher levels of aggregation**, i.e. the division (= 4-digit level), the subsection, the section or the total of industry is defined as a weighted arithmetic average of the group price indices, the weights being base period domestic or export sales values.
The foregoing applies mutatis mutandis to the construction of group (3-digit level) price indices from class (4-digit level) price indices when necessary.

The national price indices are used by Eurostat to calculate price indices for the whole European Union. This is currently done by computing weighted **geometric** averages. The geometric average is chosen because in that case the elasticity of the EUR-

24) Throughout this text 'enterprises' is used as an abbreviation of 'enterprises or other units' in the sense of Council Regulation (EEC) No. 696/93 of 15 March 1993.

total index with respect to a Member State-specific index is constant. In particular the elasticity does not depend on the relative level of the Member State index as would be the case when the arithmetic average had been used.

However, when the European Monetary Union with one single currency is in operation, the arithmetic average will be applied by Eurostat for reasons of consistency.

The foregoing applies mutatis mutandis to all other levels of aggregation.

4. Implementation

4.1. Value data for weights

The base year values of domestic and export output per industry group and commodity group (weights) can be obtained from the detailed table from which make-, use- and input-output tables are constructed. This detailed table provides for each combination of commodity group, origin and destination a value figure. The values used should ideally exclude transport and trade margins, i.e. represent value in basic prices. The advantage of using such a table, provided by the department of National Accounts of the national statistical office, is that the data form part of a larger **integrating** framework. If such a table is not available the values have to be estimated from other sources, for instance production censuses or turnover statistics. These sources can also be used for entries where the table is not detailed enough.

The intra-commodity group domestic (or export) output values per enterprise for the base year and, if necessary, for later years[25] can be obtained from annual production census data, data for turnover statistics, data for PRODCOM statistics, or other statistics. Thus **various sources** may be used.

If enterprise-specific domestic or export output values are not available, it is allowed to **approximate** domestic or export output value shares by total output value shares.

It should be noted that for aggregated price indices like the total manufacturing index, the activity information should be weighted at the branch level, not at the commodity level.[26] This agreement serves the purpose of comparability with other indices like the production, employment and turnover index.

4.2. Sampling

All enterprises are contained in a Central Business Register. They can be grouped by activity and, using ancillary information, by commodity group. Potential respondents can then be selected by using an appropriate probabilistic method (like pps-sampling). Approximate (pps-) sampling can also be used for the selection of representative commodities at a respondent enterprise. In many cases, however, one has to be satisfied with judicious samples or simple random samples. The utmost care must be taken that the sample price index is an unbiased and precise estimator of the population price index.

In order to guarantee a minimum quality of the price indices, it is recommended that per commodity group the selected reporting units should on average cover 70% of sales. The minimum coverage should be 40%. De-

25) That is the values entering formula (11) and (12) respectively in appendix I below

26) See chapter 3.2. above.

viations from this recommendation should be discussed case by case with Eurostat.

For those CPA product groups retained, either a probabilistic sample or a judicious sample can be drawn. The rules of representativity for these samples are laid down in chapter 10.2. of part A.II "General Rules and Recommendations" above.

4.3. Specification of the representative goods

When a particular enterprise is selected for the price survey it is recommended that a **field representative** visits the enterprise (reporting unit) in order to solicit its co-operation. Together with the reporting unit he selects the sample of commodities and obtains the approximate intra-enterprise weights of the representative commodities selected. At present, some Member States do not yet use field representatives. They contact the enterprises by mail, and the sample selection is left to the enterprise itself. It is important that the representative commodities are specified carefully. In particular this implies a complete specification of the (physical) product as well as a complete specification of the kind of transaction.

It is vital that all price-determining characteristics of the latter are taken into account (for example: quantity of units sold, transport provided, rebates, service conditions, guarantee conditions). The specification must be such that in subsequent survey periods the enterprise is able to uniquely identify the commodity and to provide the appropriate price per unit.

It is recommended that the selected enterprises be periodically revisited or contacted by mail in order to check whether the sample of representative commodities and the set of intra-enterprise weights need to be updated.

4.4. Practical definition of the collected price data

In the past and up until now, the price information in the various Member States of the European Union is defined pragmatically according to local circumstances and traditions. This leads to quite heterogeneous basic price data. For the future it is indispensable that the collected price information is **comparable** all over the area of the European Union. This aim of comparability of data collection concepts implies that national statistical offices have to adapt their methods and give up certain features of past data collection.

The following three **rules** apply:

- The appropriate price is the ex-factory selling price (first marketing stage)[27] excluding VAT **and** all specific taxes (for example excise taxes).
- In order to show the true evolution of price movements, it should be an **actual transaction** price, and not a list price. For the domestic price index, the transaction must be with a domestic agent.
- The price surveyed in period t should refer to **orders** booked during period t (moment of contract), not the moment when the commodities leave the factory gates. Otherwise there might be a considerable information lag.[28]

Considering that period t is a month, it is recommended that the price should refer to a **particular day** in the middle of the month, i.e. it should not represent an average over the whole month. This recommendation only serves the purpose that the National Statistical Offices can meet the ambitious deadlines set up in chapter 8. below.

27) If transport costs are included, this should be part of the product specification.

28) This rule is only relevant for durable goods with a substantial lag between order, production and delivery.

Any exceptions to these rules (in a transitory period) have to be reported to Eurostat or the Committee created by the legal act in order to assure **transparency** of the used concepts.

4.5. Unique products

Some industries only produce unique products. In those cases it is impossible to observe the actual transaction price of a commodity during subsequent time periods.

Then the following method, called **model pricing**, is recommended. In co-operation with the respondent enterprise one selects one or more of the unique products delivered during a past time period. A careful specification of the (physical) product and the kind of transaction is laid down which contains all of the price-determining characteristics. The respondent is then asked to provide regularly a realistic offer price for this commodity. In this offer price he must take into account not only the actual production cost but also the actual market condition (which determines the profit margin). These offer prices are then treated like actual transaction prices.

Of course, one must regularly check the validity of this procedure. For instance, if a certain model becomes obsolete, it must be replaced by a newer one.

5. Periodicity

Following the new legal base for Short Term Indicators and considering the importance of regular price information, the price survey has to be executed **every month** in all activites.

In areas which show less frequent price changes, a lower frequency of surveying is allowed. It should be checked at regular intervals whether this condition still applies. However, in those cases the computation of the price indices is executed as if the prices are reported to be unchanged relative to the previous month.

It is vital that these exceptions, if they relate to entire activities, are **reported to Eurostat**. This need of justification serves the purpose of transparency for the users of the price statistics.

B

6. Quality change

Suppose that a respondent enterprise announces that from period t onwards commodity i, which is part of the price survey, is no longer produced but is **replaced** by a closely related commodity i'. Technically spoken, commodities i and i' are different qualities of the same (kind of) product. The expression 'different qualities' is used to cover sets of commodities whose characteristics are sufficiently different to make them distinguishable from each other from an economic point of view but which are sufficiently similar to each other to be described by the same generic term. Quality change can be caused by a change in the physical characteristics of a product, but also by a change in the kind of transaction. One of the most important questions in price statistics is how to deal with the phenomenon of quality change. In the context of this manual the following guidelines can be given.

Suppose that the prices p_i^{t-1} and $p_{i'}^{t}$ are known, and consider the estimation of $P_{hk}^{t,t-1}$ (see expression (14) above). Then we have the following options:

(i) **Delete** commodity i from the calculation of $P_{hk}^{t,t-1}$ (provided that there are enough observations left) and replace i by i' in the calculation of $P_{hk}^{t+1,t}$.

(ii) Perhaps commodity i' was already available at period t-1 and $p_{i'}^{t-1}$ can be obtained from the respondent enterprise. Then i can be **replaced** by i' in the calculation of $P_{hk}^{t,t-1}$ and later indices.

(iii) **Estimate** what would be the price of i in period t if it was produced and sold on the market. This virtual price, p_i^t, is then used in the calculation of $P_{hk}^{t,t-1}$. In the calculation of $P_{hk}^{t+1,t}$ i is then replaced by i'.

(iv) Replace i by i' in the calculation of $P_{hk}^{t,t-1}$ and **estimate** $\tilde{p}_{i'}^{t-1}$, that is what would be the price of i' in period t-1 if it was produced and sold on the market.

Special cases of (iii) and (iv) are respectively

$$\tilde{p}_i^t = p_{i'}^t \text{ and } \tilde{p}_{i'}^{t-1} = p_i^{t-1}$$

Then the quality change is **ignored**. However, this is likely to introduce a serious bias of unknown size, or even direction, into the price indices. The first option is also not recommended in general. Quality change (introduction of a new commodity) is often accompanied by a (hidden) price change that may very well differ from the average rate of price change for the unchanged commodities.

Estimation of the virtual prices $\tilde{p}_i^t$ or $\tilde{p}_{i'}^{t-1}$ can be done:

(i) by the respondent enterprise, based on information about production cost;

(ii) by a commodity expert of the statistical office;

(iii) by the so-called **hedonic method**. The hedonic method assumes that the prices of different qualities on sale on the market at the same time are a function of certain measurable characteristics. Provided there are enough observations, regression methods can be used to estimate by how much the price varies in relation to each of the characteristics. The resulting regression coefficients can be used to predict the prices of commodities with different mixes of characteristics that are not actually on sale in the period in question. There is much literature on the hedonic method.[29] The hedonic method is quite **complex** and therefore difficult to be generally applicable in a production environment. On the other hand it can provide a useful check on the ongoing quality adjustment process. National Statistical Offices are encouraged to use hedonic methods in particular in the domain where enormous and rapid quality changes occur like in the computer industry.[30]

Output Price Indices of Export

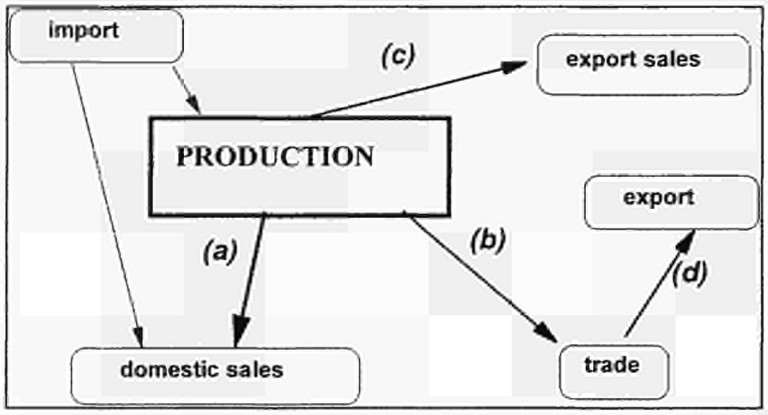
So far this manual treated the methodology of *domestic* output price indices. In the future the statistical offices of the Member States are requested to develop also output price indices of export.

29) For scientific literature on this subject see the list in appendix 2. You are also welcome to contact Eurostat.

30) Sweden shows that a statistical office can in fact use hedonic methods in its normal production environment. See Dalén, J., Operationalising a hedonic index in an official price index program: personal computers in the Swedish import price index, R&D Report 1992:15 (Statistics Sweden, Stockholm).

The model of output price indices of export is a duplicate of the model of domestic output price indices.

The implementation can though be difficult since, in addition to all potential problems explained above, the statisticians have to deal with several different currencies of foreign customers. Export prices quoted in foreign currency should be converted by the national statistical office using the exchange rate of the day of the price observation. If the exchange rates fluctuate a lot, it might be advisable to use monthly averages instead in order to avoid spurious results.



Unit values should be avoided, but they are accepted by Eurostat as a proxy for genuinely collected data. For homogeneous commodities unit values are in fact the best method and should therefore be used. More research is needed in this area.

A further specific problem is the exact definition of the reporting unit. The following diagram shall illustrate the difficulty:

For the domestic output price index, information concerning the flow of commodities (a) and (b) is measured, since both are from production units to **domestic** "users".

For the export output price index, ideally only (c) should be included in the survey, since only this commodity stream is direct **output** which is exported. As second best it may be unavoidable to measure instead the prices of (c) plus (d), i.e. export prices including traders' transactions.

8. Plausibility checks

Provisional and final price index numbers are routinely subjected to macro plausibility checks. Domestic output price index numbers can be compared with export price index numbers, import price index numbers, and price index numbers based on unit value data from annual production censuses. They can also be confronted with production volume index numbers. Also general information about the economic situation of industry groups must be taken into account.

If these checks show substantial inplausibilities, a review (i.e. a careful verification) of the sample of enterprises or the sample of commodities is necessary. In this case Eurostat or the Committee has to be informed.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A. above.

9. Appendix I: The theoretical model

a. Lowest level of aggregation

Consider a group of enterprises H. A single member of this group will be denoted by h. The set of all commodities produced by enterprise h for the domestic or export market will be denoted by C_h. A commodity is defined as a completely specified product together with a specified kind of transaction.[31] In fact, the basic economic units are the individual transactions. However, for statistical purposes some aggregation of these basic units is unavoidable.

It can safely be assumed that for two different enterprises h and h' the sets C_h and $C_{h'}$ do not overlap. A single commodity will be denoted by i. We consider two periods: a base period 0 and a comparison period t. In accordance with common usage, the domestic or export output price index for a single enterprise h, P_h^{t0}, will be calculated by the Laspeyres formula.[32] Thus the price index for period t relative to period 0 is given by the following expression:

$$(1) \qquad P_h^{t0} \equiv \frac{\sum_{i \in C_h} v_i^0 \times (p_i^t / p_i^o)}{\sum_{i \in C_h} v_i^0}$$

where

v_i^0 = base period value of the domestic or export sales of commodity i;

p_i^0 = base period price of commodity i.

p_i^t = comparison period price of commodity i.

The summation is over all commodities produced by enterprise h for the domestic or the export market.

Notice that

$$(2) \qquad v_h^0 \equiv \sum_{i \in C_h} v_i^0$$

is the base period value of the total sales of enterprise h to the domestic market.

An output price index for the group of enterprises H can now be obtained as a weighted average of the enterprise-specific output price indices (1). If the domestic or export sales values v^0_h are used as weights, the output price index for H is defined as

$$(3) \qquad P_H^{t0} \equiv \frac{\sum_{h \in H} v_h^0 \times P_h^{t0}}{\sum_{h \in H} v_h^0}$$

If we define

$$(4) \qquad C_H \equiv \bigcup_{h \in H} C_h$$

that is C_H is the set of all commodities produced by the group of enterprises H for the domestic or the export market, we can rewrite (3) as

31) Thus exports are according to this definition per se different commodities than domestic sales. In this case the kind of transaction is an important specification of the commodity.

32) Actually, the domestic and the export output price index is a subindex of the (total) output price index. Within the micro-economic theory of the firm the output price index is based on the revenue function (or restricted profit function). Under appropriate conditions it can be shown that the Laspeyres output price index is a lower bound of the (true) output price index. *For scientific literature on this subject you are welcome to contact Eurostat.*

$$(5) \qquad P_H^{t0} \equiv \frac{\sum_{i \in C_H} v_i^0 \times (p_i^t / p_i^o)}{\sum_{i \in C_H} v_i^0}$$

Thus $P_H{}^{t0}$ is also a Laspeyres price index.

Notice that the domestic output price index $P_H{}^{t0}$ **includes** the transactions between a h $\in$ H and any other h'$\in$ H, since the domestic market for enterprise h includes all other enterprises belonging to H. Thus $P_H{}^{t0}$ follows the so-called **gross concept**.

The following approach is proposed as a basis for **estimating** the output price index (5).

Assume that all commodities can be classified into disjunct commodity groups[33] $G_1,...,G_K$. Notice that

$$C_H \subset \bigcup_{k=1}^{K} G_k \ .$$

The intersection of C_H and G_k, $C_H \cap G_k$, is the set of all commodities belonging to commodity group G_k and produced by H. Notice that this set can be empty. The corresponding base period sales value is

$$(6) \qquad v_{Hk}^0 \equiv \sum_{i \in C_H \cap G_k} v_i^0$$

and the corresponding commodity group price index is

$$(7) \qquad P_{Hk}^{t0} \equiv \sum_{i \in C_H \cap G_k} \frac{v_i^0 \times (p_i^t / p_i^0)}{v_{Hk}^0}$$

$$\text{Since } C_H = \bigcup_{k=1}^{K} (C_H \cap G_k) \ ,$$

we can rewrite (5), using (6) and (7), as

$$(8) \qquad P_H^{t0} = \frac{\sum_{k=1}^{K} v_{Hk}^0 \times P_{Hk}^{t0}}{\sum_{k=1}^{K} v_{Hk}^0}$$

Thus $P_H{}^{t0}$ can be written as a weighted average of commodity group price indices. Each of these price indices can in turn be decomposed as follows: Consider the intersection of C_h and G_k, that is $C_h \cap G_k$ This is the set of all commodities belonging to commodity group G_k and produced by enterprise h. Notice that this set can be empty. The corresponding base period sales value is

$$(9) \qquad v_{hk}^0 \equiv \sum_{i \in C_h \cap G_k} v_i^0$$

and the corresponding commodity group price index is

$$(10) \qquad P_{hk}^{t0} \equiv \sum_{i \in C_h \cap G_k} \frac{v_i^0 \times (p_i^t / p_i^0)}{v_{hk}^0}$$

$$\text{Since } C_H \cap G_k = \bigcup_{h \in H} (C_h \cap G_k) \ ,$$

we can rewrite (7), using (9) and (10), as

$$(11) \qquad P_{Hk}^{t0} = \frac{\sum_{h \in H} v_{hk}^0 \times P_{hk}^{t0}}{\sum_{h \in H} v_{hk}^0}$$

$$\text{Notice that } \sum_{h \in H} v_{hk}^0 = v_{Hk}^0 \ .$$

Thus each commodity group price index $P_{Hk}{}^{t0}$ can be written as a weighted average of enterprise-specific commodity group price indices $P_{hk}{}^{t0}$.

The proposed strategy for **estimating** $P_H{}^{t0}$ runs as follows. The values $v_{Hk}{}^0$, the base period domestic or export sales values of commodity groups G_k as produced by the group of enterprises H, are considered as given. The same applies to the values $v^0{}_{hk}$, the base period domestic or export sales values of commodity groups G_k as produced

33) As nomenclature of commodity groups the CPA respectively the more detailed PRODCOM list is required.

by the single enterprises h.[34] Usually P_{Hk}^{t0} is estimated from a sample of enterprises from H. Ideally this should be a stratified sample. The values v_{hk}^0 must be used for constructing the strata. For example, enterprises with large v_{hk}^0 should be taken **with certainty** into the sample, and from the remaining enterprises one could take a **random sample**.

For each enterprise in the sample the estimation of P_{hk}^{t0}, see expression (10), is based on a sample of commodities. **Ideally**, the set of all commodities belonging to commodity group G_k and produced by enterprise h $C_h \cap G_k$ must be decomposed into Hicksian aggregates, i.e. groups of commodities showing the same price behaviour. From each of these groups it is sufficient to select only one representative commodity. The values v_i^0, or the sums of these values for the Hicksian aggregates, must be obtained from the selected enterprise.

In the foregoing model it was presupposed that the set of enterprises H and the sets of commodities C_h ($h \in H$) are fixed during the time interval from 0 to t. In reality, however, we have to operate within a **dynamic** environment. Enterprises appear and disappear, the output mix of enterprises changes, some commodities disappear from the market, and new commodities are introduced. Especially in areas with frequent technological changes (for example the computer industry) this will have the effect that a direct Laspeyres price index is unable to track current price changes adequately. In some cases it is even impossible to construct such a price index because commodities existing in the base period are no longer produced in the comparison period. In order to take account of these phenomena it is recommended to calculate the commodity group price indices entering (8) as chained indices.[35] Thus expression (11) is replaced by

$$(12)\quad P_{Hk}^{t0,c} \equiv \prod_{\tau=1}^{T} \frac{\sum_{h \in H(\tau)} v_{hk}(\tau) \times P_{hk}^{\tau,\tau-1}}{\sum_{h \in H(\tau)} v_{hk}(\tau)}$$

where we define

$$[13]\quad v_{hk}(\tau) \equiv \sum_{i \in C_h(\tau) \cap G_k} v_i(\tau)$$

and

$$[14]\quad P_{hk}^{t,t-1} \equiv \sum_{i \in C_h(t) \cap G_k} \frac{v_i(t) \times (p_i^t \,/\, p_i^{t-1})}{v_{hk}(t)}$$

In these expressions $v_i(\tau)$, $v_{hk}(\tau)$, $H(\tau)$ and $C_h(\tau)$ correspond to a certain period prior to τ. This period can be the same for a number of 'chains'. Expressions (12) and (14) form the **starting-point for sampling**. They enable us to refresh the sample of enterprises or the samples of commodities, and to update the associated weights (value shares) whenever necessary. Samples and weights can be kept fixed as long as they are considered to be 'characteristic' for the industry group.

Unfortunately, formula (12) is known to suffer from upward drift (overestimating bias) for mathematical reasons. This needs to be subject to further studies.

Summarizing, it is recommended that the domestic (and in parallel the export) output price index for an industry group is calculated as a weighted average of commodity group price indices. The weights are the base period domestic (or export) sales values. The commodity group price indices are calculated as chained price indices, based on samples of enterprises and samples of

34) See chapter 4.1.

35) It is assumed that during the time period between base year revisions there is no need to introduce new commodity groups into the output price index or to delete commodity groups from it.

representative commodities. These samples and the associated weights should be adapted whenever necessary.

b. Higher levels of aggregation

Suppose a division (subsection, section) consists of L groups $H_1,...,H_L$. The domestic or export output price indices of these groups are respectively $P_{H_1}{}^{t0},...,P_{H_L}{}^{t0}$. The base period domestic or export sales value of H_l is defined as

$$(15) \qquad v^0_{H_l} \equiv \sum_{h \in H_l} v^0_h \quad (l = 1,....,L)$$

Then the domestic or export output price index for the division (subsection, section) is defined as

$$(16) \qquad P^{T0} \equiv \frac{\sum_{l=1}^{L} v^0_{H_l} \times P^{t0}_{H_l}}{\sum_{l=1}^{L} v^0_{H_l}}$$

that is a weighted arithmetic average of the group price indices.

The foregoing applies mutatis mutandis to the construction of group price indices from class price indices (when necessary).

c. Price indices for the European Union

The national price indices are used by Eurostat to calculate price indices for the whole Community. This is currently done in the following way:
Denote the domestic or export output price index for industry group H of Member State j by $P_{H_j}{}^{t0}$ (j=1,...,Z) For 15 Member States, Z= 15. In the future this might be larger. The corresponding base period domestic or export sales value of H_j (in local currency units) is defined analogously to (15) and denoted by $v_{H_j}{}^0$ (j=1,...,Z). Let the base period currency converters (purchasing power parities) be $e_1{}^0,...,e_Z{}^0$. Each $e_j{}^0$ gives the amount of local currency units that is equivalent to 1 ECU. Then the domestic or export output price index for industry group H of EUR15 is defined as:

$$[17] \qquad \ln P^{t0}_{H,EUR15} = \frac{\sum_{j=1}^{15} \left(\frac{v^0_{H_j}}{e^0_j} \right) \times \ln P^{t0}_{H_j}}{\sum_{j=1}^{15} \left(\frac{v^0_{H_j}}{e^0_j} \right)}$$

Thus the EUR15 price indices are weighted **geometric** averages. The geometric average is chosen because in that case the elasticity of the EUR15 index with respect to a Member State-specific index is constant. In particular the elasticity does not depend on the relative level of the Member State index as would be the case when the arithmetic average had been used.

However, from 1999 onwards, when the Monetary Union with the single currency (EURO) is in operation, the arithmetic average will be applied by Eurostat for reasons of consistency.

The foregoing applies mutatis mutandis to all other levels of aggregation.

10. Appendix II: Literature

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V. Indicators of Labour Input

B

1. Introduction

In order to analyse and assess the most recent developments of the business cycle, the users of short term statistics do not only need information on the production index and output price evolution, but also facts and figures on the **labour market** as one of the essential **input** factors into the economic process.

The following indicators of labour input are treated in this manual:

- Employment (number of persons employed),
- Volume of work done (number of hours worked),
- Gross wages and salaries

It should be pointed out here that these variables collected in the framework of industrial short term statistics are meant to be economic indicators (like e.g. production or turnover) giving a picture of the development in volume of the labour component of industrial activity. They should therefore be clearly distinguished from the so called "social variables"[36] measuring the labour supply and giving information on the social aspect of the economy.

36) At the European level compiled by Directorate E "Social and regional statistics" of Eurostat.

The collection of labour input variables on a short term basis provides valuable information for

- judging the latest evolution of the economy (employment and volume of work done),
- "now-casting" the annual data of the structural enquiry (gross wages and salaries)
- calculating productivity measures (especially asked by the future European Central Bank)
- quarterly National Accounts

Looking at the supply side of the labour market an index of vacancies (number of vacant jobs) would be very helpful.

For the future EC statistics it is vital that all Member States use the same definitions of the variables in order to dispose of **comparable** data.

Labour input variables are transmitted to Eurostat since many years, however, the actual contents of the series has remained very **heterogeneous**. To remedy this unsatisfying situation a Seminar was organized in October 1997 to present and discuss the different methodological concepts used in the Member States to compile short term labour input statistics. On the basis of definitions proposed by Eurostat, representatives of the NSO discussed the best practice for labour input variables; the results are taken into account in the following text.

Binding principles concerning

- the institution responsible,
- the classifications,
- the treatment of confidential data,
- the observation units,
- the coverage of the enquiry,
- the sampling techniques,
- the delays of data collection,
- aggregations,
- seasonal adjustment,
- quality checks of the indices and
- data dissemination

have been laid down in part A. above. These principles should be observed as carefully as the following specific rules and recommendations for the collection and compilation of labour input variables.

2. Changing Requirements

In recent years substantial changes took place on the labour market, which lead to modified requirements concerning the collection of labour input variables. Amongst these changes the most important ones are:

- increased share of *services* in economic activity
- reorganisation of the labour market leading to
  - a diversification of types of contracts, and
  - a variety of types of persons employed.

These changes have certainly an impact on the requirements concerning data on labour input and will therefore affect the definitions.

Furthermore, the characteristics of the variables will as well be influenced by the following:
Labour input Variables are frequently combined with other economic variables, in order to calculate various short term productivity measures.

One of the main users of these ratios is the European Monetary Institute (EMI), the predecessor of the European Central Bank. According to an internal paper stating the future needs of EMI, the following measures are defined to be the most important ones:

$$\frac{\text{production}}{\text{persons employed}} = \text{output per person employed}$$

$$\frac{\text{production}}{\text{hours worked}} = \text{output per man hour}$$

$$\frac{\text{wages \& salaries}}{\text{production}} = \text{unit wage and salary cost}$$

$$\frac{\text{wages \& salaries}}{\text{hours worked}} = \text{hourly earnings}$$

Some further relations which are frequently asked for are

- sums of gross wages and salaries per person employed
- turnover per person employed
- value added per person employed

It is obvious that with respect to the necessary quality of such ratios, absolute **consistency** between labour input variables and other economic variables, like e.g. production or turnover, has to be guaranteed.

3. Definitions

3.1. Persons Employed

Persons employed are defined as the total number of persons who are engaged in the productive activity of the observation unit

during the reference period, irrespective of whether they are paid or not.

Components of the variable

According to this definition the following elements should be **included**:

- all **paid** persons employed
  - employees
    - homeworkers
    - apprentices / trainees
    - family workers
    - persons on temporary leave (maternity, sickness, strike, lock-out, etc.)
    - part time workers
    - temporary workers
    - seasonal workers
  - agency workers
  - borrowed staff
- **unpaid** persons employed
  - working proprietors (owners)
  - family workers

The number of persons employed should **exclude**:

- persons on long term leave (e.g. long term sickness, military service or alternative service
- persons carrying out repair or maintenance work
- family workers included on the payroll of another unit as principal occupation
- persons temporarily working for another unit

Part-time or short-term employees are at present counted as full-time employees. A conversion of part-time employees into **full-time-equivalents** is strongly recommended, since due to the liberalization of the labour market the share of staff not working full-time is constantly rising. A conversion into full-time equivalents should also be realized for active owners and members of their families.

For reasons of consistency with the production index, the inclusion of **agency workers** does only apply for those contributing to the output of the observation unit.

Through the increasing automation in the industry, the continuous substitution of manual labour, and the endeavours to standardize the social security schemes, dividing lines between manual labour or other employees blur and lose significance. Therefore, a distinction between blue and white collar workers is not needed any longer.

The information to be queried from the units being the **number** of persons employed implies that **no average figure** over the whole reference period should be calculated.

Clearly some elements of the "number of persons employed" are more difficult to measure than others, in particular agency workers, active owners, their families, home workers and voluntary workers. It is recommended and makes sense to **estimate** these figures, which are difficult to measure, indirectly with the aid of the labour force survey.

Persons employed vs. employees

To take account of the above mentioned changes on the labour market it is absolutely necessary to broaden the definition of the employment variable to all persons employed, i.e. to all persons contributing to the output of a given activity, although it might appear to be more difficult to collect this information than to collect data only on employees, i.e. persons being on the payroll of the observation unit. The collection of persons employed is especially important for the calculation of high-quality productivity measures.

The supply of a **further variable** covering only the employees would however be very valuable in order to calculate a satisfying ratio of average earnings which constitutes as well a variable asked by the EMI.

3.2. Hours worked

The volume of work done is expressed by the number of hours worked in the reference period (i.e. one quarter) are defined as the total number of hours actually worked for the observation unit during the reference period by all persons employed as defined above. It is necessary to cover the hours worked by all persons employed in order guarantee consistency with the other labour input variables as well as with the production or turnover index.

Components of the variable

According to the definition given above, the variable should **include**

- the total amount of all hours actually worked
  - ✓ during regular working hours according to collective agreements
  - ✓ overtime
  - ✓ during nights, Sundays or public holidays
  - ✓ but not paid
  - ✓ by manual and non-manual workers
  - ✓ by apprentices
  - ✓ by unpaid persons employed
  - ✓ paid owners and family workers
  - ✓ agency workers

Excluded from the volume of work done are

- hours paid but not worked due to leave, sickness, accidents, strikes, lock outs, slack time, etc.
- time spent for meal breaks and commuting
- strike days

Here again some elements like for example hours lost due to sickness are difficult to measure and might have to be estimated.

Short breaks taken at the work place should not be deducted.

In respect of monthly salaried employees (e.g. non-manual workers) the regular working time has to be recorded as far as no overtime is paid beside.

Hours worked vs. hours contracted

A problem area related to the data collection is the choice between hours worked and hours contracted. Although the collection of hours actually worked is strongly recommended, in order to be able to calculate comparable competitiveness indicators, like e.g. output per man hour or hourly earnings, hours contracted may be accepted as a provisional proxy.

Overtime work

For the purpose of following the business cycle very closely and to detect turning points as fast as possible, the separate collection and publication of **overtime hours** should be envisaged. This variable will move stronger and faster with the business cycle than total hours worked, since it shows fluctuations of capacity utilisation of the labour force.

3.3. Wages and Salaries

Gross wages and salaries are defined as the total sum of remunerations in cash or in kind payable to all persons employed in return of work done during the reference period, irrespective of whether this remunera-

tion is paid regularly or not. Direct taxes and employees' social security and pension contributions should not be deducted.

Components of the variable

Included	Excluded
all basic wages & salaries payable at regular intervals enhanced rates of pay for overtime, nightshift, week end work, etc. any allowances, gratuities or bonuses paid by the employer, like ♦ cost of living, housing, local or expatriation allowances ♦ food allowances ♦ allowances for to and from work ♦ holiday bonuses, 13th month pay ♦ allowances actually paid for annual holidays not taken ♦ output, production or productivity bonuses ♦ extra allowances for extreme working conditions like dust, dirt, temperature, smoke, danger, etc. ♦ redundancy payments actually paid to laid-off employees, ♦ allowances for improvement proposals and patent fees paid to the person employed ♦ directors' and employees' fees ♦ family allowances paid by the employer under a collective agreement commissions, tips, etc. value of the bonus shares distributed free to the employees, payments made by employers to employees under the saving schemes or other schemes, taxes, contributions and other sums payable by employees and deducted by employers, payments of agency workers and borrowed staff, wages and salaries or parts thereof which the employers continue to pay directly to the employee in case of sickness, maternity, industrial accident, invalidity etc. of the employee, any payment in kind	social security and other contributions payable by the employer, contributions of the labour exchange to the employer for short time-work, statutory family allowances, retirement pensions and benefits of similar nature, taxes paid on the total wages and salaries paid, sums set aside specially to cover possible payments of allowances for annual holiday not taken or redundancy payments, reimbursement of employees for travelling, removal, separation, hotel and entertaining expenses, telephone fees etc. incurred in the course of their duties, reimbursement of current expenditure on the transport of employees to and from work, whether this is carried out by the enterprises' own means of transport or by third parties on behalf of the enterprise, allowances paid to employees for the purchase of tools, equipment and special clothing needed for their work or that part of their wages and salaries which under their contracts of employment are required to devote such purchases, gifts in cash and in kind to the employees at their jubilee, marriage, christenings, etc., tips and attendance's fees, expenditure for office parties, expenditure for educational costs (training costs).

Payments in kind

The evaluation of the payments in kind, which should be included in the total sum of wages & salaries may cause some difficulties. The following simple evaluations are recommended: If it is payments in kind produced by the employer, they should be valued at producer prices. For payments in kind bought by the employer, on the other hand, an evaluation at market prices should be realized.

3.4. Report to Eurostat

In order to increase **transparency**, the practices of computations in the National Statistical Offices have to be made known to Eurostat. It is certainly in the interest of the users of our short term statistics, if occasionally remaining differences of method - as long as they do not make comparisons meaningless - are made public.

4. Type of index

Generally elementary indices are calculated. For a given activity a we compare all observations X (employment, hours worked or wages & salaries) of month t with the observations of the base period 0.

$$I^{X}_{a,t} = \frac{\sum_{i=1}^{N} X_{i,t}}{\sum_{i=1}^{N} X_{i,0}} \times 100$$

In order to compile more aggregated indices (main industrial groupings or total industry) the same algorithm is applied, i.e. the partial activity indices are summed up as a weighted index, using as weight the appropriate observations of the variable in the base year.

Some Member States publish labour input variables as absolute figures. This is recommended for all EU Member States.

The figures of the base year result from the corresponding annual industrial survey.

Member States using other weighting systems (for example employment for all three indicators) will have to convert such systems.

5. Basic information

5.1. Sources

For labour input variables variables, **data sources** and **definitions** vary considerably among the Member States.

Three very different sources can be identified:

- Direct industry collection, where enterprises are asked to give information on the labour input variables. These **enterprise surveys** are the most common source in the area of short term indicators. Sometimes, these surveys only relate to industrial activity, sometimes they cover as well other sectors of the economy, like e.g. services.
- The **labour force survey** (LFS), where households are asked (by direct interviewers of via the telephone) to provide the appropriate information. This source is for example the base for the compilation of labour input variables in Spain and Finland.

- A third source also common in some Member States is the use of **administrative data** available in connection with the social security system. This source allows a rich set of variables and poses no additional burden on enterprises.

A further possibility for the collection of Labour Input variables constitutes the **combination of different sources**. This is currently practised in the Netherlands.

For obvious reasons the results differ substantially depending on the source:
A data collection based on direct enterprise surveys is recommended by Eurostat because of the following advantages: Data are collected and compiled on a monthly basis and they are available at a high level of detail. Furthermore enterprise surveys guarantee the necessary consistency between the Labour Input Variables and other economic variables, since they are collected by the same survey. This is particularly important for the calculation of the above mentioned productivity measures.

The LFS survey presents deficiencies concerning the identification of the industrial activity in which the interviewed person works (who is not familiar with the 4-digit level of NACE Rev.1), which might lead to measurements errors. On the other hand, a LFS provides most accurate information on hours actually worked, which is more difficult to obtain form direct enterprise surveys. For the latter, it can be assumed that mostly hours contracted are taken as a basis, which surely do not reflect the hours actually worked.

Administrative sources often follow a different concept of data definition which can not be controlled by the statistician. Furthermore, data collected on the basis of administrative sources often arrives rather late in comparison to direct data collection, which constitutes a big disadvantage in the field of short term statistics.

The collection of labour input variables by using a combination of different sources certainly causes the problem of integration of different statistical sources. Furthermore, this integration procedure is very time consuming, and therefore adversely affects the timeliness of data supply.

5.2. Periodicity

Figures on persons employed, being the most important labour input information and relatively simple to measure, should be supplied on a **monthly** basis. Monthly data is at present supplied by about half of the Member States. The forthcoming Regulation stipulates a quarterly frequency.

Hours worked and wages & salaries have to be collected and computed at least on a **quarterly** basis. A monthly frequency is though encouraged by Eurostat.

5.3. Transition period

The Member States will adjust their basic information and periodicity as soon as possible according to the rules and recommendations of this manual. All deviations have to be reported to Eurostat and will be published. It is the aim that as fast as possible all basic information should be adjusted and homogeneous.

6. Observation unit

The relationship between hours worked and production indicates labour productivity. In the short run it can be assumed that the

influence of other production factors (mainly quantity and quality of capital) remains invariable. Thus, an index of short term productivity is often calculated and published using the formula

$$\text{productivity} = \frac{\text{production index}}{\text{hours worked}}$$

If information on hours worked is not available, employment can be used as a rough approximation of labour input. Because of their analytical value these productivity measures are often requested by users of short term statistics.

Consequently there is every reason to calculate the indices of hours worked as close as possible to the concept of the production index. This implies to follow the so called "branch" concept, i.e. to use **kind-of-activity units** as observation units, even if this is more difficult than using enterprise data.

The fluctuations of the employment index follow often the trend of new orders with a certain time-lag and are similar to those of production though less intensive. But the employment indices are also often regarded in comparison with the development of turnover and value added.

This is again a reason to use KAUs as observation units.

7. Levels of breakdown

7.1. Calculated activities

Data on labour input should be collected and calculated at least at the level of NACE Rev.1 divisions (2-digit level), if there is any production in the Member States. All calculated figures have to be transmitted to Eurostat. The national statistical offices should mark confidential data.

Member States are strongly **encouraged** to collect and publish labour input information at a more detailed level than the divisions. Any more detailed indices which are compiled and published in the Member States should be transmitted to Eurostat on a voluntary basis in order to make them available to a larger public.

7.2. Breakdowns

The classification of units according to size classes makes it also possible to observe trends of enterprises and units taking account of the different number of employees. It may be expensive to calculate and publish such data and lies at present in the responsibility of the Member States.

However, from the base year 2000 onwards a quarterly employment index for **small and medium sized enterprises** should be achieved on the Community level. For this purpose Member States whose 2-digit activity presents more than 10 % of EU value added should transmit to Eurostat quarterly information broken down by four size classes:

- 10 to 19 persons employed
- 20 to 99 persons employed
- 100 to 499 persons employed
- more than 500 persons employed

It is left to the Member States to break down the indices of the labour input indicators according to regional aspects or to distinguish between manual workers and other.

8. Comparison with other statistics

An important plausibility check constitutes the comparison of the index of hours worked with the production index. Normally both should show similar trends, though the growth rates of the hours worked are often lower.

Furthermore, the gross wages & salaries per hour worked remain nearly constant for a longer period until new collective agreements are put into force.

The short term labour input information has also to be compared with the results of

- the annual structural inquiry and
- the figures of National Accounts.

If the growth rate of annual short term employment data of a given NACE Rev.1 activity deviates by more than 2 percent points with the growth rate of the comparable annual short term figures, both statistics in question, short term indicators and annual enquiry, have to be checked for inconsistencies in order to find explanations for the major deviation. If necessary, adjustments have to be realized.

Imagine for example that in a given branch the annual employment figure for the year t is 35000 persons, in year t+1 it is 34000 persons. This equals a rate of change for this branch of -3%. If at the same time the short term employment index shows between year t and year t+1 a constant evolution (rate of change ± 0%), the difference of 3 percent points gives reason to examine closely the two surveys.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination?
These topics and several more are treated in part A. above.

VI. Investment

B

1. Introduction

Quarterly investment information is regarded by many users as a very important variable to analyse developments in the business cycle. Moreover, it is used as well in the analysis of competitiveness.

So far, this variable is not a mandatory part of the forthcoming Council Regulation on Short Term Statistics. However, the fact that the draft Regulation stipulates pilot studies on the collection of short term investment data shows the importance which is attached to this variable.

At present, only few Members States conduct a survey on short term statistics in investment. In January 1997 a methodological seminar was organized to present existing surveys within the EU, which provided an insight of the different approaches used and possible sources available.

Above all, short term data on investment may serve as:

- an economic indicator for business cycle analysis (leading indicator),
- a view of the current situation regarding investment trends, as well as a tool for up-to-date estimates of yearly investment figures,
- a source for quarterly national accounts.[37)]

The following table shows the use made of short term investment data within the EC.

	Business Cycle Analysis	Estimation of Yearly Figures	National Accounts
B	X		
D		X	(X)
F	X		
IRL			X
NL		X	(X)
S	X	X	X
UK	X		X
N	X	X	X
ESA			X
DGII		X	

Since in most of the countries the collection of investment data is destined to be a source for National Accounts, the existing surveys were mainly designed to meet the corresponding needs.

37) The **quarterly** compilation of the variable "Gross Fixed Capital Formation", was only introduced in ESA-95

2. Characteristics of the variable

2.1. Types of investment

Dealing with the collection of short term data in the area **of business statistics**, the type of investment variable to be collected should refer to investments made by the **market sector.** Investments of the public sector (which comprises all kinds of civil infrastructure like roads, schools, hospitals) are not taken into account. Hence, the definition proposed by Eurostat relates to **productive investment**, which are mainly realized in order to

- increase production capacity,
- gain productivity by lowering unit costs,
- replace old capital goods.

2.2. Definition

The recommended definition of investment is based on the definition of **gross investment in tangible goods** used for the implementation of the Regulation on structural business statistics.

Included are thus all investments made during the reference period in all tangible capital goods having a useful life of more than one year, irrespective of whether they are

- newly bought or already existing
- bought from third parties or produced for own use (i.e. capitalised production of tangible capital goods)

Included as well are non-produced tangible goods such as land.

Any additions, alterations, improvements or renovations prolonging the service life or to increase the productive capacity of capital goods should also be taken into account.

Excluded from the definition are current maintenance costs as well as investment in

- capital goods used under rental and lease contracts
- intangible goods (such as patents, trade marks, software)
- financial assets
- goods acquired through mergers

Some of the assets to be included or excluded in the definition of investment have to be discussed further, since they may be controversial.

Leasing

Leasing is defined as a type of long term renting contract according to which current payments are made by the company for the use of capital goods. Two types of leasing have to be distinguished: **financial leasing** and **operational leasing**. Unlike operational leasing, in case of financial all risks and rewards of ownership are transferred *de facto* though not *de jure* from the lessor to lessee.[38] The value of the good is therefore known to the company and can be indicated. Practice in the Members States whether to include or exclude financial leasing in the definition of investment, is rather heterogeneous.

In most EU countries goods acquired through financial leasing do not appear on the balance sheet of the user of the goods (lessee) and hence it might be very difficult to ask the respondents to include them in their investment figure.

38) See annex II of ESA '95

Computer Software

Computer software are regarded as investment or not depending on whether they are bundled with hardware equipment bought by the company or whether it purchased separately. In the first case it is regarded as tangible investment, in the second case it is not.

With the rapid change of technology we witness to today, this practice will need to be reviewed.

Intangibles

In most Member States conducting short term investment surveys intangible goods (patents, licences, trade marks, etc.) are not included in the definition. The major reasons for this are definition and measurement problems.

2.3. Valuation of investments

All investments should be valued prior to (i.e. gross of) value adjustments, and before deduction of income from disposals.

Depending on the type of good however, different prices should be used for **evaluating** them: Purchased goods are to be valued at purchase price, i.e. transport and installation charges, fees, taxes and other costs of ownership transfer are included. Own produced tangible goods are valued at production cost.

In case of large investments with expenditure taking place over more than one reference period, the expenditure should be recorded as investment in the reference period in which the expenditure is incurred.

Purchases of small tools which are not capitalised are included under current expenditure and are excluded from investment.

3. Member States Practice

Within the EU, data sources for the collection of investment data vary considerably.

Three major approaches may be identified:

Short term investment surveys

In the scope of these surveys data on investments are collected on a monthly or a quarterly basis, which allows the sub-annual pattern of the variable to be followed. Quantitative data collection can be combined with business opinion survey providing qualitative information on the investment assessment although this may significantly delay the production of the qualitative opinion survey.

Sub-annual assessment of yearly investments

This is done by **asking several times a year** the investment figures for the preceding and the current year and investments plans for the remaining part of the current year. The results of these surveys provide progressively more accurate forecast of current year investment.

Commodity-Flow-Method

This approach is based on **product data** for capital goods adjusted by foreign trade data. Product data may be taken from an existing quarterly Prodcom survey; investments are then estimated by adding imports of capital goods to the national production and by subtracting exports:

$$Inv^{t} = p + m - x$$

The commodity-flow-method allows a detailed break down by type of investment goods but a breakdown by industrial activities is not feasible.

It should be noted that the different approaches presented above do not exclude one another. In fact, they are often used **simultaneously**, one approach being used as the main collection method, the other being used as a complement to improve the quality of the data collected or to extend the survey to economic sectors not covered by the main method. The following table summarizes the current practice in the Member States:

	short term survey	ass^{t} of annual data	commodity flow
B	✓		(✓)
D			✓
F	✓		(✓)
IRL	✓		(✓)
NL	(✓)		✓
S	✓	✓	(✓)
UK	✓		(✓)
N	✓	✓	(✓)

✓: main methods used
(✓): method used as a complement

4. Basic Information

4.1. Sources

Apart from direct enterprise surveys which are the most frequently used source for the collection of data on investments made, some Member States compile their investment data on the basis of **value added tax returns** used by the tax administration; these returns contain a question on the value of investments made by the enterprise.

The use of such administrative data for statistical purposes undoubtedly bears the problem of discrepancy in concepts and definitions; in addition details of these sources such as activity coverage, observation unit can only rarely be influenced by statisticians. Investment data based exclusively on administrative data has therefore to be checked very carefully.

On the other hand, it has to be admitted that the use of an existing source keeps the burden on the reporting unit to a minimum. A pilot study on the possible use of VAT returns would therefore be very interesting.

4.2. Time of Recording

Three possibilities of timing at which investments are registered can be outlined:

- moment of change of ownership
- moment of payment
- moment of use

In the field of short term statistics it might appear reasonable to record the investment in the period when it is ready for use, especially because the investment variable is

meant to be linked to other economic variables (production, employment).

However, recording investment at the time of change of ownership would guarantee consistency with the practice of National Accounts, which is one of the main users of short term investment data.

In practice enterprise in many countries may find the moment of payment easiest to use.

4.3. Frequency

Dealing with short term statistics, the supply of quarterly data would be desirable.

4.4. Scope of survey

The data production should cover sections C-E (Mining and Quarrying, Manufacturing, Energy supply) of Nace Rev.1.

4.5. Level of detail

Data should be supplied at least at the 2-digit level of NACE Rev.1.

The compilation of main industrial groupings (intermediate goods, capital goods, consumer goods) similar to the other short term statistics is necessary.

4.6 Observation Unit

For the collection of investment data, enterprises seem to be the most appropriate observation unit. This is particularly valid if administrative sources like VAT returns are used, which do not allow a break-down into KAU'S. Additionally data from enterprises are much easier to obtain than form KAU's.

In order to guarantee consistency between investment data and other economic variables for reasons of comparison, it would make sense to use KAU's as observation unit. In this case, the investment data is also valid to be used for National Accounts, which is a major user of short term information on investment.

However investment decision may often be made at the enterprise level and hence it may be more appropriate to collect data of this level.

4.7. Breakdown

For analytical purposes a break down of the variable by type of tangible assets would be very desirable. In order not to put too much burden on the reporting units, the following breakdown of gross investment is proposed:

- buildings machines and equipments of which means of transports
- other assets

5. Implementation

5.1. Deflation

In order to obtain investment data at constant prices, a deflator has to be applied to the original data.

Appropriate deflators are producer prices or import prices of the goods bought as investment. In case that no information is available on the composition of investment in terms of the type of goods acquired, it might sometimes be difficult to know which price index to apply as deflator.

A possible solution to this problem is to conduct of a special survey at each change of base year as is practised in the UK, in order to have an average composition of investment used to combine the different producer price indices used as deflators.

5.3. Weights

Value data needed for grossing up the figures obtained from the samples as well as for aggregation procedures can be obtained from different variables, like for example employment and turnover. Most of the NSO use employment figures. However, it has to be clearly stated that investments is only weakly linked to the employment or turnover size of the enterprise. Nor is it strongly limited to production, since small units can have large investment if they are newly founded and in a development phase, while large and longrunning enterprises may invest comparatively much less.

5.4. Non-Response

The problem of non-response is of particular importance in the case of short term investment surveys. The evolution in time of investment for a given enterprise **fluctuates** considerably and it is often the case that a company has no investment for one or several quarters. These cases should then be treated as **real zero values** not to be mistaken with a non-response, because otherwise the results would be adversely affected. Concerning the treatment of non-response it should first be checked whether the reporting unit has sent back the questionnaire or whether the blank left on the questionnaire refers to a real zero.

In case of a real non-response several possibilities of estimating the missing values are conceivable:

The simplest way is the use of data from past returns which are then averaged. If no past returns are available, the following imputation procedure - currently used in the UK - may be applied: It consists in calculating the investment per head of each respond; these investments per head are then averaged to give a ratio. The employment of non-respondents is then individually multiplied by this ratio to compute estimates for their investment activity. Another possibility for estimating missing values is the use of other sources, like for example National Accounts.

This ratios are calculated per-head because the employment variable is commonly found in the business register.

5.5. Outliers

The fluctuations in investment activity mentioned above may as well lead to particularly **large investment** by a company in one quarter, followed by small investment in subsequent periods. This is especially the case of newly built enterprises. The treatment of these "outliers" represents a special problem (even a challenge) for the compilation of **reliable** investment data and should be done in a very scrupulous way.

In fact, returns showing unusual levels of capital expenditure have to be checked very carefully, because of their significance towards the final figures.

Rapid explanations for special behaviour can be obtained by adding a "comments box" to the questionnaire where the reporting unit should provide information on unusual fluctuations in figures; this is actually done in Ireland and the UK.

The information given in these comments boxes allows then the NSO to take a well-

founded decision whether to include or to exclude the reported value.

This method of simply excluding a large value from the total figure may appear not to be very satisfactory (danger of biasing the results). A solution put into practice by the NSO of the UK is the use of weights between 0 and 1 for the values reported. Large outliers are thus not necessarily excluded, but incorporated in the total figure with a lower weight.

5.6. Plausibility checks

An important source for checking the plausibility of estimated short term investment are the annual data collected in the framework of Structural Business Statistics.

Since the surveys normally carried out for Structural business statistics have larger samples and hence greater coverage, they are able to provide much more reliable information.

A comparison of quarterly data against the annual figures is therefore strongly recommended.

6. Pilot studies

In general terms, pilot studies should cope with the implementation of the theoretical concept of the investment variable in practice. More specialized studies may be conceivable for example on possible procedures for a satisfying impulation of missing data and grossing of the data returned in the sample.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A. above.

C. CONSTRUCTION

I. The Special Case of Construction

C

1. Introduction

The present manual has been written to provide guidance regarding the procedures necessary to achieve the harmonisation of national statistical series for the **construction industry**.[1] Short term statistics (monthly and quarterly) on construction were at the European level for the first time **legally binding** with the Council Directive (78/166/EEC) of February 1978.[2] For over fifteen years this gave the base for harmonized European construction statistics. The requirements of this Directive have since been refined and developed through the promulgation of the Draft Regulation on Short Term Indicators (see later).

The present methodological manual asks for some **significant extensions** of the statistical series called for by the old Directive. These new rules are presented for National Offices' consideration as the basis for the provision of harmonised national and, hence, Union-wide short term information of greater **practical benefit** to statistics users in the construction industry itself and in the industries supplying materials and components to construction, as well as to national and Union policy makers. It thus constitutes the nucleus for the future Regulation on short term indicators which will also cover the sector of construction.

Rules and recommendations are presented regarding the **principles** upon which harmonisation should be sought and regarding the **priorities** which National Offices should follow in pursuing it. Proposals are also made regarding some of the difficult issues of **definition** amongst the wide range of the construction industry's activities which, it is hoped, will expedite the harmonisation process.

2. The importance of the construction industry

The European construction industry is huge. In 1993 the gross value added at market prices of the European construction industry was 315 ECU, this figure is more

1) Throughout this manual, the word "construction industry" is used including "civil engineering", unless otherwise stated.

2) See Official Journal No L 52/18 of 23 February 1978.

than 50 per cent higher than the comparable figure of the united States.

In the European Union, value added of construction was double the net output contribution to GDP made by agriculture and over 25% of that of manufacturing industry. Also in the USA and in Japan, construction is a substantial part of GDP.

Construction Markets in Europe, U.S.A. and Japan 1993
(Billion ECU)

Country	Value Added at market prices	Percent of GDP
EU-15	315.2	5.5
U.S.A	202.7	3.7
Japan	367.8	10.0

These statistics must be used with caution, but they do indicate:

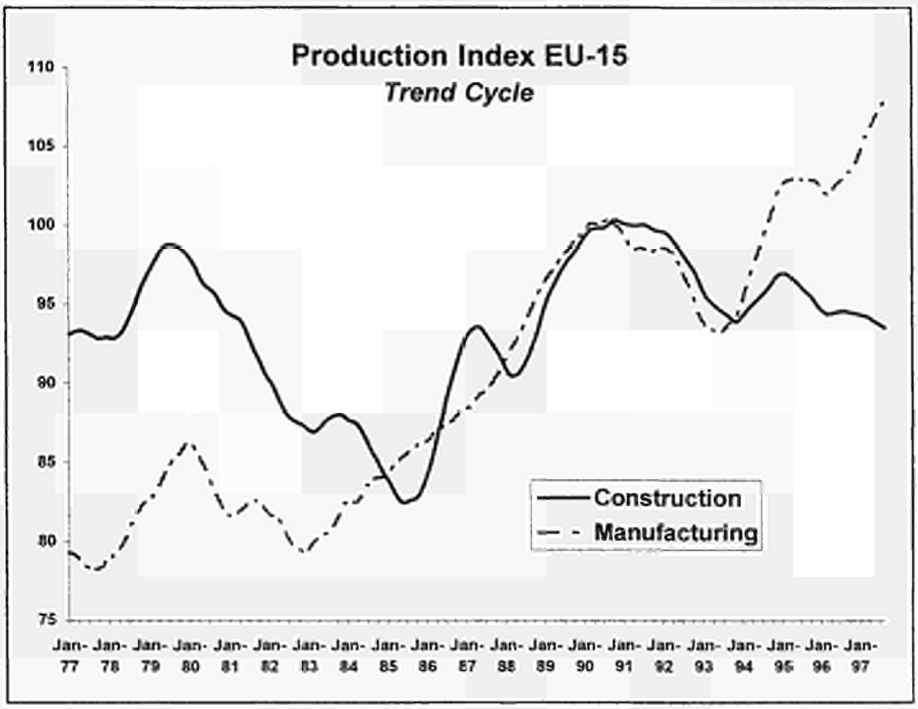
- the importance of the construction industry in Europe and
- the importance of the industry as a market for materials and manufactured products supplied by other industries.

Concerning the ups and downs of the **business cycle** it is well known that the sector of construction is one of the most affected. The graph of the trend-cycle for the European Union shows this very well.

It is in the light of this conclusion that we ask the National Statistical Offices to take the opportunity of the harmonisation process to extend their statistical series to include those at the more disaggregated level recommended further down. Information at this more detailed level will provide a valuable input into the decision making process not only of the construction industry but also of the material and component supplying industries.

3. The importance of small enterprises

Enterprises employing fewer that twenty people play an **important** role in the European construction industry, particularly in the low-rise residential sector, in the building repair and maintenance sector and in the building completion and fitting out trades. The contribution of these smaller undertakings to total building output varies from country to country but is nowhere insignificant, as the following tables for 1994 show:



Turnover by size class in construction (in %)

	number of employees			
	0-9	10-19	50-249	+250
EUR15	29.0	30.4	20.5	20.1
B	42.7	26.9	17.7	12.7
DK	34.9	29.1	*	*
D	17.3	39.3	26.8	16.7
GR	31.7	24.7	18.8	24.8
E	37.2	30.2	15.3	17.3
F	30.9	26.4	17.6	25.1
IRL	40.3	27.3	23.0	9.4
I	39.5	34.8	15.3	10.5
L	12.7	35.6	38.6	13.1
NL	19.1	30.8	25.6	24.5
A	15.7	27.9	26.8	29.7
P	35.5	22.9	17.6	24.1
FIN	36.3	21.8	14.8	27.1
S	24.8	19.1	11.5	44.6
UK	44.0	18.0	15.5	22.6

* confidential data

Source: Eurostat estimations (SME project)

Persons employed by size class in construction (in %)

	number of employees			
	0-9	10-49	50-249	+250
EUR15	45.7	28.4	13.3	12.5
B	56.8	23.7	12.8	6.7
DK	41.4	31.5	*	*
D	26.7	41.6	18.0	13.7
GR	44.8	25.7	15.8	13.7
E	50.7	26.9	11.9	10.5
F	46.1	26.3	12.5	15.0
IRL	47.0	28.0	18.9	6.1
I	58.4	28.9	7.7	5.0
L	13.9	38.2	36.7	11.1
NL	30.6	33.0	17.9	18.5
A	18.4	30.5	26.2	24.9
P	46.8	24.8	15.5	13.0
FIN	47.0	23.7	11.8	17.6
S	39.7	19.8	10.6	29.9
UK	66.7	13.8	8.3	11.2

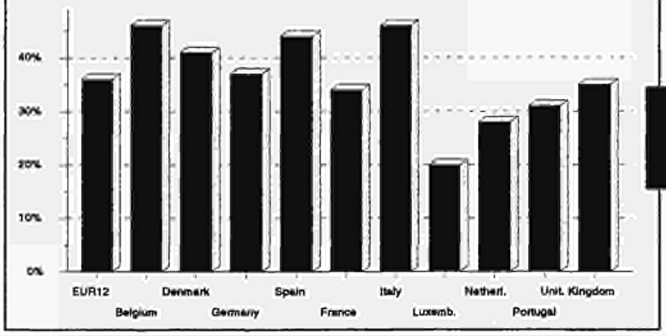
* confidential data

Source: Eurostat estimations (SME project)

in 1994 small and medium size enterprises represented over 99% of all construction business and provided about 80% of all jobs in this sector.

One cannot but conclude that the provision of statistics based on surveys of enterprises employing twenty or more people cannot present a **true picture** of the situation of the construction industry. They can present only partial picture of an admittedly important sector of the industry.

Value Added of Firms with less than 20 Employees in Construction



On the other hand, in addressing the seemingly formidable task of extending statistical coverage to include enterprises employing fewer than twenty people, National Offices should bear in mind that what is required to achieve this are **sample surveys** of such enterprises.

4. The new Regulation

The indicators which are required by the forthcoming Regulation are as follows:

- Volume Index of Production
- Output Prices Index
- Input Prices Index
- Index of new Orders
- Building Permits
- Number of persons employed
- Gross Wages and Salaries Paid
- Hours Worked

In the following Sections we consider how these various indicators may be generated in order to provide guidance to National Offices as to the most effective routes through which they may be achieved.

5. Particularities in Construction

The construction industry, with its great complexity of products, types of work and types of sizes of undertakings and its greater rates of demise, reappearance and replacement of undertakings, presents National Offices with greater problems of surveying and analysis than most manufacturing industries.

Most of the General Rules and Recommendations discussed in Part A: Common Guidelines are also applicable to the collection and compilation of statistics concerning the construction industry. (See *Section A: Common Guidelines*) They are:

- the institution responsible,
- the classifications,
- the treatment of confidential data,
- the observation units,
- the coverage of the enquiry,
- the sampling techniques,
- the delays in data collection,
- aggregations,
- seasonal adjustment,
- quality checks of the indices and
- data dissemination

Other aspects need an specific treatment in this section.

6. Survey Coverage by Size

The significant contribution of **small firms** to the output of the industry has already been noted in Part I.3 above (See "The importance of the small enterprises"). Even single, self-employed tradesmen make a measurable contribution. The comparative importance of self-employed tradesmen will vary from Member State to Member State but nowhere will they be unimportant. A complete survey of the industry is not possible without them.

7. Cross-Border Operations

Many large construction organisations operate in more than one country. They generally do so through subsidiary companies established in the countries of operation. These present no problem for the collection of construction statistics. They are to be included in structural and activity surveys and treated equally with nationally-owned enterprises and reporting units. The criteria for inclusion in national surveys is location not ownership.

Cases arise, however, where enterprises located in one Member State carry out work on the territory of another State, whether within the European Union or not. The value of such work, including any profit arising from it, and the value of orders generating it are to be excluded from reporting units' survey returns. Construction work carried out on the territory of another State is a contribution to the gross domestic product of that State and not to that of the

State of domicile of the enterprises carrying it out.

These essentially simple principles are embodied in both the European System of Integrated Economic Accounts (ESA) and in the United Nations' Revised System of National Accounts (Rev SNA). These establish the criteria determining the treatment of foreign-owned commercial enterprises operating within the boundaries of a member State. A foreign-owned enterprise is deemed to be a resident enterprise if it has a **centre of economic interest** within a State and this is defined as existing firstly if the enterprise owns buildings or land in that State and, secondly, if it engages in or intends to continue to engage in economic activities based on that location indefinitely or for a long period of time. A long period of time is defined as a year or more, although this period is suggested as a guideline rather than an inflexible rule.

These criteria have to be interpreted in the context of the practices and circumstances of the construction industry. We would suggest that the overriding principle governing the collection of construction statistics and the apportionment of production value added, output and orders between member States is that the erection of a building or structure within the territory of a member State is a contribution to the economy of that State irrespective of the domicile of the contractors and consultants involved in its erection.

However, this principle, which in itself appears simple and self-evident, will present difficulties to National Offices in the conduct of industry surveys and in the collection of data. We suggest that the guiding rules here should be as follows:-

i) A foreign-owned construction enterprise should be regarded as a resident enterprise, and treated as such for survey purposes, if it establishes an administrative office or offices, such as a site office, on the territory of a member State for whatever period of time.

   Thus a foreign-owned enterprise with a national address may be included in an industry survey for a particular period if it is operating from that address during that period.

ii) More controversially, perhaps, a foreign domiciled enterprise should be regarded as a legitimate target for national survey enquiries if it conducts operations within the territory of a member State for a continuous period exceeding one year. Such enquiries could be made directly by the National Office of the State in which the operations are conducted or through the National Office of the State of domicile of the enterprise.

Any such cross-border enquiries would no doubt be infrequent. They could arise only in the case of large foreign-constructed projects. In the context of a developing Europe-wide free market, however, they should not be excluded in principle.

The registration and capture for survey purposes of contractors who deliberately move the bases of their operations at intervals between neighbouring States for tax avoidance and other illegal purposes is probably impossible. Their activities are part of the "black economy" and, of their nature, defy measurement. However the existence of immeasurable cross-border black economies does not relieve National Offices of the obligation to take into account the cross-border operations of legitimate enterprises.

Under the rules of subsidiarity the actual conduct of industry surveys is a matter entirely within the jurisdiction of National Offices. Within this context the rules proposed above should be taken as guidelines which may prove helpful to National offices

in addressing the issue of cross-border operations.

8. Data collection and control

Many facets of this subject have already been discussed in Section A: Common Guidelines.[3)]
They do not need to be repeated here.

Questionnaires used in activity surveys must be designed to allow the recording of values under all the above headings as appropriate. They must also, ideally, allow for the recording of:

- the value of the civil engineering content of building projects and orders, and vice-versa, where significant
- The breakdowns of the values (or floor areas) of work done and orders received on multi-purpose buildings
- the value of work done on private "self-build" new houses (in countries where this is appropriate)

National Offices carrying out industry surveys will, no doubt, already issue Advisory Notes to provide guidance to respondents in completing questionnaires or include such notes in the questionnaire forms. Questionnaires based on the recommendations of this Manual should be accompanied by or include Advisory Notes explaining to respondents that:

Values of work done, material and equipment costs incurred and orders received should **exclude**:

- work done, costs incurred and orders received for work beyond national boundaries
- work or orders subcontracted to others
- the value of land
- architects' and other professional fees
- work done for and orders received from private self-build clients (where appropriate).

Values of costs incurred should **include** the costs of hired equipment and site accommodation or the value of owned equipment written off over the reporting period.

Advisory Notes should also explain and clarify the breakdowns of work done and orders received between:

- new work and RMI
- building and civil engineering work
- building work by type of client and type of building
- civil engineering work by type of client.

Notes should explain the rules, where these are adopted, governing:

- the reporting of the civil engineering contents of building projects and vice-versa
- the reporting of work done and orders received for multi-purpose buildings.

Notes must also clarify for respondents the definitions of:

- the types and numbers of employees to be recorded and that these must include self-employed and "labour only" sub-contractors,
- Residential and non-residential buildings.

It is strongly recommended that National Offices take the opportunity provided by the publication of Advisory Notes and the despatch of questionnaires to educate respondents of the value and usefulness of timely and accurate statistics. Every opportunity should be taken to elicit higher rates of response to statistical surveys and the stressing of the practical value of good sta-

3) See Section A: **Common Guidelines**, chapter II, "General Rules and Recommendations"

tistics to decision makers within industry as well as government is more likely to recruit respondents' timely co-operation than the mere reiteration of their legal obligations.

9. Seasonal adjustment

Many facets of this subject have already been discussed in Section A: Common Guidelines.[4] They do not need to be repeated here.

Besides the normal seasonal effects, the weather conditions are a very important source of fluctuations in the construction sector. As this effect is nearly deterministic and making it difficult to analyse the important movements in the series, it would be preferable to adjust for this known effect.

Nevertheless this has been proved to be very difficult as normally the average temperature of a given month is used as a regression variable causing the following problems:

- in big Member States enormous differences in the different regions can be observed concerning the weather conditions,
- in December, a month where weather effects are important, only the first weeks up to Christmas are most often relevant in the construction sector, not the average temperature of the whole month.

Research has to be undertaken, how in practice a more relevant adjustment can be done to increase the quality of the adjusted series.

4) See Section A: **Common Guidelines**, chapter III, "Seasonal Adjustment"

10. Quality checks

Many facets of this subject have already been discussed in Section A: Common Guidelines.[5]
They do not need to be repeated here.

Experiences from Member States proved that data on building permits are subjected to further and sometimes important revisions. Thus the maximum deviations coefficient accepted for revision of the indices recommended for manufacturing industry may not be appropriate for this variable.

C

11. Working rules

11.1. Avoidance of Double Counting

The complexities of sub-contracting present problems for the measurement of output, production/value added and orders. In order to avoid double counting of any of these variables it is imperative that reporting units, and particularly main contractors and builders, be instructed to report only the values of work done and of materials and equipment used by themselves directly and only the values of those proportions of orders they themselves intend to fulfil. The values of work done by sub-contractors and of sub-contracted orders must be deducted from all project totals. The total values of these must be measured by enquiries directed to the sub-contract trades.

5) See Section A: **Common Guidelines**, chapter II, "General Rules and Recommendations"

It might be argued that new building and civil engineering output could be measured adequately by enquiries on the values of total contract work completed and total orders received by main contractors and builders. These could then take in the values of sub-contracted work and orders. Such enquiries would only cover new construction, however. They would exclude all RMI work except, presumably, that ordered through and carried out by main contractors and builders. Thus only partial pictures of construction activity would emerge.
It cannot be stressed too strongly that the only worthwhile aim of a harmonisation process as major as that envisaged here has to be the uniform measurement of the activities of the whole of the construction industry. Surveys of the sub-contract and specialist trades are essential for this to be achieved. Hence double counting must be avoided.

11.2. Valuation of Building and Civil Engineering Work

Reasonably accurate measurements of the value of work done on construction projects is fundamental to the achievement of meaningful statistics on the value of construction output and on the value added (production rate) generated by the industry. Accurate measurement is not a simple matter, however. Construction projects are completed over varying, and sometimes quite long periods of time. Thus the problem is to measure the value of work done over a period of time, i.e. the reporting period - a month or a quarter as the case may be, during which the project has not been completed.

To produce harmonised statistics it is imperative that National Offices work to the same set of rules in guiding reporting units on the completion of survey questionnaires as regards this important issue. It is recommended that the following rules be adopted. They concern

- the valuation of completed structures, and
- the valuation of work in progress

11.3. Valuation of Completed Structures

We deal first with the relatively simple question of the value of a completed building or civil engineering structure. This is simply the sum paid or to be paid to the contractors to build it, i.e. the price paid or to be paid by the client, excluding any value added or other taxes. (We deal later with the valuation of speculative and own-use buildings). As such it excludes:

- the value of the land,
- the cost of architectural and other design and professional fees.

The activities of architects and other consultants are classified in NACE Rev 1 in Division 74 at Class 74.20 - Architectural and engineering activities and related technical consultancy. Hence fees paid to consultants as a result of their involvement in the construction process, and included in final prices to clients, are to be deducted and accounted for or reported under Class Heading 74.20.

This means that contractors offering a "design-build" service and erecting buildings under "design-build" contracts must deduct the cost to themselves of architectural and design services from their valuation of buildings and of work done.

11.4. Valuation of Work in Progress

It is here that the difficulties of measurement arise. It is common for builders to receive regular progress or stage payments during the course of a contract based on valuation certificates. Valuations are based on measurement of the work completed to a particular date and a certificate is issued showing the amount due when agreement is reached between the client or his agents and the contractor.

Actual payments to the contractor are based on these valuations less a retention sum which is payable on completion of the contract.

At first sight it might appear that valuation certificates provide an easy answer to the problem of measuring work done during the erection process. This is not necessarily the case however. The problem is that their timings may not coincide with those of reporting periods. They may appear to offer exactitude but this is an illusion if they do not refer to work actually done during a reporting period. Thus they provide a guide to work measurement; only coincidentally will they provide exact measurement.

The point is that what is required for statistical reporting purposes are reasonably accurate assessments by the contractor or tradesmen of the value of work done. (Value of Output data) and of the cost of materials used and equipment rented (Production/Value Added data) during the reporting period.

It must be stressed that what is to be measured is the value of work done during the reporting period, not the value of work paid for. Stage payments are often made in arrears; retention sums are always paid in arrears. Meanwhile the work has been done.

Reporting units should be instructed to provide their best estimates of the value of work done during reporting periods. They should be instructed to use valuation certificates or stage payments as a guide in making these estimates, but only to use certificate or stage payment values directly if the certificates or payment periods coincide with reporting periods or, at the most, relate to periods which are no more than five working days "out of phase" with reporting periods.

In making estimates without certificates, contractors and tradesmen should be advised to use such factors as man-hours expended or materials used during a reporting period.

It might be objected that the abandonment of valuation certificates and stage payments as a prime means of measurement renders the whole process of statistics generation subject to the possibly doubtful accuracy of reporting units' estimations so far as value of output and production/value added series are concerned. This is true, but it is true of all statistics generation which is always vulnerable to the injection of misleading or inaccurate returns. The issue which National Offices have to address in this regard is that of the education of reporting units. Statistical series of whatever variable can be soundly based only on the intelligent co-operation of reporting industries. Respondents must be brought to an appreciation of the value of accurate and timely statistics and to understand that misleading figures are worse than valueless. This is the only route, other than unacceptably laborious back-checking, whereby National Offices may limit the danger of "garbage in - garbage out."

In the real world it will encourage respondents to provide accurate valuations and other figures if they were to be assured, provided national laws permit, that survey returns will be handled confidentially and

not subsequently made available to national tax authorities.

11.5. Speculative and Own-Use Building

These categories of buildings present a problem for statistics generation only as regards their valuation and the valuation of work done on them during the building process. As they remain in the builder's ownership until they are completed or, in the case of own-use buildings, presumably permanently, there is no question of his being paid stage payments during their erection. Nor, on their completion, is it immediately clear precisely what their market value might be.

The only way they can sensibly be handled as regards the valuation of work done on them and their final valuation is for this to be recorded at cost. If upon completion they should be sold, or rented at an implied value greater or less than the cost of building, then this additional value or shortfall must be recorded in subsequent reporting returns. Provision should be made in reporting return forms for the inclusion of additional values (positive or negative) to allow for this contingency.

Should only part of the space in a speculative building or development be sold, or rented at an implied value, different from the cost of building that space, then the resulting value adjustment should be calculated to account for the proportion of space sold or rented.

II. The Classification Problem

1. Activity or type of construction

The construction industry is classified in Division 45 of **NACE Rev.1** as follows:

Group	Class	Description
45.1		Site preparation
	45.11	Demolition and wrecking of buildings: earth moving
	45.12	Test drilling and boring
45.2		Building of complete constructions or parts thereof; civil engineering
	45.21	General construction of buildings & civil engineering works.
	45.22	Erection of roof covering and frames
	45.23	Construction of highways, roads, airfields and sport facilities
	45.24	Construction of water projects
	45.25	Other constr. work involving special trades
45.3		Building installation
	45.31	Install. of elect. wiring and fittings
	45.32	Insulation work activities
	45.33	Plumbing
	45.34	Other building installation
45.4		Building completion
	45.41	Plastering
	45.42	Joinery installation
	45.43	Floor and wall covering
	45.44	Painting and glazing
	45.45	Other building completion
45.5	45.50	Renting of construction or demolition equipment with operator

However, NACE Rev.1 does not make a clear distinction between building and civil engineering activity. Thus at the four digit level 45.11 'Demolition and wrecking of buildings; earth moving' combines building demolition, an activity which more often precedes building than engineering work, with earth moving, an activity more generally associated with civil engineering. Similarly at 45.21 the general construction of buildings is combined with civil engineering work. More examples could be quoted.

Given that government and public bodies are proportionately more important clients in the civil engineering sector, the provision of separate statistical series for each sector is necessary to provide adequate industry data to Union and national policymakers as well as to other users of construction statistics.

Thus statistics users require statistical series tracking the trend of the industry's activities by **type of construction**, eg. index of production and orders received broken down between building and civil engineering.

For this purpose, the Classification of Types of Constructions (CC)[6] has been developed by Eurostat on the basis of the provisional Central Product Classification published in

6) Classification of buildings and civil engineering works, proposed by Eurostat as a Commission recommendation

1991 by the United Nations. CC uses the decimal system and classifies the construction products in 2 Sections (1-digit), 6 Divisions (2-digits), 20 Groups (3-digits) and 46 Classes (4-digits). Its structure up to the Group level is the following:

Classification of Types of Constructions CC*

1		BUILDINGS
11		**Residential buildings**
	111	One dwelling buildings
	112	Two- and more-dwelling buildings
	113	Residences for communities
12		**Non-residential buildings**
	121	Hotels and similar buildings
	122	Office buildings
	123	Wholesale and retail trade buildings
	124	Traffic and communication buildings
	125	Industrial buildings and warehouses
	126	Public entertainement, education or hospital and institutional care buildings
	127	Other non-residential buildings
2		CIVIL ENGINEERING WORKS
21		**Transport infrastructures**
	211	Highways, streets and roads
	212	Railways
	213	Airfield runways
	214	Bridges , elevated highways, tunnels and subways
	215	Harbours, waterways, dams and other waterworks
22		**Pipelines, communication and electricity lines**
	221	Long-distance pipelines, communication and electricity lines
	222	Local pipelines and cables
23		**Complex constructions on industrials sites**
24		**Other civil engineering works**
	241	Sport and recreation construction
	242	Other civil engineering works n.e.c.

* The complete structure is presented in the Annex IV.

The above Table provides a guide to the classification and grouping of construction products and activities for the gathering of relevant information. We must stress, however, that it is not necessary to collect information at the highest, four digit level of disaggregation.

Which one of these classifications - NACE Rev.1 or CC -, as well as the level of detail to be supplied, must be decided for each individual indicator separately.

Standard definitions of the terminology used in the above table, i.e. of the terms 'building', 'dwelling', are explained in the annexed glossary (Annex V). They are the definitions to which National Statistical Offices should work. It is of course vital that all Member States use the same definitions of data.

1.1. Building versus Civil Engineering Work

Many new building projects require ancillary engineering work such as the building of access roads and open car parks and the laying of water supply, sewerage and drainage pipes. Similarly many new civil engineering projects, such as the building of reservoirs, locks and railways may involve the erection of control buildings.
Strictly speaking ancillary civil engineering work should be distinguished from building work proper and vice versa in measuring the value of construction output and orders.

Achieving such a distinction with precision is probably impossible. Depending upon the nature and detail of order or tender documents, managements of reporting units may find difficulty in reporting accurately the value of ancillary work whether it be building or civil engineering. Where ancillary work is covered by a separate contract or contracts, of course, no problem arises. This is not always the case, however, and it is recommended that National Offices make clear in Advisory Notes accompanying survey questionnaires, the desirability of making an accurate distinction between the two types of work. However, it is recommended

that, in practice, reporting units should not be required to enumerate the value of ancillary work completed, or ordered unless it constitutes 5% or more of the value of a contract or more than 100,000 ECU, whichever is the lesser. In any event it is recommended that reporting units' best estimates of the value of ancillary work shall be acceptable in cases where its value cannot otherwise be clearly determined.

Car Parks

As regards the categorisation of particular structures as buildings or civil engineering structures it should be noted that 'car parks' are classified as buildings. This is to be interpreted as meaning multi-storey car parks and car parking facilities provided in the basements or on the roofs of buildings. Open car parks built simply as areas of hard standing are to be classified as civil engineering works and categorised as "Streets and roads" (Annex IV).

Airports

As regards airport building, the actual buildings (terminals, hangars, etc) are to be classified as buildings. Only the runways, taxi ways and other hard standing areas and roads within airport perimeters are to be classified as civil engineering works and categorised as 'Airfield runways' (Annex IV).

1.2. Multi-Purpose Buildings

Not all buildings are designed to be used for one purpose. Many serve more than one purpose. The definitions of residential and non-residential buildings mentioned in the glossary, leave outstanding those buildings, which occur from time to time, which are divided almost precisely 50/50 between residential and non-residential use, eg two storey buildings comprising shops or offices with superjacent apartments.

To meet the terms of the new legal base, National Offices are only required to use this "50% or more" rule in classifying buildings. In the case of large developments, however, this may give rise to the misallocation of significant areas of floor space and of order and output values. Under the rules of subsidiarity National Offices may wish to reach a closer measure of orders and output for residential and non-residential space creation in large mixed use projects. Thus contractors could be asked to apportion the values of such contracts or orders pro rata to the division of erected or intended floor space between the two categories. Clearly, to limit the reporting burden, such apportionment need only be required for projects above a certain high value limit and where, say, 10% or more of the floor area of a project is designated as being for residential purposes in a non-residential project and vice versa.

These, and all cases of multi-purpose buildings, present no problem, in principle, as regards the measurement of building output or orders by type of building.

Mixed Residential/Non-Residential Buildings

Reporting units should be advised, in Advisory Notes accompanying survey questionnaires, of the need to apportion the values of "mixed" building contracts and orders between residential and non-residential building or space creation. The values of such contracts or orders should be apportioned pro rata to the division of erected or intended floor area between the two categories. To limit the reporting burden, however, it is recommended that such apportionment should be required only where 10% of the floor area of a building is designated as being for residential purposes in a non-residential building and vice versa.

Mixed Use Non-Residential Buildings

As regards the categorisation of "mixed use" non-residential buildings or of the value of non-residential work in mixed residential/non-residential buildings, it is recommended that the value of the building or of the non-residential space shall be categorised to that purpose which accounts for the greatest proportion of the useable space.

Office space in non-residential buildings which is directly associated with or ancillary to the prime use of the building, eg ancillary office space in warehousing, industrial, research or retail buildings, should be categorised to that main purpose and not recorded separately as distinct office space.

2. Prefabricated Timber Buildings

Prefabricated buildings, largely manufactured off-site and merely assembled or placed on site, are not to be regarded as building structures for the purposes of construction statistics.

When used by contractors as site accommodation units, whether bought or hired, they are to be defined as construction plant and equipment and treated as a component of building costs as is the cost of providing services to them.

In an era when a growing proportion of building components, properly defined, is manufactured and prefabricated off-site it is important to reach a clear definition of a prefabricated building. This is a building the structure and envelope of which is completely, or in its larger part, manufactured off-site and the erection of which comprises the assembly of parts which, together, make up its entire envelope.

> The production of timber prefabricated buildings, which comprise the great majority of them, is to be recorded under NACE Rev 1 Division 20 at Class 20.30 "manufacture of builders' carpentry and joinery".

3. New Work versus Repair, Maintenance and Improvement (RMI)

Neither NACE Rev.1 nor the CC **(Classification of Types of Constructions)** make any distinction between new building and civil engineering work and repair, maintenance and improvement work.

The distinction between these two categories of work is widely accepted within the construction industry. The provision of separate statistical series for, for instance, output for each category would be valuable in forecasting the short-term future likely work load of national industries, given that new work is notoriously subject to the rise and fall of the general business cycle whereas repair and maintenance work offers a much steadier and more reliable market. It is estimated that repair and maintenance comprise up to a half of the industry's work load. So high a proportion justifies the provision of statistical series specific to this sector from the points of view of both Union and national policy makers and of decision makers within the construction industry and within the material and component industries.

Repair, maintenance and improvement (RMI) is widely regarded as constituting a

"grey area" in the definition of construction activities. It needs not to be so if clear rules are adopted in defining the distinction between new work and RMI as follows:

3.1. New Construction Work

New Construction Work shall be defined as activity directly and intentionally leading to the creation of new habitable or useable building space or to the creation of new existing civil engineering structures.

All other work shall be classified as repair, maintenance or improvement.

The physical extension of an existing building to provide new and additional habitable or useable space shall be classified as "improvement" and not as new building work.

The physical extension of civil engineering works such as roads, coastal defences, harbour works, pipeline or drainage systems shall be similarly classified as "improvement".

Assuming the above definition is followed a possible point of difficulty remaining is the classification of building work resulting in the creation of newly-built space behind the retained facades of pre-existing buildings. This shall be defined as newly-built space, and, hence, as new building work.

Demolition work preceding new construction should be classified to the type of new construction which it precedes. Demolition not to be followed immediately by new construction, ie. land clearance work, should be classified to building transformation as appropriate.

3.2. Repair, Maintenance and Improvement Work

By definition **Repair, Maintenance and Improvement work** is any construction activity which does not result in the creation of new building space or newly built space or in the creation of new civil engineering structures.

If National Offices work to our recommendation that new work be defined as the creation of new space or civil engineering structures, no problems should arise in the combination of national series to produce harmonised Union-wide series. Nonetheless, problems of definition inevitably arise at the margin and, subject to the rules of subsidiarity, further clarifying recommendations may be helpful.

The "grey area" which probably requires clearer definition is that of "**improvement**" and we recommend as follows:

The upgrading of buildings through the installation of new mechanical, electrical or heating systems should be classed as improvement albeit the systems themselves may be new. Similarly, the replacement of existing drainage or water supply pipes is improvement albeit the replacement pipes themselves are new.

Attic conversions are best classified as improvement albeit new usable space is created. However, the contribution to total activity from these conversions, however classified, will be so small that we do not recommend that National Offices amend any established methods they currently use in classifying them.

Finally, in practice, the extension of existing buildings is often combined with improvement of the original building. To ease the reporting and subsequent processing burden arising from such "combined" works we

recommend that the whole expenditure in such cases should be classified as improvement when over 50% of the spend goes on improvement and as extension work, and hence new building, when over 50% goes to extension work.

It would be otiose to seek the further distinction of improvement work from more run of the mill repair and maintenance activity even though it is generally of a more discretionary nature than repair and maintenance work.

Demolition work carried out other than as an integral part of a new building project (see above) is to be classified as building improvement and, hence, as RMI.

4. Renting of Machinery and Equipment

The definition of division 45 in Nace Rev.1 covers the whole range of construction activities with one exception - the renting of construction equipment without operator. In some Member States there is a clear distinction of trades between equipment hire companies renting plant with and those renting it without operators. This is not the case in all countries, however.

In those States where equipment hire companies usually provide both services an awkward division will arise in the statistics gathering process if the two methods of operation are distinguished. Reporting units will have to differentiate between their orders and turnovers for equipment rented with and those rented without operators.

5. Exclusion of private activities

As will be appreciated from the above description of the industry, construction, for the purposes of national and European statistics, is defined as an industry, not as an activity including households.

It is not readily possible nor, from the point of view of the harmonisation of national statistics, is it desirable for National Statistical Offices to attempt to measure the construction activity of private individuals and householders. In some countries DIY (Do It Yourself) expenditure by individuals and households on repairs and improvements to homes may be a significant proportion of consumer expenditure and fixed investment respectively. As such it may comprise a modest percentage of total national construction activity and possibly a significant percentage of building repair, maintenance and improvement expenditure. A line must be drawn somewhere, however, and building work carried out by private individuals for their own benefit or that of friends is not to be regarded as part of the output of national construction industries. It is a sufficient task for National Statistical Offices to measure the activity of the construction industry proper as defined above, i.e. the activity of legally established enterprises and of tradesmen carrying out construction and construction-related work for profit or gain.

This definition of the industry may create some difficulty in measuring construction activity meaningfully in those countries, such as Ireland, where "self build" constitutes an important proportion of house building activity.

There is no question but that the building and building repair and maintenance activities of private individuals and households present difficulties for statisticians seeking

to measure construction activity. The recently published United Nations' Revised System of National Accounts (Rev. **SNA**) addresses this problem along the lines we have suggested above. Thus a distinction is made between, on the one hand, DIY expenditure on the repair, maintenance and improvement of dwellings, which is defined as "own account" activity and is excluded from any measure of industrial activity and, on the other, "major renovations or extensions to dwellings" which are classified as fixed capital formation, i.e. as part of construction output.

The question which is begged, is what constitutes a "major" renovation or extension. It would be possible, although in our view fruitless, to define "major" in terms of some arbitrary cost or value of work done or area of new space created. Any such definition would then define a boundary down to which construction activity should be measured and below which, expenditure would be assigned to the DIY household sector. Numbers of "major" extensions would then, presumably, be tracked through national planning procedures.

There are a number of difficulties here which lead this line of approach into a cul de sac.

Firstly, the definition of "major" extension will vary from country to country depending upon the detail of national planning procedures. In principle, harmonisation might be possible here but would probably prove very difficult politically. Secondly, and more importantly, "major" renovations will probably escape detection through most national planning systems. Thirdly, and most importantly, there is no means of tracking through planning procedures whether the work is actually carried out by building tradesmen or by private householders themselves.

Construction activity therefore has to be measured by conducting surveys of construction businesses of all sizes including the smallest ones as well as **self-employed tradesmen.**[7]

National Offices which track building activity purely through national planning returns (imputing output and value added via building models and standard time lags - see later) effectively measure only **new** building output. Although this method cannot be dismissed for this purpose it is not possible fully to monitor repair and maintenance output in this way as much work must escape planning overview and the measurement of civil engineering output cannot be other than problematical.

By taking the stance that what is to be measured is the activity of the construction industry and that construction work is defined as that carried out by construction professionals, we avoid the pitfall of defining what is, and what is not, "major" work. The "boundary" to which it is recommended National Offices should work is not that between "major" and lesser small building projects but that between work carried out by building professionals, including small firms and single tradesmen, and that carried out by others.

This boundary definition is simple and logical. It defines clearly the limits of the construction industry and the proper sphere of construction industry surveys. In the practical business of measuring construction activity it avoids, in principle, the problem of having to handle data of two different types arising from different sources, i.e. from building permits, which may or may not be fulfilled by building professionals, and from sample surveys of construction enterprises.

There is a sphere of building activity where this boundary should, perhaps, in principle be breached. This is the sector of self-build

7) See chapter I. 3 "The importance of small enterprises"

housing where whole dwelling units are built by individual families either by themselves or through informal arrangements with local tradesmen. In some countries, such as Ireland and Finland, self-build activity may comprise significant proportions of total residential building.

However, the sector, of its nature, poses considerable difficulties to the collection of data. It is therefore recommended that , for the purposes of this Manual, the selfbuild groups and cooperatives are established as legal entities. For the periods of their existence these are, effectively, house building enterprises and should be registered and treated as such.

III. Volume Index of Production

C

1. Introduction

This is surely the most important index in any sector of the economy. It measures movements of production (in volume) and indicates how the construction industry is developing in relation to other sectors of economy.

It is generally accepted that it shows the evolution of value added at constant prices. Since value added can not be observed in its own, approximations are necessary.[8] In the domain of construction (building and civil engineering), the enterprise structure of the industry, especially the domination of very small units, adds a further complication to the calculation of a production index. All in all four different approaches can be distinguished:

- deflation of output
- hours worked
- consumption of new raw materials
- authorisation / progress

2. Basic information

2.1. The Deflated Output Method

If truly **value added** should be measured, this would require National Offices collecting data on the value of construction **output** in any period and on the value of **bought-in** materials, components and plant. The **difference** between these values is clearly the measure of value added by the construction process at current prices. As what is required is an index of added value at constant prices, National Offices would then have to apply price deflation procedures.

Normally we work instead with the assumption that for short time intervals the ratio

$$r = \frac{\text{input}}{\text{output}}$$

is fairly constant, so that only the **output** of construction needs to be measured.
These must account for the breakdown of construction activity in national markets by:

8) See also Section B: **Industry** , chapter III, "The Production Volume Index (PVI)"

- type of construction [9]
- region within the national market where construction prices vary significantly by region

The bases upon which input product **price indices** may be calculated are described further down in the next chapter of this manual.

Such a method would produce a fairly direct estimation of value added at constant prices and, hence, an index series. National Offices in a position to pursue its principles are urged to do so. However, it may not be possible for many countries to adopt it due to lack of data on the value of construction output in the necessary detail, or due to the lack of data necessary for the generation of adequate output and input price deflators.

The forthcoming Regulation does require National Offices to provide series of output price indices. At some point in the future, therefore, National Offices will have to address the question of producing such index series. Nonetheless, whilst the lack of output price deflation data may be a problem which National Offices must perforce rectify in the future, it remains possibly only one of the obstacles which stand in the way of their using this method. In practice, therefore, we must search for viable proxies and alternative methods for reaching volume indices of production.

2.2. The Hours Worked Proxy

This is probably both the most readily gathered and the closest proxy indicator for an index of value added at constant prices. The value of the industry's contribution to gross domestic product is directly determined by the work done by its operatives and the numbers of hours worked is a most readily available measure of this work value.

Clearly National Offices will have to collect data separately on the numbers of hours worked in the different parts of construction required in the future Regulation in order to achieve separate indices. In each case, sample data should be grossed up to achieve assessments of total hours worked in the universes of undertakings in each sector, the sum of these assessments providing the total measure for the industry as a whole.

In measuring the number of hours worked, the question arises - by whom? It is recommended that measurement be limited to manual workers and site operatives, including working foremen and 'labour only' subcontractors, i.e. to people actually employed in the building process. Where National Offices' survey coverages include small undertakings, the hours worked by working proprietors should also be included. Hours worked by working directors, managers and office staff should be excluded. Time worked by managerial and office staff cannot be related directly to actual construction processes.

As a proxy for a value added index, the hours worked index is subject to the criticism that it leaves **productivity** out of the equation. Thus it does not reflect any improvements in productivity which may be achieved in the industry year on year, through improved working practices, the greater use of plant and capital equipment or the development of construction technology and the use of new materials. The rebasing of the index at five year intervals will mitigate this defect to some extent, but will not obviate it entirely even within a five year period. Long term analyses of "value added" based on an hours worked proxy will be of doubtful validity. For this reason, the series have to be corrected by the estimated evolution of productivity.

9) See the nomenclature in chapter II.1 "Activity or type of construction" above

2.3. The Materials Used Proxy

Labour is only one of the inputs to the construction process. The others are materials and components, plant and equipment and working capital. Like labour the rate of utilisation of any of these is determined by the level of construction activity. In principle, therefore, all or any could be measured and used as a proxy for the measurement of construction activity and, hence, of value added.

Principle is one thing, however, and practicality is another. No construction input is so ubiquitous as labour. Whatever is built and however it is built it has to be built by people. This is not the case with any other input other than working capital which, in practice, is impossible to measure other than as final building cost.

Thus, of all the construction inputs other than labour that might be measured as a proxy for added value, very few are sufficiently widely used as to provide a meaningful measure of the whole range of construction activity. However, National Offices need not necessarily rely on the measurement of only one material input. As we have noted, traditional building methods vary between member States. Hence, National Offices could elect to measure the consumption of a range of materials selected to reflect activity levels, as accurately as possible, across the whole range of their industries. Here, however, we must again face the issue of practicality. There is no point in National Offices, in collecting usage data to provide a proxy for added value, to expend more than a modest fraction of the effort that would be needed to measure added value directly. Thus, although it would be preferable for National Offices to measure the usage of a range of basic construction materials, this range must necessarily be limited.

In practice, the range of materials which are used sufficiently widely to merit consideration as the basis of an added value proxy is, itself, limited. Traditional building methods and materials vary but modern methods are widespread. The usage of **cement** and of **concrete** could provide a reasonably accurate proxy for the measurement of activity both in the "modern" building sector and in civil engineering. Such a proxy could usefully be developed to provide a more accurate reflection of activity in the building sector by adding the usage rates of **structural steel**, **bricks** and **timber** and in the civil engineering sector by adding the usage of aggregates. However, of all the materials used in construction, the only ones with sufficiently widespread use to be worthwhile considering as the basis for a materials usage proxy are concrete, cement, aggregates, structural steel, bricks and timber. These are used in very different proportions however, in the three broad sectors of traditional low-rise building, modern building and civil engineering.

Here, we must confront a further problem which arises in the search for a meaningful material usage proxy. The future Regulation calls for the provision of separate production indices for several parts of building and civil engineering work. If material usages are to be taken as proxies for these indices, then it will be necessary to distinguish, and to measure by separate sample surveys, the usages of selected materials by building firms on the one hand, and by civil engineering firms on the other. Sample usage rates would then have to be grossed up to the separate total universes of building and civil engineering undertakings. This having been done, a decision would have to be taken as to the weights to be given to the two separate sectoral indices to arrive at an index series for the construction industry as a whole. Thus the creation of reasonably precise material usage proxies presuppose the availability of good information in the structures of national industries.

If material usage rates are to be measured at the "user end" of the materials markets, i.e. by sample surveys of construction companies, then building firms must be distinguished from civil engineering firms. If this were to be possible, then there is no reason why the materials selected should be the same for both sectors. The usage of concrete and aggregates would provide a good proxy for activity and value added in the civil engineering sector. In the building sector, the usage of cement and concrete would provide a fairly accurate indicator of activity, although a more accurate indicator would be achieved if the materials range were to be extended to include structural steel and bricks and/or timber depending on the prime material used in traditional, low-rise building in each member State.

The collection of materials from the supply side of the market, i.e. from producers and merchants, is certainly an easier proposition and it is the possibility of this approach which renders the concept of a materials usage proxy so attractive. Certainly, there are far fewer producers and merchants that need to be questioned in supply-side sample surveys and production and deliveries data may already be available from surveys of manufacturing industries.

The problem which arises in approaching a materials usage proxy from this side is that not only is production not utilisation nor are deliveries (albeit adjusted for import and export trade.) Deliveries by manufacturers direct to end users, e.g. of ready-mixed concrete, can be taken as a reasonably accurate measure of usage. Material stocks are unlikely to remain long unused in contractors' yards. This is not the case with deliveries to merchants, however. Their essential function is to hold stocks in order to provide local availability.

Thus any reasonably accurate assessment of materials usage from the supply side, will require the combination of sales data both from producers as regards direct deliveries to contractors and from merchants.

In any event, the derivation of a materials usage proxy from supply-side enquiries will leave unresolved the question of the comparative, and fluctuating proportions of materials used in building and civil engineering operations. In the absence of research into, or information regarding, the proportional split of usages between the two sectors, such an approach can, at best, result only in an overall proxy for value added by building and civil engineering combined, which is not good enough for our purpose.

Commentary

To sum up:

a) There are few construction materials that are sufficiently widely used to merit selection as the basis for a material proxy. In practice, they are limited to cement, concrete, aggregates, structural steel, bricks and timber.

b) It would be preferable for National Offices pursuing this route to a value added proxy to measure the usage of more than one material, the selection being made to reflect, as far as possible, national construction practices.

c) In order to create separate proxies for all parts of building and civil engineering, as required by the forthcoming Regulation, National Offices will have to direct separate sample surveys of materials usage to building and to civil engineering undertakings.

d) Measurement of materials usage from the supply side, to be at all accurate as a value added proxy, will entail directing enquiries to producers regarding direct deliveries to contractors and to merchants as regards sales to contractors. Such measurement, would only provide

a proxy for value added by the construction industry as a whole.

It must be clear that the development of materials usage proxies is not without its problems. The creation of reasonably accurate proxies will require the conduct of sample surveys. Collection of data from the supply-side will provide a proxy only for the industry as a whole. The creation of separate proxies for building and for civil engineering will require industry surveys and, this being so, the collection of hours worked data would provide the basis for a more valid proxy.

2.4. The Authorization / Progress Tracking Method

This method[10] requires the recording by local Planing Authorities of building and renovation / extension **permits** by type and size (volume) of buildings.

Most statistical offices maintain a database of typical building costs per cubic metre[11] by type of building - residential buildings, shops, offices, etc.

The next step is to distribute the total cost of a building across the phases of foundation work, frame erection and final complementary structure completion and the installation of services. The current values used for measuring costs incurred at the **various stages** of **erection** of a block of flats are in cubic meters for:

- foundation works
- frame construction
- complementary completion and services installation

Clearly the gross cost of a building is determined by its volume and by the cost per cubic metre and, in practice, this can only be measured in terms of average cost per cubic metre for the type and size of building.

As well as maintaining a database of average building cost by type and size of building the Statistical Office also has to monitor typical building **times** and **time lags**.

The database of building costs collected in a particular year provides one of the bases for the calculation of the value of building work done in any month at constant prices, these being the prices ruling during the base year of collection. The other base is the information provided by the Planning Authorities on the starts of building work. The total gross value of building work at constant prices done in any month is calculated as the sum of progress achieved in all buildings under construction.

This summation starts when information of building starts reaches the statistical office. The Planning Offices inform at the ground inspection (start) of all buildings.

The calculation of gross value of building work at constant prices for a particular type of building according to this procedure can be expressed as follows:[12]

10) This method has been developed by the Finnish Statistical Office. Detailed literature can be obtained there. A method similar in principle is used also in the Netherlands.

11) For those countries that do not register in their administrative databases the volume of the buildings but their surface, an approximation of this method can be applied just replacing the cubic meters by the square meters.

12) See Jorma Tuomainen, Veikko Lampinen, Pekka Mäkelä "The Finish Volume Production Index", Nordic Workshop on Methodology of Economic Indices, Nordisk Statistisk Sekretariat, Tekniska Reporter 55.

May the unit value for a building category I_n be

$$P_n^0 = \sum p_n^0(k) \qquad k=1,.....,v\ ,$$

Where $p_n^0(k)$ defines the distribution of the unit values to the months k, k=1,..., v, when the constructing is going on.

The building costs for a building i in constant prices in t month can be calculated when it is known that the constructing will be started in the month s and its volume will be q_i m^3 when finished as follows:

$$p_i^0(t)q_i$$

where $p_i^0 = p_n^0$

and $p_i^0(t) = p_i^0(k)$ when k = t -s +1 and $1 \le k \le v$
or

$p_i^0(t)$ = 0, elsewhere

The volume index for the type of buildings i that belongs to category I_n according to Laspeyre's volume index is

$$V_0^t(La) = \frac{\sum p_i^0(t)q_i}{\sum p_i^0(t_0)q_i)}$$

$$= \frac{\sum p_i^0 \pi_i^0(t)q_i}{\sum p_i^0 \pi_i^0(t_0)q_i}$$

$$= \frac{\sum p_i^0 q_i^t}{\sum p_i^0 q_i^{t0}}$$

where $\pi_i^0(t) = p_i^0(t) / p_i^0$

and $\pi_i^0(t_0) = p_i^0(t_0) / p_i^0$

defines the percentage distribution of the unit value p_i^0 , and accordingly

$$q_i^t = \pi_i^0(t)q_i$$

and $q_i^{t0} = \pi_i^0(t_0)q_i$

defines that "part" of the total volume of building i that has been built in month t and t_0.

An essentially similar method, based on building permits, is used in the Netherlands. Here the **values** of work to be done are recorded as part of the building authorisation process together, as in Finland, with the proposed start date and the scheduled date of completion. Hence the number of days needed to complete a project to schedule is known. These days are apportioned pro rata to each of the months during which building will be in progress, allowance being made according to established norms for reduced work rated during "bad weather" months. Hence the number of work days achieved per month is calculated and the assumption is made that each work day generates an equal value of work done towards the completion of the project. Hence the value of work done is calculated for each moth. The values of work done on all monitored projects then summate to the value of national building output during any month. This value is deflated using price information to give a value at constant prices. Value added is then calculated by applying an historic relationship between the value of output and value added.

Commentary

We would comment on the Finnish/Dutch method as follows:

a) It provides a route to a constant price index of value added in the **building** sector without recourse to sample surveys of contractor undertakings and without the need to develop price deflator indices, although the Dutch method, being based on approved building values, does require the application of a price deflator.

b) It does not actually provide an index of added value but of building output. But

this characteristic is shared with other methods.

c) It provides a route to a value added index for building but not for civil engineering. The principles of the method could be extended to civil engineering by the measurement of progress achieved in civil engineering works and the development of a series of typical prices and costs for civil engineering works such as road works, tunnels and harbour works. In practice, however, the development of such a database of typical prices and costs would be a more difficult task for the civil engineering sector given the greater degree of uniqueness of civil engineering structures.

   Probably the simplest method of recording progress on civil engineering works is the measurement of concrete placed. If this measure is used, then the method becomes essentially a material usage proxy.

d) The method presupposes the existence of a building authorization and inspection which may not be the case in all Member States.

e) It presupposes the availability of costing information on a wide range of building projects in sufficient numbers to permit the derivation of reasonably representative average prices and costs by type. Thus, to be instituted, it would require National Offices entering into an initial research programme to develop adequate price/cost databases given that building methods continue to develop and change this research would have to be ongoing to enable necessary updating.

f) Finally, like civil engineering, the method does not account for any repair and maintenance work carried out which does not come under the oversight of the national authorities.

2.5. Discussion of the Possible Methods

The four methods we have suggested for the production of a volume production/index are:

- Deflated Output Method
- Hours Worked Proxy
- Materials Used Proxy
- Authorization/Progress Tracking Method (only for the building sector)

All have their disadvantages.

The **Deflated Output Method** aims at the more or less direct measurement of valued added. It entails the regular sample surveying of the industry to achieve grossed-up measures of the value of production and the development and application of output price deflation indices. It may be beyond the capabilities of many National Offices since it is difficult to apply to the very small enterprises in construction.

The Hours Worked Proxy requires the sample surveying of the industry to produce grossed-up measures of hours worked. Surveying permits of the distinguishing of hours expended in building and in civil engineering operations and hence of the production of separate proxy indices for the two sectors. Furthermore, labour is the most ubiquitous input into all construction operations. Measurement of it provides the most direct proxy measurement of the activities which create the added value generated by the industry. Thus it provides the basis for the most meaningful and valid proxy for value added.

The grossed up numbers of hours worked in each sector, of themselves, provide a crude basis for the weighting of the two sectoral indices to produce a proxy index for the industry as a whole, although this procedure assumes that value generated per hour worked is similar in both sectors.

The **Materials Used Proxy** is subject to the criticism that no material input is so universal in its use as is labour. The range of sufficiently widely used materials is limited and the monitoring of more than one is desirable. If separate proxy indications are to be generated for both the building and civil engineering sector, then sample surveys must be undertaken of both sectors so that the materials usage proxy offers no advantage over the hours worked proxy so far as National Offices are concerned.

If materials usage is monitored from the supply side, then the only proxy that can be meaningfully achieved is that for the industry. In any case, surveys must be conducted to monitor **sales** to contractors. Neither production rates nor manufacturers' deliveries provide the basis for an accurate proxy for construction activity/value added.

Both the Hours Worked and the Materials Used Proxies are subject to the criticisms that productivity rates and construction methods, and hence materials usages, change over time. Thus long-term comparisons of value added based on these proxies would be of questionable value if it were not corrected for the productivity evolution.

The **Progress Tracking Method** as presently developed and used in Finland, it measures not value added in building operations but the constant price volume of building output. As yet, it has **not been developed** to cover **civil engineering** nor any building maintenance and repair work not overseen by Local Planning Authorities. It may provide an appropriate route to the measurement of value added in building for member States with sufficiently rigorous and enforceable building authorization and inspections procedures, providing average material and plant input costs can be developed for a representative range of building types and sizes.

Conclusion

National Offices must make their own decisions as to which methods to use to achieve a constant price index of production in the light of their own resources, national traditions and the circumstances of national industries. In view of the above considerations, however, it would appear that, failing direct measurement at constant prices of value added itself, the labour input/hours worked proxy provides the most valid and viable alternative.

It is very important to note that different methods, i.e. production index proxies, can be applied to **different parts** of the industry. While method 2.4. could be applied to Residential Building, the other methods may cover all construction activity. The overall production index is in any case a weighted average of the individual indices, the weights used being (estimated) value added in the base period.

The following **table** gives an overview of which method is used in some selected European countries for approximating volume of production.

Dominant method 1994

	defl. output	admin. data	hours worked	emplo yment	materi al input
B			✓		
DK		✓		✓	
D			✓		
E	✓				
F			✓		
I	✓			✓	
L			✓		
NL		✓	✓		
N		✓		✓	
A	✓				
FIN		✓			
UK	✓				

It should be noted that most countries apply several methods, depending on the sector of construction. But all in all the method of using employment or - more sophisticated - hours worked as a proxy is dominating.

3. Coverage and Level of Detail

The Regulation requires that National Offices shall provide index series of production/value added separately for building and for civil engineering work. To reflect the trends of construction activity accurately these series should include the contribution to value added made by repair and transformation work in each sector. However, many National Offices may face difficulty in measuring value added through RMI work and its inclusion should perhaps, best be regarded as a longer term objective. Pilot studies may be appropriate to establish the practicalities of including coverage of RMI work in these series.

4. Periodicity and pilot studies

As a first step National Offices should aim to provide separate production /value added series for building and for civil engineering on a quarterly basis. Pilot studies to provide production indices on a monthly basis are recommended.

The gathering of information from enterprises regarding repair, maintenance and improvement work may present difficulties for some National Offices which have not previously collected such data. However, the value to statistics users of separate series tracking the industry's output in RMI work is clear.

Pilot studies to explore the practicalities of collecting and processing such data for the production index may be appropriate for some National Offices.

C

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A. above.

IV. Price Indices

1. Introduction

The forthcoming Regulation does call specifically for the provision of price index series. It also requires the provision of index number series for production and for values of orders. To be of most value these should best be presented in constant price terms. To achieve this, National Offices will have to apply price deflators to any data collected originally at current prices. We therefore present our reflections on this issue here.

The aim of this Manual is to ensure the provision by National Offices of price index series which are compatible and consistent at the European level. We explore below a number of routes whereby price indices may be developed, either directly or from construction cost indices. A clear distinction must be made between price and cost indices (see later) and, to serve their prime purpose of tracking construction prices, the preferred method for generating price indices is from contract and/or tender prices.

1.1. The Complexities of Price Indices in Construction

The measurement of changes in the prices or costs of construction work presents great difficulties. The output of the industry in any period includes a great variety of structures and types of work. The pattern of work - buildings of all types, civil engineering structures and repair and maintenance work varies from period to period and from year to year.

Quite apart from these considerations each building and civil engineering structure is, in some way, unique. The construction costs of seemingly identical buildings can vary quite considerably because of variations in ground or site conditions and, hence, in foundation and working costs.

Thus the industry itself is probably unique in the complexity and variability of its products.

1.2. Price versus quantity

When measuring prices, the monetary value is divided into two components:

1) the price component and
2) the quantity component.

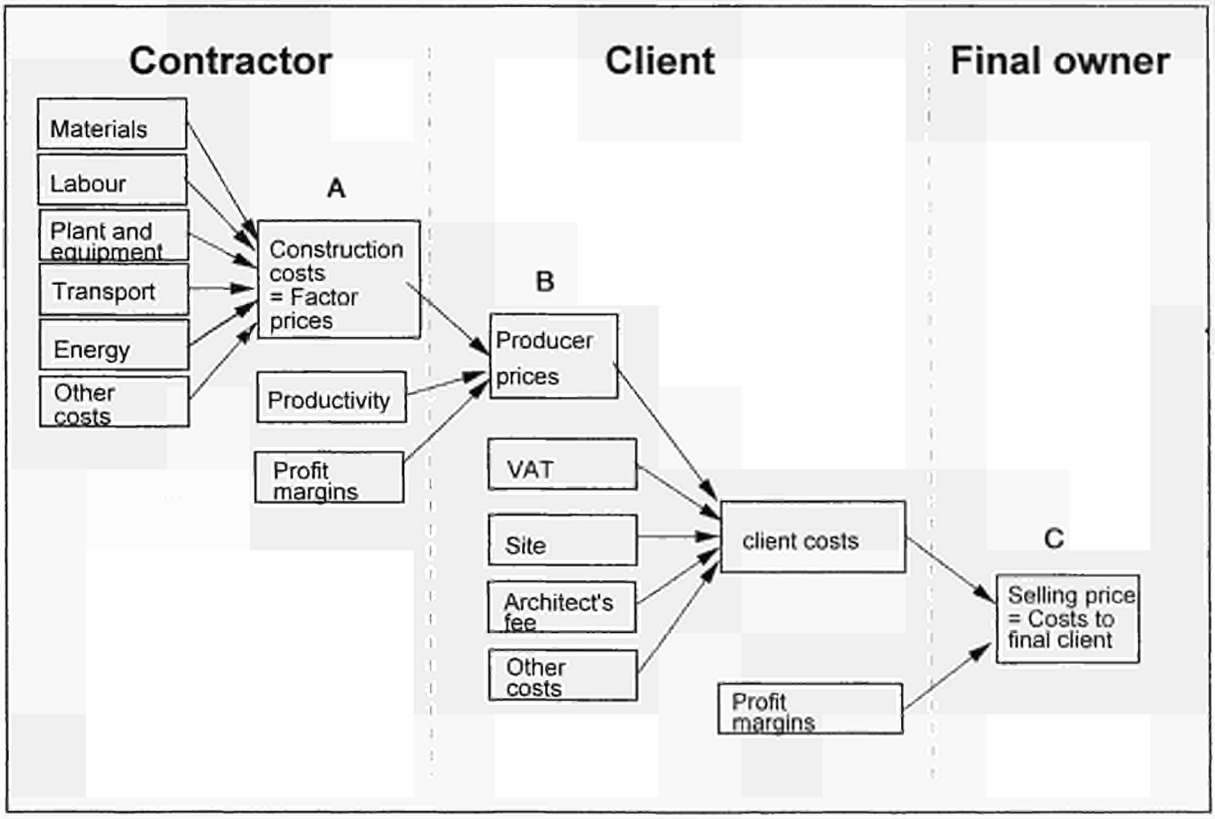
Relevant **quality** aspects are **included** in the **quantity** component. For a product such as for example a road, an area in which almost every single project is unique, there is no easy way to define "quality". If we are to define the characteristics of quality, there will have to be a long list specifying the length of the road in question, different

cutting depths, ground conditions, type of road, etc.

The "quality" of a road depends partly on the "extent" to which each of these different kinds of components appears and partly on how one values these components but also how these interrelate in making up the total value.

- the architect or the engineer,
- the materials suppliers,
- the contractor,
- the client

The terms 'Cost index' and 'Price index' have different meanings according to the point of view of the agent concerned.



2. Basic concepts

The terms 'Cost index' and 'Price index' are frequently used in the construction industry and are open to confusion. It is necessary to clarify the terminology we will use in the remainder of this manual when we will discuss on price indices.

Different agents are involved in the process of building a road, a house, a bridge:

In the context of construction statistics, we are concerned by the evolution of prices in the construction industry as it is defined in Division 45 of NACE Rev.1. For this reason, the terms 'Cost index' and 'Price index' will be considered **from the point of view of the contractor**, for the actual construction process lies in his hands. A construction cost index will show the evolution of costs incurred by the contractor to carry out the construction process. A construction price index will show the evolution of prices paid by the client to the contractor.

2.1. Main types of price indices

There are different categories of construction price indices.[13] Two of them are of primary interest:

- *input price indices*
- *output price indices*

An *input price index* measures the price development of production factors used in the construction trade, i.e. the input of raw material, labour, utilisation of machinery, etc. It is also called *factor price index.* It corresponds to item **A** in the previous diagram. An input price index measures the relationship between costs, at **constant technology** and **constant input mix**, that are associated with the implementation of a fixed amount of construction works.
Such an index differs from an *output price index* which measures movements in prices to clients of construction work. This is specially true when the price index is calculated from tender prices which can vary from time to time and place to place depending on the state of competition and market conditions. *Output price indices* include both changes in productivity and in the contractor's margins. (See item **B** in the previous diagram).

This index shall be distinguished from the "selling price index" (item **C** in the diagram) that measures changes in the prices paid by the final owner of the output to the client. It includes the price of the land, architect's fees and client's margins.

Ideally, a fourth type of index also exists: the *construction cost index.* A construction cost index will measure the movements in the costs incurred by the contractor/producer carrying out the construction work, i.e. costs of labour, materials and plant and overheads, *together with an adjustment for changes in productivity.* Such an index is very difficult to obtain. For this reason, in the context of this manual we will use the terms input price index and construction cost index as synonyms.

13) A joint- publication "Sources and methods - Construction Price Indices" has been published by OECD and Eurostat. It describes all methodological aspects related to the different categories of construction price indices calculated by OECD member countries.

3. The user needs for prices information

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In the construction area, we can identify three different main requisites for construction indices.

1. **Valuation adjustments**, etc. according to current price levels. Indices are required mainly in connection with providing government grants to building and civil engineering work.
2. **Regulation of contract payments** allowing for the changes in production factor prices that occur during the construction period, where the client and contractor have agreed upon a fixed price, and the contract permits variations due to fluctuating prices. For this purpose, we normally need a factor price index. However, other ways of determining contract payments are also conceivable, such as applying a consumer price index or a net price index.
3. **Financial analysis**. The interest here focuses on analysing price developments, or, an analysis which necessitates the conversion of previous investments into constant prices. In principle, a financial analysis can be divided into two main categories:

a) One entails an analysis of the business in the sector in question, in terms of the input of labour, raw material and capital service, and the output of finished constructions. This is where production and productivity analysis, as well as cost and profit analyses for the sector in question, belong. A common factor to both these areas is that the analysis is based on comparisons between the above mentioned index series.

b) The other main category of financial analysis consist of the fixed capital and investment analysis. These include constructions shown as the fixed capital in a production process, such as production of road services. What is needed in this context is a construction price index.

4. Input prices

4.1. Definition

The **Input price index** measures the evolution of the prices of the factors employed in the activity of construction. These factors are, among others, the materials, the wages and salaries, the plant and equipment hire. The price of land as well as architect's or engineer's fees should be excluded.

4.2. Elements of the input prices

There are differences between the available indices in the Member States. These differences concern both the elements included in the index (materials, wages, equipment, transport, overheads, ...) and the coverage.

The following table gives an overview of the different elements included in the Input price indices compiled in the European countries. Further details can be checked in the methodological data base MONA LISA.

	Elements of the input prices indices					
	Material	Wages	Pla.& Equi.	Transport	Energy	Others
B						
DK	✓	✓	(✓)	(✓)	(✓)	
D	✓					
GR	✓	✓				✓
E	✓	✓				
F	✓	✓	✓	✓	✓	✓
IRL	✓	✓				
I	✓	✓		✓		
L						
NL	✓	✓				
N	✓	✓	✓			
A	✓	✓	✓		✓	✓*
P	✓	✓				
FIN	✓	✓	✓	✓	✓	✓
S	✓	✓	✓	✓	✓	
UK	✓	✓	✓	✓	✓	✓

* Only for road and bridge construction

Materials and *wages* are the common elements to all input prices calculated in the European countries. Price indices for materials and wages are published separately in most of the countries. In fact the users are more interested in following the evolution of the prices of these elements separately than the evolution of the aggregated input price index.

4.2 Methods of calculating input prices

An input price index (factor price index) is made up of aggregated prices for material, labour costs and other types of costs.

$$I = \sum_{i=1}^{n} \left(w_i^M * M_i + w_i^L * L_i + \ldots\ldots \right)$$

I = the index, total

M_i = material index

where L_i = wages

w_i^M = weight for materials

w_i^L = weight for wages

It is assumed that neither the construction technique, nor the building organisation have undergone any change, and consequently, the calculations pay no regard to factors such as productivity improvements, more efficient utilisation of materials, etc. which can influence cost development. Nor have we taken any changes in the profit margins, which also affect a factor price index, into account.

Population and sample

In principle, the weight system intended for a factor price index should be based on the final costs incurred for material, wages, etc. during a certain reporting period. In practice, however, it is only possible to establish this cost when a project is completed. In setting up a sampling frame, we could then use the statistics from completed projects during a certain year as a point of initiation.

Measuring prices should, as far as possible, be based on actual prices (net prices), given the fact that price information about a certain material sometimes varies, even from the same company. This is explained by the fact that a price is a product of negotiation. Many factors affect the process: market situation, quantity involved and the size of previously placed orders. The estimator should take these conditions into account.

The estimates should be based on a probability sample of both goods and a choice of responding companies. Lacking a suitable sampling frame, we are forced to rely on a biased sample of representative goods, based on the advice of construction industry experts. In certain sectors, it is desirable to consider the possibility of basing the factor price index calculations on a probability sample of construction materials (representative goods).

4.3. Sources

Member States do not, in general, run special surveys to calculate input price indices. They use other indices already available from different sources. The following table gives examples of the different sources used in some European countries:

Materials	Price lists, PPI, Statistical Offices of Trade Chambers, Wholesale prices, ...
Labour	Collective agreements, Labour cost survey, ...
Equipment	PPI for machinery
Energy	PPI, Wholesale price index

4.4. Level of detail

The coverage of the input price indices varies from country to country.
The following table shows the present data availability:

Input price indices

	All Constr.	All Build.	Resid. Build.	Non-Resid. Build.	Civil Eng
B					
DK			✓1)		✓4)
D					
Gr			✓		
E	✓	✓			✓
F		✓			✓
IRL	✓		✓		
I			✓1)	✓4)	✓4)
NL			✓1)		
N			✓		✓
A		✓			✓4)

FIN		✓3)	✓	✓	✓
S			✓	✓	
UK	✓				

Notes
1) Low rise housing only.
2) Residential materials and labour costs only.
3) New building, only
4) Only for specific buildings or civil engineering works

The requirements of the Regulation are to supply input price indices for residential buildings. Those Member States that do not yet calculate input price indices for other types of constructions may conduct pilot studies in order to explore their practicality.

5. Output prices

5.1. Definition

The **Output price index** shows the evolution of actual prices paid by the client. This index takes into account not only the evolution of prices of the factors employed in the construction process but also all changes in productivity and contractor's profit margin. VAT should be excluded.

The price of land as well as architect's or engineer's fees should be also excluded.

It has to be highlighted the importance of collecting the **actual** prices paid, in the reference period, by the client to the contractor. If the prices obtained to calculate the output price index correspond in fact to those used in tenders and the variation of prices clauses (VOP) are not included, then one should call these indices 'Tender price indices'. The use of these indices as output price indices is just an approximation.
The prices shall be net of discounts.

5.2. Methods of calculating output prices

The result of the construction activity, the buildings and civil engineering structures, are complex products. As a consequence some methods for calculating the prices of these objects are based on the decomposition of their construction process into "standard operations" (see glossary in Annex V). The prices evolution of these "standard operations" is monitored across time and aggregated in order to obtain indices for different types of buildings. If the decomposition is made "a priori" we speak about the **component cost** method. The **schedule of prices** method is based on a decomposition made "a posteriori".

In this section we present and discuss some of the methods that can be used to calculate output price indices.[14)]

5.3. The component cost method

This method regards construction output as the result of a set of standardised homogeneous components (standard operations). Prices for these components are obtained by surveying contractors that have recently performed one of these services. These prices should correspond to the real transaction prices paid by the client to the contractor. They incorporate productivity gains and changes in profit margins.

14) Detailed information on the methods used in the different European countries was presented at the seminar organised by Eurostat on 21 and 22 February 1996 Eurostat publication "Methodological aspects of construction price indices" is a compilation of papers presented at the seminar.

The standardised components should be selected on the basis of:

- Probability sampling of existing types of buildings stratified by the proportion of total cost for the group of housing/construction.

Or, when the input information is inadequate,

- by subjective assessment. Great care should be taken to ensure that frequently occurring types of buildings and other suitable constructions are included.

A price index is first calculated for each standard component. The various indices are then aggregated to calculate the output price index for the hypothetical building initially defined.

The advantage of basing the price index calculations on standard components is that with the help of a relatively limited number of these components, we are able to produce indices of the different categories of building work found in each sector. Most of these standard components are common to most of the building sector categories. Those standard components specific to certain categories in the building industry should be taken into account when calculating these indices. By using the components cost method, we can ignore the enormous range of constructions and concentrate on fewer types of construction work.

5.4. Schedule of prices method

This method is based on the selection of a representative sample of real projects that are taking place or that have been completed during the reference period. These projects are then decomposed into standard components and evaluated by quantity surveyors in order to determine the price of these components in the base year.

The theoretical price of the project in the base year is calculated by aggregating the theoretical prices of all the components. The output price index is calculated as the ratio of the real present price to the theoretical calculated price in the base year.
This method is very costly, not only for the National Offices that compile the indices but also for the respondents. A lot of time is necessary to analyse the projects sampled and to evaluate the prices at the base year.

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5.5. Regression method (Hedonic method)

This method[15] is based on the assumption that the market prices for the projects in the sector or sub-sector, are **strongly correlated** with the **quality characteristics** of construction. It is further assumed that the market prices reflect the consumers' or the producers' valuation of the quality characteristics of the building, or construction. This assumption hold, at least approximately.

In this context, the regression gives us the valuations of the buildings' or constructions' quantity and quality characteristics required for calculating the indices. The index is then used on the same statistical material it was calculated from.

We then assume that the price of a construction can be expressed as a simple function of different characteristics of the house or building. For example the size of the dwelling, the number of extra bath-

15) This method has been developed by the Swedish Statistical Office. Detailed literature can be obtained there. A similar method, based on building permits data, is used also in the Netherlands.

rooms, the depth of the basements or the region where the dwelling is located. These variables may vary from country to country. The multiple regression expression for the time point t can be formulated as follows:

$$Y_t = a_t + b_{1t}x_{1t} + b_{2t}x_{2t} + \ldots\ldots\ldots + b_{nt}x_{nt} + u_t$$

or

$$Y_t = a_t + \sum_{i=1}^{n} b_{it}x_{it} + u_t$$

where

Y_t = the building price at point t

x_{it} = the quality characteristic ($i = 1\ldots\ldots n$) at point t

b_{it} = regression coefficient ('price') for the corresponding quality characteristic at point t

a_t = fixed amount irrespective of the value of quality characteristics x_{it}

u_t = disturbance term

The dependence of building prices on quality characteristics is treated as a linear relationship. This assumption is based on the understanding that there exists some kind of uniformity in the pattern of consumer valuation.

The building prices in the regression calculations are expressed in terms of price per sq. m of primary utility floor space (dependent variable).

If the values of the regression parameters a and b are calculated for both time 0 and time t, both the Laspeyres (L) and Paasche (P) price indices can be constructed:

$$I_{0t}^{L} = \frac{a_t + \sum_{i=1}^{n} b_{it} * \bar{x}_{i0}}{a_0 + \sum_{i=1}^{n} b_{i0} * \bar{x}_{i0}} \quad \text{and} \quad I_{0t}^{P} = \frac{a_t + \sum_{i=1}^{n} b_{it} * \bar{x}_{it}}{a_0 + \sum_{i=1}^{n} b_{i0} * \bar{x}_{it}}$$

Dealing with shift effects

Using this method, the shifts in the construction output from one year to another, for example from one area where prices are reasonable to another where they are high, will not affect the indices. Shifts of this type require special treatment which means that the previous index expression must be somewhat modified. Whether or not we should let shifts affect the indices, must be seen from the user's point of view, i.e. how the consumer perceives such shifts, and how they affect the resource allocation of the producer.

The quality classes (Z) are expressed in the regression in the form of dummy variables (0-1 variables), where 1 denotes class adherence and 0 otherwise. The regression coefficient can be interpreted as the price difference between the classes, which could refer to type of house, geographical position, etc.

The quality elements, primarily various fittings, are assigned prices and aggregated to quantitative variables. The regional coefficient for this variable expresses the market's valuation of the sum of the quality characteristics. The regression coefficient can be greater or lesser than 1, which means that the market values the quality characteristics above or below their production costs.
The quality elements can, as with the property tax assessment value, be expressed in the form of a scoring system. In the main, the scoring system is consistent with the relative prices or production costs of the quality elements used.

Building indices are calculated according to Paasche's formula, as a chain index with annual links. It is easier to calculate than a Laspeyres index because the regression coefficients need to be estimated for the base period only. For quarterly calculations, we do not have access to estimates of the a and b regression coefficients, because the available statistical material is insufficient to support such calculations.

The index calculations can, for example, be based on the formula:

$$I_{0t}^{P} = \frac{a_t + \sum_{i=1}^{n} b_{it} * \bar{x}_{i0} + \sum_{i=1}^{n} c_{it} * \bar{z}_{i0}}{a_0 + \sum_{i=1}^{n} b_{i0} * \bar{x}_{i0} + \sum_{i=1}^{n} c_{i0} * \bar{z}_{i0}}$$

An important condition when recalculating a value in constant prices (deflate) is that the following holds:

value index = price index * volume index

This condition is not met in the previous case, as the weighted and unweighted mean values are different. The mean values for the quantitative variables x_i that occur in the regression cannot be applied directly in the indices, as these are based on the building price per square meter. A standardisation like this means that all observations are given the same weight, irrespective of whether they represent large or small objects. One way of addressing the problem is to adjust the regression using constants, i.e. ensuring that the condition stated above is met. Geometrically, this is a parallel shifting of the regression so that the weighted average values are included.

$$I_{0t}^{P} = \frac{k_t + a_t + \sum_{i=1}^{n} b_{it} * \bar{x}_{it} + \sum_{i=1}^{n} c_{it} * \bar{z}_{it}}{k_0 + a_0 + \sum_{i=1}^{n} b_{i0} * \bar{x}_{it} + \sum_{i=1}^{n} c_{i0} * \bar{z}_{it}}$$

where

$$k_t = \bar{Y}_t - a_t - \sum_{i=1}^{n} b_{it} * \bar{x}_{it} - \sum_{i=1}^{n} c_{it} * \bar{z}_{it}$$

$$k_0 = \bar{Y}_0 - a_0 - \sum_{i=1}^{n} b_{i0} * \bar{x}_{i0} - \sum_{i=1}^{n} c_{i0} * \bar{z}_{i0}$$

In these expressions, $\bar{x}_{it}$, $\bar{x}_{i0}$, $\bar{Y}_0$ and $\bar{Y}_t$ indicate weighted mean values.

$$I_{0t}^{P} = \frac{\bar{Y}_t}{\bar{Y}_0 + \sum_{i=1}^{n} b_{i0} * (\bar{x}_{it} - \bar{x}_{i0}) + \sum_{i=1}^{n} c_{i0} * (\bar{z}_{it} - \bar{z}_{i0})}$$

5.6. The quoted prices method

This method is based on the selection of a representative sample of construction models. The prices of these models are followed across time.

The detailed descriptions of the models are sent to different contractors. These contractors are asked to provide prices for the detailed components of these models as if they were tendering for real work. The prices of each component are then aggregated to obtain an overall price.

5.7. The factor price method

An input price index, or actually, a production factor price index measures the price development of production factors, i.e. labour, material and capital. The use of this type of index instead of an output price index would lead to bias, as the index neglects the effect that changes in productivity in the building and construction business has on price development.

Assuming productivity being positive this leads to an over estimation of the factor price index.

If we could make independent calculations of the development in productivity and even the development of the margins in the construction sector, it would be possible to estimate a construction price index using an input price index and adjust for the developments in productivity and margins.

In practice, however, it turns out that to measure developments in productivity and

margins we must have knowledge about changes in building costs and prices (all other things being equal). This leads to a circular argument. Alternatives are, however, conceivable. (See Appendix at the end of this chapter.)

5.8. Discussion of the possible methods

The **schedule of prices** method appears to be the most expensive one. It is based in the analysis of a set of real projects. It implies a lot of work to be done by the respondents and also by the Institution responsible for the compilation of the indices in order to evaluate the actual prices of each project.

The **hedonic method** is much cheaper. In the Netherlands an interesting comparison has been made of the 'hedonic' and 'schedule of prices' methods applied to new social houses. The results do not differ essentially. Nevertheless, up to now, the hedonic method has been used only to calculate price indices for residential buildings.

The **component cost** method is not very expensive and can be used to calculate price indices for different types of constructions with a low cost. It is the most widespread method in Europe.

The main objection made to the **quoted prices method** is that it is difficult to obtain actual market prices paid for the client to the contractor. This is due to the fact that it is difficult for enterprises to take the process seriously and give real prices for projects that are not to be executed.

The following table gives an overview of the methods used in the European countries. Further details can be checked in the methodological data base MONA LISA.

Method	Country	Coverage
Component cost	D	New resid. build New non-resid. New civil engin.
	GR	New resid. build.
	F*	Repair & maint. of resid. build.
	L	New buildings
	NL	Road construction
	A	Building civil engineering
Schedule of prices	F	New resid. build.
	UK	Building Civil engineering
Hedonic	NL	New resid. build.
	N	Detached houses
	FIN	New resid. build.
	S	New resid. build.

* Project under study

5.9. Level of detail and pilot studies

Most of the Member States that collect output price indices cover new residential buildings. Other types of construction works (non-residential buildings, civil engineering works) are only covered by a small number of Member States. Only few countries calculate or try to calculate output price indices for repair and maintenance work.

Current Publication of Output Price Data

	All Constr.	All Build.	Resid. Build.	Non-Resid Build.	Civil Eng
B					
DK					
D			✓	✓	✓
Gr			✓		
E					
F			✓		
IRL					
I					

	All Constr.	All Build.	Resid. Build.	Non-Resid Build.	Civil Eng
NL			✓		✓
N			✓1)		
A	✓	✓			✓
FIN			✓		
S			✓		
UK	✓		✓		✓

Notes 1) Detached single dwelling houses only

Module B of the Regulation requires the provision of data for new residential buildings.

Different evolution of prices for new work and repair and maintenance can be expected due to different reasons:

- the sector of "repair and maintenance work" is a sector in expansion
- the competition conditions between the enterprises working in the "repair and maintenance sector" may be different than those present in the "new work" sector

Pilot studies may be appropriate to establish the practicalities of National Offices producing output price indices for other types of construction than residential buildings.

5.10. Transition periods

The Regulation envisages a three year transition period following consultation with the Statistical Programme Committee after which transmission of price index series to Eurostat will be mandatory.

6. Recommendations

6.1. Output prices

Given the wide range of construction output by type of structure, to reach a weighted overall construction price index National Offices will have to produce sectoral price indices. It is recommended that sectoral indices be developed along the following lines:

- low-rise traditional houses
- multi-dwelling residential buildings
- non-residential buildings
- civil engineering work

Final account documents must be collected to provide representative coverage of structure types within each sector or a series of models devised to provide good representation of types within each sector.

The **component cost method** can be easily applied to different types of constructions. The **hedonic method** is apparently the second best. The **schedule of prices method** is the most expensive one.

The prices collected shall be real market prices (prices paid by the client to the contractor).

6.2. Input prices

Input price indices (which several National offices already publish) are requested in module B of the Regulation. The comparison of input with output price indices provides insight into the profitability and, hence, into the longer term viability of the construction industry. In making such an analysis, however, it is necessary to compare like with like. Thus to be used for this purpose input price indices must be developed for building

types corresponding to the types upon which output price indices are based, and similarly for the civil engineering sector.

It is obvious, of course, that where output prices indices are calculated from input price indices by adding a factor to allow for profits and overheads then their comparison with the original cost indices to drive assessments of profits can not be done. The argument becomes circular and, in any event, assessment of the level of profit and overheads has already been made. Hence our earlier recommendation that output prices indices should best be based on real market prices.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination?
These topics and several more are treated in part A. above.

Appendix: Productivity

In this part we present an attempt to estimate changes in productivity.

Operationally, productivity can be described as the ratio between the result (output) and the resources used (input). The change in output, the numerator, could refer to sales, production, or added value, gross or net. Correspondingly, the resources used refer to the total consumption of building material, labour and capital.

The productivity concept used is thereby specified as follows: the numerator should include the total production volume, and the denominator should include total resources.

The following method is used.

$$P_{ij}^0 * Q_{ij}^0 = M_{ij}^0 * m_{ij}^0 + L_{ij}^0 * l_{ij}^0 + K_{ij}^0 * k_{ij}^0 * r_{ij}^0$$

P_{ij} = the price of stage i in project j

Q_{ij} = the amount of stage i in project j

M_{ij} = material consumed for stage i in project j

m_{ij} = prices of material consumed for stage i in project j

L_{ij} = man hours for stage i in project l

l_{ij} = wages etc. per hour for the labour required for stage i in project j

$K_{ij}k_{ij}$ = the amount of capital (machinery, etc.) at replacement price for stage i in project j

r_{ij} = gross earnings factor including depreciation and interest for stage i in project j.

Thus, the price depends on the effectiveness of the different resources

$$P_{ij}^0 = (M_{ij}^0 / Q_{ij}^0) * m_{ij}^0 + (L_{ij}^0 / Q_{ij}^0) * l_{ij}^0 + (K_{ij}^0 * k_{ij}^0 / Q_{ij}^0) * r_{ij}^0$$

$$\text{Productivity} = \frac{\sum\sum\left(P_{ij}^0 * Q_{ij}\right)}{\sum\sum\left(P_{ij}^0 * Q_{ij}^0\right)} \Bigg/ \frac{\sum\sum\left(M_{ij}^{'} * m_{ij}^0 + L^{'}_{ij} * l_{ij}^0 + K_{ij}^{'} * k^{'}_{ij} * r_{ij}^0\right)}{\sum\sum\left(M_{ij}^0 * m_{ij}^0 + L_{ij}^0 * l_{ij}^0 + K_{ij}^0 * k_{ij}^0 * r_{ij}^0\right)}$$

which reduces to

$$\text{Productivity} = \frac{\sum\sum\left(P_{ij}^0 * Q_{ij}^{'}\right)}{\sum\sum\left(M_{ij}^{'} * m_{ij}^0 + L_{ij}^{'} * l_{ij}^0 + K_{ij}^{'} * k_{ij}^{'} * r_{ij}^0\right)}$$

The same result is obtained by replacing changes in volume with changes in price of the output and resources.

$$\text{Productivity} = \frac{\frac{\sum\sum\left(M_{ij}^{'} * m_{ij}^{'} + L_{ij}^{'} * l_{ij}^{'} + K_{ij}^{'} * k_{ij}^{'} * r_{ij}^{'}\right)}{\sum\sum\left(M_{ij}^{'} * m_{ij}^{0} + L_{ij}^{'} * l_{ij}^{0} + K_{ij}^{'} * k_{ij}^{'} * r_{ij}^{0}\right)}}{\frac{\sum\sum\left(P_{ij}^{'} * Q_{ij}^{'}\right)}{\sum\sum\left(P_{ij}^{0} * Q_{ij}^{'}\right)}}$$

which reduces to

$$\text{Productivity} = \frac{\sum\sum\left(P_{ij}^{0} * Q_{ij}^{'}\right)}{\sum\sum\left(M_{ij}^{'} * m_{ij}^{0} + L_{ij}^{'} * l_{ij}^{0} + K_{ij}^{'} * k_{ij}^{'} * r_{ij}^{0}\right)}$$

Calculating the productivity using Laspeyre's volume indices gives the same result as Paasche's price indices.
Even if these are theoretically similar, we must choose between different estimates of the price, wage, capital cost and material price developments. The goal is that the estimates be constructed so that the similarity between the volume and the price index methods is as great as possible.

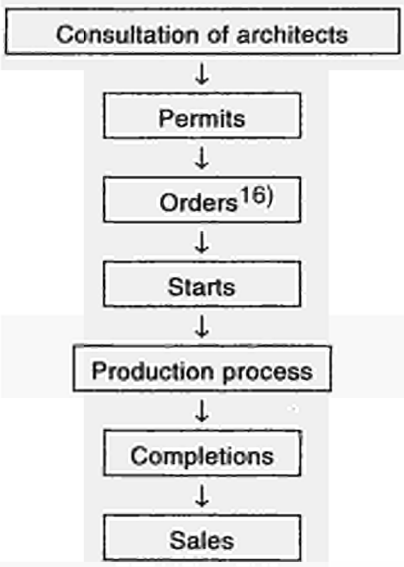
One of the characteristics which the price index method offers is that it is more robust than the volume index method, because it is insensitive to inconsistencies between the numerator and the denominator.

V. Leading Indicators

1. Introduction

Building permits and building starts are two variables specific for the domain of construction, they do not exist in other sectors of the economy. Information on these variables provides an indication of the upcoming workload available to the building industry. That is why they are considered, together with the variable "new orders received", as "leading indicators". The three sets of information need a thorough discussion.

In the building process one can consider the following sequence of events:



The point should be made here that this sequence of events, starting with authorisation procedures, rules primarily in the **building** sector. The great bulk of building work is carried out on behalf of private, non-governmental clients. Hence the need for authorisation procedures to ensure social control over the location, size and nature of buildings.

The situation is different in the civil engineering sector. Here most work (indeed, practically all work apart from comparatively minor road and open car park construction in connection with building projects) is carried out on behalf of public and government bodies. Thus in the civil engineering sector the building permit is replaced by the governmental decision. Nonetheless orders have to be placed before civil engineering work commences just as in the building sector.

This point is, no doubt, self-evident. We make it in order to clarify that when, below, we deal with building permits and building starts we mean **building** permits and starts. When we deal with orders, however, we have to include orders for civil engineering.

16) Except in the case of own use and speculative buildings where no orders are placed.

2. The needs of the users

Just as the construction market as a whole divides into the markets for building and for civil engineering work so the building market, in turn, divides into the sector generated by public clients and that generated by private customers. It would surely be helpful to Union and national policy makers to be aware of the balance of these two sectors in the industry's up-coming workload particularly at low and high points in the business cycle.

Secondly, just as policy makers have an interest in knowing the balance of the industry's order book between public and private sectors so decision makers within the industry and within its supplying industries have a clear interest in knowing the balance between different types of buildings.

Throughout the Union, low-rise housing continues largely to be built using local materials according to local designs and traditions. On the other hand large buildings - office blocks, factories, multi-occupation residential buildings - are generally built to 'modern' designs using 'modern' building methods and materials. This is a matter of common observation and it has important implications both for the building industry and the material and component supplying industries.

The development of 'modern' buildings and building techniques have had a profound effect on the building industry. Specialist building enterprises have emerged, concentrating their activities on particular types of buildings. Specialist sub-trades such as concrete and steel frame erectors, suspended ceiling fixers and heating and ventilating engineers have been created by the demands of the market and have grown in importance.

Similarly within the supplying industries, companies have emerged manufacturing highly specific building components - curtain walling systems, highly manufactured cladding systems, ceiling tiles and suspended ceiling systems.

All these enterprises need sector-specific statistics and so do many main building contractors. It is true that some large construction enterprises operate in all sectors of the construction market including civil engineering but at the operating level they do so through specialist Divisions and subsidiaries working in specific market sectors and these, and hence their holding enterprises, have an interest in sector specific workload prospects. It is also true that within the material supplying industries, there are enterprises providing basic materials, such as cement, stone, aggregates, bricks and timber, which are used in all, or many sectors and which have an interest in the short-term prospects of construction as a whole. Nonetheless, the producers of more highly manufactured, sector-specific products are now of such importance that their legitimate interest in sector-specific workload prospects cannot, or should not be ignored.

3. Permits versus starts versus Orders

3.1. Building permits

By building permit is meant the authorisation granted to a principal, at his demand, to start work on a building project.

Such series will provide an indication of the up-coming workload available to the building industry. However, it is questionable whether building authorizations are necessarily acted upon. National traditions and practices vary but it is certainly not the case that all building permits necessarily result in buildings being erected.

Secondly there are the factors of the time lag between the granting of a building permit and the start of building work, and of the variability of this time lag from project to project, and of the variability of the average time lag (whatever that might be) at different points in the industry's business cycle. Clearly any average time lag will tend to be longer when the industry is overloaded and shorter when its workload is low.

3.2. Building Starts

A building project is considered to have started when the site preparation or laying of foundations have been commenced.

Not all building permits are acted upon. Some lapse or expire before work is commenced. Thus series based on building starts are a more accurate reflection of what is happening in the real world than series based on building permits. However we must face practicality here. Building permits data should be readily available to National offices whereas data on building starts will require separate enquiry procedures in many States. Furthermore the shortfall between permits and starts may not be significant in many States. Pilot studies to evaluate this shortfall may be appropriate but in Germany, for instance, it is estimated that some 98% of building permits are acted upon

3.3. Orders received

By orders received is meant the total value of contracts accepted during the period of reference as well as that of speculative buildings and other work started during the same period, whether these buildings and other works are destined to purposes of the reporting enterprise itself or whether they are intended to be subsequently sold or leased to third parties.

3.4. Present data availability

The following table shows the leading indicators available in the different European countries:

	Permits	Starts	Orders
B	✓		✓
DK	✓		
D	✓		✓
GR	✓		
E	✓	✓	✓
F	✓	✓	
IRL	✓		
I	✓		
L	✓		
NL	✓		
N	✓		✓
A	✓*		✓
P	✓		
FIN	✓	✓	
S	✓	✓	
UK		✓	✓
CH	✓		

* Only annual

3.5. Comparison

Although statistical series of building permits may give an indication of the industry's short-term future workload, it is open to question whether or not they provide a good

indicator. What is not open to question is that they provide a less useful indicator to decision makers in the material and component supplying industries of the up-coming demands for their products than series of data relating to building orders.

Series based on building starts are a more accurate reflection of what is happening in the real world than series based on building permits. Given their greater accuracy as indicators of building activity, we recommend that those National Offices not as yet producing starts related series should consider doing so. However, for the practical purposes of statistical harmonisation (See 3.4 above) it is preferable that all National Offices provide building permit series.

Again one can argue that starts data is more realistic as orders, in their turn, are subject to some proportion of cancellation. However, series based on orders cover both building and civil engineering work.

4. Building permits

4.1. Definition

Normally a building permit is defined as an authorisation, granted to a principal, to start work on a building project.

The building planning and authorisation procedures of the Member States, whilst following similar principles, vary at the detailed level but nowhere can an authorisation to start work be a requirement to start. Subject to this proviso, however, it is clear that the data required for this set of indicators is that deriving from the final stage of national planning and building authorisation procedures.

In some Member States the existing building planning and authorisation procedures include other developments than the authorisation to start work on a building project. In these cases, Member States are encouraged to provide Eurostat with the necessary estimations in order to approach as much as possible the definition proposed above.

4.2. Sources

The construction industry is unique in that its production operations are subject to and governed by control by public authorities. The collection of data on the numbers of residential and non-residential building permits should present no great difficulty to National Statistical Offices as the information is generated by other Government agencies.

However, the statistical systems of the Member States do not always foresee the obligation of Government agencies to provide the Statistical Institutes with data on building permits at the level of detail and at the frequency required by the forthcoming Regulation. It should be stressed that the use of administrative sources for data collection implies a very good relationship between the different institutions concerned.

4.3. The needs of the users

The tracking of building permits provides a relatively simple indication of the short-term future workload of the building side of the industry. To maximise the value of such series, however, it is essential that they should be further quantified to provide accurate data on the number of dwellings and on the habitable or usable floor area authorised.

Data on the **number of dwellings authorised** is valuable to Union and National policy makers for the purposes of social policy as well as for the purposes of policy directed to the building industry. It is also in itself directly useful to building enterprises specialising in house and residential building and to their material and component suppliers in that, uniquely in the building industry, the concept of the "average" house or apartment does have some meaning. However, data on the habitable floor area authorised is a far more accurate and directly useful indicator. In the non-residential sector data on the usable floor area authorised is the only truly useful indicator which can be derived from the building authorization process. Non-residential buildings vary so enormously in their nature and size that data purely on the number of permits granted, can be useful only as a very broad indicator.

It is normal commercial practice for buildings to be defined in terms of **floor area** and it is probable that in many member States, planning applications are presented, judged and authorised primarily only in floor area terms. Thus, in these States, data is most likely to be available only in floor area terms. Nonetheless, buildings have **volume** and it is the volume of a building which determines the energy input needed to maintain tolerable living and working conditions within it.

In an age when national and Union policy makers are rightly concerned about the rate of consumption of finite energy measures and the pollution created by energy generation, it is highly desirable that a data flow should be available tracking the creation of new building volume at the national and Union levels. This data can be generated most readily from national building authorization procedures. National Offices are therefore encouraged to provide building authorization data in volume terms.

4.4. Level of detail

Eurostat requires the provision of data for building permits in the following units:

Number of dwellings	• one dwelling residential buildings • two and more dwelling residential buildings
Useful floor area	• one dwelling residential buildings • two and more dwelling residential buildings
	• residencies for communities • office buildings • other buildings

C

National definitions vary. In the German statistics, the areas of all rooms or spaces with a ceiling height of at lease 2 metres are counted as habitable space (Wohnfläche). A half of the areas of spaces with ceiling heights of between 1 and 2 metres and 25% of the areas of balconies are taken into computation but spaces with ceiling heights of under 1 metre are discounted as are cellars, washrooms/laundries and attics.

Standard definitions of the data to be collected, i.e. of the terms 'dwelling' and 'useful floor area' etc., are explained in the annexed glossary (See Annex V). These are the definitions to which National Statistical Offices should work. It is of course vital that all Member States use the same definitions of data.

Volume constructed

Where this data is generated directly by the building permit procedure, no difficulty arises. Where building permits are granted

initially, only in floor area terms, National Offices should convert the resultant data into volume terms. Conversion factors can be derived fairly easily by examination of typical building plans or by enquiries amongst architects. Volume assessments derived in this matter, should be quite accurate enough for practical purposes. National Offices are requested, however, to inform Eurostat whether volume data derives directly from building permits or from the application of conversion factors.

4.5. Estimations

Keeping in mind the comments made when comparing the three leading indicators (See 3.5 above) Member States facing severe difficulties to provide data on building permits are allowed to estimate it from building starts, if they are available.

Statistical Offices should inform Eurostat about the methods used to estimate the figures.

5. Orders

The value of new orders received measures most of the up-coming demand for the industry's services and its future workload in the short to medium term.

5.1. Definition of Orders and Timing of Orders

The ordering process itself takes time as tenders are sought and bids made. It is important, therefore, that National Offices harmonise their collection of order statistics and work to the same definition of what constitutes "an order". It is, therefore, strongly recommended that an **order** be defined as:

a signed contract to carry out construction work or, in the case of small builders and tradesmen who generally work more informally, a firm undertaking to carry out construction work.

Thus an order is not an invitation to tender nor a mere enquiry. [17)]

The value of orders corresponds to the definition of turnover:

- all taxes on products have to be excluded. This applies also to VAT.
- given rebates, discounts and other price reductions have to be deducted from the list prices.

The reporting units should also take account of subsequent rises of quotations, subsequent price reductions and order **cancellations** by customers. Equivalent sums must be added to respectively deduced from the value of new orders in that month in which the changes of prices or orders occur. This implies that if cancellations are very high, new orders for a given month can be negative.

Duplication which could result from the transfer of orders or parts of orders to subcontractors should be excluded. More precisely, care must be taken to ensure that the order values for firms participating in consortia are not reported twice.

Architects' and consultants' fees as well as the site value are also to be excluded.

The date of an order shall be the date of contract signing or, in the case of small operators, the date of entering into a firm undertaking to commence work.

17) This definition of "orders" is equivalent to its definition in manufacturing. See Section B.

New orders correspond to all orders received in the course of the reference period.

5.2. Building Installation and Completion Work

It is difficult to determine if small operators work really on orders as they have been defined above. Small enterprises are concentrated in the activities of building installation and completion. For this reason, the Regulation does not require the provision of data on new orders received for those enterprises which main activity is building installation and completion work (NACE Rev.1 groups 45.3 and 45.4)

Despite this dispensation, the point must be made that installation and completion work can comprise a high proportion, sometimes as much as 40% to 45%, of the total value of some complex modern buildings, e.g. hospitals and office blocks incorporating the latest electronic technology.

In the future it will therefore be necessary to strive to include the value of installation and completion work both in the order data and in the value of turnover data. National Offices not, as yet, collecting such data are urged to do so as soon as may be practicable.

In any event, for the purposes of transparency of data, it will be necessary for National Offices to inform Eurostat of the coverage of their order and turnover data as regards installation and completion work.

5.3. Speculative and "Own Use" Building

Working to such a definition of orders will provide a firm basis for the harmonisation of national series tracking the values of construction orders strictly defined, i.e. orders emanating from building clients. As such, however, they will not provide a full measure of the up-coming workload of the industry nor of the resulting markets for building materials and components because they will not take into account speculative building carried out by contractors on their own account for future renting or sale nor buildings erected by contractors for their own use. Such projects are not initiated by an order from a client but as a result of internal management decisions within contractors' organisations.

To provide a meaningful measure of short term workload, value of orders series should include the values of such speculative and own-use projects. Thus, for the purposes of harmonisation, the definition of "orders" must be extended to include speculative and own-use building started by contractors. The problems of the valuation of such projects is dealt with later.[18] At this point it will suffice to stress that, for the purpose of including their value in value of orders series, they shall be deemed to have been "ordered" on the date of commencement of work on site.

Given that the values of speculative and own-use projects should be included in value of order series to this extent such series will be "mixed". They will include the values of buildings ordered by clients and of buildings started by contractors on their own initiative. This arises from the need for National Offices to produce the most meaningful "order" data of the greatest practical value to statistics users. However, outside the context of speculative/own-use building where National Offices have no recourse other than to take the ordering of buildings as being coincident with the start of works, it must be stressed that generally speaking in normal building operations there are time

18) See chapter I.12 "Working Rules", above.

lags between the closing of orders and the commencement of work.

5.4. Transitional Provision of Building Starts Data

National Offices providing order series will do so in value terms at current and constant prices.

For five years, starting from the beginning of the first reference period of the Regulation the information on new orders may be approximated by an alternative leading indicator which may be calculated from opinion business survey data.

5.5. Type of index

Index of orders should not only be provided in value terms, but also be presented in **constant price** terms which will entail National Offices applying price deflators, derived from the trend of contract prices, to order data collected initially in current price terms. However, as a means of assessing the industry's short to medium term workload, latest or current reporting period data is most useful in current price terms.

Eurostat requires the provision of series tracking the values of new orders received during reporting periods, not of **stocks of orders** outstanding on the industry. Strictly speaking the latter provide a more accurate measure of the industry's up-coming workload, subject to the proviso that orders may be cancelled. Some National Offices already provide data on order stocks.

5.6. Level of detail

The Regulation requires the provision of data on orders from enterprises classified under groups 45.1 and 45.2 of NACE Rev.1. This orders must be supplied for the following level of detail:

- building
- civil engineering
- whole construction industry

However, as the European Union grows ever more closely to a unified economy, so the market forces leading to the specialisation of both building enterprises and the manufacturers supplying them will grow more powerful. It is from the point of view of this future perspective that the usefulness and value of statistical series providing more detailed insight into the industry's order books becomes apparent. We therefore recommend that National Statistical Offices consider the possibilities of publishing order series under the headings of the classification of constructions[19], to the two digit level as regards new buildings, and civil engineering works.

It will be evident that the argument rehearsed here leads us to recommend the disaggregation of turnover series along the same lines (see later, Turnover).

5.7. Periodicity

Given that some National Offices do not as yet produce orders series it seems more practical to call for quarterly provision at least during the early stages of the harmonisation process.

5.8. Industrial Future Prospects Surveys

The production of value of orders series to meet the requirements of the Regulation

19) See Chapter II.1 "Activity or type of construction", above.

must necessarily entail the collection of appropriate quantitative information from the industry through sample surveys. It has been suggested that the reporting burden on the industry could be lightened if, instead of being required to provide specific information on the values of orders received during a reporting period, companies were to be asked their views on their likely future workload in a more **qualitative survey** of the industry's prospects. Such surveys, directed to various industries and to industry in general, are conducted in a number of countries by National Offices, trade associations and employers' organisations. However, although such surveys may provide indications of the industry's future workload they provide only **indications**. They cannot provide a measure, however imperfect, of future activity levels. In the final analysis they are surveys of **opinion** not of fact and produce political rather than statistical information. Such data is hardly compatible with value of orders series produced by National Offices pursuing quantitative enquiries through sample surveys. It is, indeed, arguable that, as companies are required to respond to questionnaire surveys in order to generate such qualitative data, their reporting burden would be comparatively only marginally increased by requiring them to produce quantitative order data given the greatly enhanced value of the resultant statistical product.

5.9. Recommendations

It is clear that orders are the most useful leading indicator of forthcoming construction activity levels. It is imperative that National Offices not as yet producing such series should seek to remedy this deficiency.

It is generally recognised that orders for RMI work are more fugitive and difficult to track, particularly in the building sector, than orders for new work. It is therefore recommended that as a first step in the harmonisation process national Offices should seek to provide orders series limited to new building and civil engineering, these being limited to the two series:

- values of orders for new building
- values of orders for new civil engineering.

with an overall index number series combining the two.

A two step approach towards this is recommended for those National Offices not as yet producing orders series, viz.:

1) The collection of order data by enquiry from samples of large enterprises,
2) Pilot studies to establish the practicalities of collecting such data from small enterprises.

However, it is for consideration whether the provision of order data to a more detailed breakdown by type of work and client might not be within the capabilities of National Offices and of greater value both to Union and national policy makers and to statistics users in the construction industry and its supplying industries generally.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination?
These topics and several more are treated in part A. above.

VI. Labour Input Indicators

1. Introduction

In order to asses the most recent developments in the business cycle, the users of construction short term statistics need also information on the labour market as one of the input factors into the economic process.

The following indicators are required by the Regulation:

- Employment (persons employed)
- Hours worked
- Wages and salaries

These three indicators have already been discussed in Section A: Industry, chapter VII "Indicators of Labour Input". The same definitions used in the manufacturing industry are applicable in the construction industry. In this section we will only comment on those aspects that are specific to the construction industry.

2 Characteristics of the variables

The importance of small enterprises and self-employed tradesmen together with the characteristics of the construction industry have already been highlighted in chapter I. "General review". In order to have a real picture of the labour input in this sector of the economy the definitions of the variables applicable in the manufacturing industry should be amended according to the following lines:

The number of persons employed should comprise also:

- those workers who are placed at the disposal of the inquiry unit by other enterprises for payment ("**hired workers**"), as well as
- the contract workers ("**self employed**") in those countries where this category of workers plays a not unimportant role (mainly in the United Kingdom and in Ireland).

As a consequence, those Member States where "hired workers" and "self employed" workers are taken into account in the employment statistics should also include in the amount of "wages and salaries" and in the "hours worked" the payments paid to them or the hours worked by them.

For the purposes of data to be presented to Eurostat only totals of all persons employed are to be provided with no distinction being made between white and blue collar workers

3. Periodicity

Number of persons employed, hours worked and gross wages and salaries have to be collected and computed at least **quarterly**. A monthly frequency is though encouraged by Eurostat. This is already realized in several Member States of the EC.

4. Level of detail

The data of labour input shall be supplied at the 2 digit level of the classification NACE Rev.1. The Regulation foresees pilot studies to study the practicality of collecting and compiling data broken down by building and civil engineering.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A. above.

VII. Turnover

1. Introduction

This indicator is *conceptually simple* and is of great value in tracking the industry through the business cycle. There are a number of practical problems to be solved if harmonisation of its measurement is to be achieved across the Member States.

Given that the industry fulfils the functions of erecting buildings and civil engineering structures and repairing, maintaining and improving them, and that these functions meet the needs of different markets, it is mandatory that the industry's output under these headings be measured separately, following the classification of constructions and activities set up in Chapter II "The classification problem", above.

As a longer term objective the desirable breakdown of turnover data would be:

- new residential building
- new non-residential building
- building transformation, maintenance and repair
- new civil engineering work
- civil engineering transformation, maintenance and repair

The desirability of turnover series to this level of disaggregation has to be stressed as a long-term ideal. Meanwhile the purpose of this Manual is to provide guidance to National Offices as to how harmonised data may be generated within the foreseeable future to provide useful turnover series, albeit at a level of disaggregation less than the ideal.

There are three methods whereby turnover data may be generated or assessed:

- direct collection of data
- the use of taxation/value added returns
- developments of building starts

2. Direct collection of data

Recent data on turnover can only be obtained by direct enquiry of the industry through sample surveys. Such surveys entail major effort on the part of National Offices and it may be argued that, as high or complete response rates are not achievable, this effort is not justified. In the longer term this argument cannot be conceded. Slow and non-response is the perennial problem of all statistics gathering. If National Offices were to plead this argument as a reason, in principle, why sample surveying should not be considered, they must inevitably accept a status as merely the processors of information gathered by other agencies and call into question their own raison d'être. National Offices have little option, therefore, but to

continue to work to contain the problem by initiating surveys, extending sample frames and continuing education of national industries.

If, in the longer term, the slow/non-response problem is to be contained within acceptable limits, (it will never be eradicated), it should be possible for National Offices to collect value of output/turnover data to the five headings suggested above through direct enquiry.

However, long-term objectives are one thing and short-term practicalities another. National Offices which are presently unable to mount industry surveys or which find the problems of slow or non-response so great as to render their results useless, must seek other ways of generating turnover data. We suggest two possible alternative routes below.

Assuming, however, that the direct collection of data through industry surveys will be a practical route for some National Offices we must deal with the practical problems of the **valuation** of construction work. This is done in chapter III.9 "Working rules", of this manual.

3. The Use of Taxation/Value Added Tax Returns

Data on companies' and undertakings' turnovers, down to the level of self-employed tradesmen registered for Value Added Tax purposes, will be recorded by national tax authorities. In principle this should provide a more or less comprehensive source of turnover data provided it can be made available to National Statistical Offices in a form which permits of the identification of construction enterprises or is limited to such enterprises.

Thus enterprises classified to NACE Rev.1 Division 45 provide a universe of organisations primarily engaged in the construction industry and the use of this universe is recommended as a basis for generating data on construction industry turnover as a whole. Such a universe will not, however, provide the basis for the further differentiation of turnover series into those distinguishing, for instance, building from civil engineering turnover unless National Offices employ some further sub-division of the NACE Class structure so as to identify building from civil engineering enterprises.

The total turnover of construction enterprises during any period should equate, within certain limits, with the value of construction output. Thus, in principle, this route should lead to a viable measurement of output that avoids double counting (works made in collaboration, consortium,....). It has some shortcomings, however, which we see as follows:

i) Assuming that it is possible for the tax authorities to identify all tax-paying or registered undertakings whose principal activities are in the construction industry and to provide their turnover data, this will be total turnover irrespective of whether it arises from construction or other activities. Thus, to some extent, it will probably overstate the industry's turnover. However, from a practical point of view, the volume of work related to secondary activities, done by undertakings classified in the construction sector is not significant.

ii) Given that it will be total turnovers that will be reported, it will not be possible to distinguish between turnovers generated in the different market sectors served by the industry.

iii) Turnover data from this source must inevitably be of an historical nature. Depending on their working methods, some national tax authorities may be able to provide data on a quarterly basis. It is more likely to be made available for a recent past calendar or financial year.

This method will provide data on recent reporting periods, and not on current reporting periods.

4. The Development of Building Starts Data

Where data on building starts is available, either the building authorization and inspection process as in Finland or by other means, it should be possible to project the likely turnover resulting from these starts. As we have noted (vs.) the Finnish method is actually a method for assessing the value of building output.

As we have seen, National Offices pursuing this method will have to develop data on building cost or value per square or cubic metre for a range of "typical" buildings and for different sizes of buildings.

Ideally the method should be based on periodical inspections and reports of building progress. If data were also to be developed of average time lags during the building process then, in theory, the periodical inspection reports on actual buildings would not be necessary. However, in practice, this would add a further dimension of possible error to the resultant output assessments.

Do you now need explanations concerning classifications, scope of survey, confidentiality, reporting units, type of survey, data collection, seasonal adjustment, quality control and data dissemination? These topics and several more are treated in part A. above.

As we have noted, this method has not, as yet, been extended in Finland to cover civil engineering output. The difficulties presented by the untypicality of civil engineering structures are clearly great. In practice the use of some form of concrete placed or used proxy appears to be the only way forward in this sector if direct measurement through industry sample surveys is precluded.

4.1. Commentary

The route through building starts and progress reports will provide reasonably accurate assessments of building sector output and hence turnover for current reporting periods. However, this method will require the establishment of quite sizeable databases of typical building prices, and possibly time lags, for a wide range of building types and sizes. Further, to date, this method has not been developed in practice to provide measurement in the civil engineering sector and, clearly, significant research into the measurement and costing of civil engineering projects will be necessary before it can be. Finally the use of this method presupposes the existence of sophisticated and reliable building authorization and inspection procedures.

D. ANNEX

ANNEX I:

Main Industrial Groupings (MIG)

1. Definition

D

The five main industrial groupings (MIG) are defined at the 4-digit level of NACE Rev.1.

For the calculations used when the 4-digit level is not available for a given variable in a Member State, see page 176 ff

Energy related activities

Code	Description
10.10	Mining and agglomeration of hard coal
10.20	Mining and agglomeration of lignite
10.30	Extraction and agglomeration of peat
11.10	Extraction of crude petroleum and natural gas
11.20	Service activities incidental to oil and gas extraction excluding surveying
12.00	Mining of uranium and thorium ores
23.10	Manufacture of coke oven products
23.20	Manufacture of refined petroleum products
23.30	Processing of nuclear fuel
40.10	Production and distribution of electricity
40.20	Manufacture of gas; distribution of gaseous fuels through mains
40.30	Steam and hot water supply

Intermediate goods industries (except energy)

Code	Description
13.10	Mining of iron ores
13.20	Mining of non-ferrous metal ores, except uranium and thorium ores
14.11	Quarrying of stone for construction
14.12	Quarrying of limestone, gypsum and chalk
14.13	Quarrying of slate
14.21	Operation of gravel and sand pits
14.22	Mining of clays and kaolin
14.30	Mining of chemical and fertilizer minerals
14.40	Production of salt
14.50	Other mining and quarrying n.e.c.
15.41	Manufacture of crude oils and fats
15.61	Manufacture of grain mill products
15.62	Manufacture of starches and starch products
15.71	Manufacture of prepared feeds for farm animals
15.92	Production of ethyl alcohol from fermented materials
15.97	Manufacture of malt
17.11	Preparation and spinning of cotton-type fibres
17.12	Preparation and spinning of woollen-type fibres
17.13	Preparation and spinning of worsted-type fibres
17.14	Preparation and spinning of flax-type fibres
17.15	Throwing and preparation of silk
17.16	Manufacture of sewing threads
17.17	Preparation and spinning of other textile fibres
17.21	Cotton-type weaving
17.22	Woollen-type weaving
17.23	Worsted-type weaving
17.24	Silk-type weaving
17.25	Other textile weaving
17.30	Finishing of textiles
17.52	Manufacture of cordage, rope, twine and netting
20.10	Sawmilling and planing of wood, impregnation of wood
20.20	Manufacture of veneer sheets; manufacture of plywood, laminboard, etc.
20.30	Manufacture of builders' carpentry and joinery
20.40	Manufacture of wooden containers
20.51	Manufacture of other products of wood
20.52	Manufacture of articles of cork, straw and plaiting materials
21.11	Manufacture of pulp
21.12	Manufacture of paper and paperboard
21.21	Manufacture of corrugated paper, paperboard and of containers of paper
21.23	Manufacture of paper stationery
21.24	Manufacture of wallpaper
21.25	Manufacture of other articles of paper and paperboard n.e.c.
22.24	Composition and plate-making
22.25	Other activities related to printing
22.33	Reproduction of computer media

Code	Description
24.11	Manufacture of industrial gases
24.12	Manufacture of dyes and pigments
24.13	Manufacture of other inorganic basic chemicals
24.14	Manufacture of other organic basic chemicals
24.15	Manufacture of fertilizers and nitrogen compounds
24.16	Manufacture of plastics in primary forms
24.17	Manufacture of synthetic rubber in primary forms
24.20	Manufacture of pesticides and other agro-chemical products
24.30	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
24.41	Manufacture of basic pharmaceutical products
24.61	Manufacture of explosives
24.62	Manufacture of glues and gelatines
24.63	Manufacture of essential oils
24.64	Manufacture of photographic chemical material
24.66	Manufacture of other chemical products n.e.c.
24.70	Manufacture of man-made fibres
25.11	Manufacture of rubber tyres and tubes
25.12	Retreading and rebuilding of rubber tyres
25.13	Manufacture of other rubber products
25.21	Manufacture of plastic plates, sheets, tubes and profiles
25.22	Manufacture of plastic packing goods
25.23	Manufacture of builders' ware of plastic
25.24	Manufacture of other plastic products
26.11	Manufacture of flat glass
26.12	Shaping and processing of flat glass
26.13	Manufacture of hollow glass
26.14	Manufacture of glass fibres
26.15	Manufacture and processing of other glass including technical glassware
26.22	Manufacture of ceramic sanitary fixtures
26.23	Manufacture of ceramic insulators and insulating fittings
26.24	Manufacture of other technical ceramic products
26.25	Manufacture of other ceramic products
26.26	Manufacture of refractory ceramic products
26.30	Manufacture of ceramic tiles and flags
26.40	Manufacture of bricks, tiles and construction products, in baked clay
26.51	Manufacture of cement
26.52	Manufacture of lime
26.53	Manufacture of plaster
26.61	Manufacture of concrete products for construction purposes
26.62	Manufacture of plaster products for construction purposes
26.63	Manufacture of ready-mixed concrete
26.64	Manufacture of mortars
26.65	Manufacture of fibre cement
26.66	Manufacture of other articles of concrete, plaster and cement
26.70	Cutting, shaping and finishing of stone
26.81	Production of abrasive products
26.82	Manufacture of other non-metallic mineral products n.e.c.

Code	Description
27.10	Manufacture of basic iron and steel and of ferro-alloys (ECSC)
27.21	Manufacture of cast iron tubes
27.22	Manufacture of steel tubes
27.31	Cold drawing
27.32	Cold rolling of narrow strips
27.33	Cold forming or folding
27.34	Wire drawing
27.35	Other first processing of iron and steel n.e.c.; production of non-ECSC* ferro-alloys
27.41	Precious metals production
27.42	Aluminium production
27.43	Lead, zinc and tin production
27.44	Copper production
27.45	Other non-ferrous metal production
27.51	Casting of iron
27.52	Casting of steel
27.53	Casting of light metals
27.54	Casting of other non-ferrous metals
28.40	Forging, pressing, stamping and roll forming of metal; powder metallurgy
28.51	Treatment and coating of metals
28.52	General mechanical engineering
28.63	Manufacture of locks and hinges
28.72	Manufacture of light metal packaging
28.73	Manufacture of wire products
28.74	Manufacture of fasteners, screw machine products, chain and springs
28.75	Manufacture of other fabricated metal products, n.e.c.
31.20	Manufacture of electricity distribution and control apparatus
31.30	Manufacture of insulated wire and cable
31.40	Manufacture of accumulators, primary cells and primary batteries
31.50	Manufacture of lighting equipment and electric lamps
31.61	Manufacture of electrical equipment for engines and vehicles n.e.c.
31.62	Manufacture of other electrical equipment n.e.c.
32.10	Manufacture of electronic valves and tubes and other electronic components
34.30	Manufacture of parts and accessories for motor vehicles and their engines
37.10	Recycling of metal waste and scrap
37.20	Recycling of non-metal waste and scrap

Capital goods industry

Code	Description
28.11	Manufacture of metal structures and parts of structures
28.12	Manufacture of builders' carpentry and joinery of metal
28.21	Manufacture of tanks, reservoirs and containers of metal
28.22	Manufacture of central heating radiators and boilers
28.30	Manufacture of steam generators, except central heating hot water boilers
28.62	Manufacture of tools

Code	Description
28.71	Manufacture of steel drums and similar containers
29.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
29.12	Manufacture of pumps and compressors
29.13	Manufacture of taps and valves
29.14	Manufacture of bearings, gears, gearing and driving elements
29.21	Manufacture of furnaces and furnace burners
29.22	Manufacture of lifting and handling equipment
29.23	Manufacture of non-domestic cooling and ventilation equipment
29.24	Manufacture of other general purpose machinery n.e.c.
29.31	Manufacture of agricultural tractors
29.32	Manufacture of other agricultural and forestry machinery
29.40	Manufacture of machine- tools
29.51	Manufacture of machinery for metallurgy
29.52	Manufacture of machinery for mining, quarrying and construction
29.53	Manufacture of machinery for food, beverage and tobacco processing
29.54	Manufacture of machinery for textile, apparel and leather production
29.55	Manufacture of machinery for paper and paperboard production
29.56	Manufacture of other special purpose machinery n.e.c.
29.60	Manufacture of weapons and ammunition
30.01	Manufacture of office machinery
30.02	Manufacture of computers and other information processing equipment
31.10	Manufacture of electric motors, generators and transformers
32.20	Manufacture of televisions and radios
33.10	Manufacture of medical and surgical equipment and orthopaedic appliances
33.20	Manufacture of instruments for measuring, checking, testing, navigating etc.
33.30	Manufacture of industrial process control equipment
34.10	Manufacture of motor vehicles
34.20	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers
35.11	Building and repairing of ships
35.20	Manufacture of railway and tramway locomotives and rolling stock
35.30	Manufacture of aircraft and spacecraft
36.12	Manufacture of other office and shop furniture

D

Durable consumer goods industry

Code	Description
29.71	Manufacture of electric domestic appliances
29.72	Manufacture of non-electric domestic appliances
32.30	Manufacture of television and radio receivers, sound or video recording etc.
33.40	Manufacture of optical instruments and photographic equipment
33.50	Manufacture of watches and clocks
(34.1b	*Manufacture of privately used motor vehicles)*
35.12	Building and repairing of pleasure and sporting boats
35.41	Manufacture of motorcycles

Code	Description
35.42	Manufacture of bicycles
35.43	Manufacture of invalid carriages
35.50	Manufacture of other transport equipment n.e.c.
36.11	Manufacture of chairs and seats
36.13	Manufacture of other kitchen furniture
36.14	Manufacture of other furniture
36.15	Manufacture of mattresses
36.21	Striking of coins and medals
36.22	Manufacture of jewellery and related articles n.e.c.
36.30	Manufacture of musical instruments

Non-durable consumer goods industry

Code	Description
15.11	Production and preserving of meat
15.12	Production and preserving of poultry meat
15.13	Production of meat and poultry meat products
15.20	Processing and preserving of fish and fish products
15.31	Processing and preserving of potatoes
15.32	Manufacture of fruit and vegetable juice
15.33	Processing and preserving of fruit and vegetables n.e.c.
15.42	Manufacture of refined oils and fats
15.43	Manufacture of margarine and similar edible fats
15.51	Operation of dairies and cheese making
15.52	Manufacture of ice cream
15.72	Manufacture of prepared pet foods
15.81	Manufacture of bread; manufacture of fresh pastry goods and cakes
15.82	Manufacture of biscuits, manufacture of preserved pastry goods and cakes
15.83	Manufacture of sugar
15.84	Manufacture of cocoa; chocolate and sugar confectionery
15.85	Manufacture of macaroni, noodles, couscous and similar farinaceous products
15.86	Processing of tea and coffee
15.87	Manufacture of condiments and seasonings
15.88	Manufacture of homogenised food preparations and dietetic food
15.89	Manufacture of other food products n.e.c.
15.91	Manufacture of distilled potable alcoholic beverages
15.93	Manufacture of wines
15.94	Manufacture of cider and other fruit wines
15.95	Manufacture of other non-distilled fermented beverages
15.96	Manufacture of beer
15.98	Production of mineral waters and soft drinks
16.00	Manufacture of tobacco products
17.40	Manufacture of made-up textile articles, except apparel
17.51	Manufacture of carpets and rugs

Code	Description
17.53	Manufacture of nonwovens and articles made from nonwovens, except apparel
17.54	Manufacture of other textiles n.e.c.
17.60	Manufacture of knitted and crocheted fabrics
17.71	Manufacture of knitted and crocheted hosiery
17.72	Manufacture of knitted and crocheted pullovers, cardigans and similar articles
18.10	Manufacture of leather clothes
18.21	Manufacture of workwear
18.22	Manufacture of other outerwear
18.23	Manufacture of underwear
18.24	Manufacture of other wearing apparel and accessories n.e.c.
18.30	Dressing and dyeing of fur; manufacture of articles of fur
19.10	Tanning and dressing of leather
19.20	Manufacture of luggage, handbags and the like, saddlery and harness
19.30	Manufacture of footwear
21.22	Manufacture of household and sanitary goods and of toilet requisites
22.11	Publishing of books
22.12	Publishing of newspapers
22.13	Publishing of journals and periodicals
22.14	Publishing of sound recordings
22.15	Other publishing
22.21	Printing of newspapers
22.22	Printing n.e.c.
22.23	Bookbinding and finishing
22.31	Reproduction of sound recording
22.32	Reproduction of video recording
24.42	Manufacture of pharmaceutical preparations
24.51	Manufacture of soap and detergents, cleaning and polishing preparations
24.52	Manufacture of perfumes and toilet preparations
24.65	Manufacture of prepared unrecorded media
26.21	Manufacture of ceramic household and ornamental articles
28.61	Manufacture of cutlery
36.40	Manufacture of sports goods
36.50	Manufacture of games and toys
36.61	Manufacture of imitation jewellery
36.62	Manufacture of brooms and brushes
36.63	Other manufacturing n.e.c.

2. Approximations

If the 4-digit level of NACE Rev.1 is **not available**, the National Statistical Office must indicate into which of the five MIG the 3-digit (or eventually even 2-digit) information is added. In most cases this will follow the table (*suggestions*) below. In all cases Eurostat should be informed of the choices made in order to assure transparency.

Explanation of the appreviations:

AE	=	Energy related industries
AI	=	Intermediate goods industries (except energy)
B	=	Capital goods industries
CD	=	Durable consumer goods industries
CN	=	Non-durable consumer goods industries

4 digit		3 digit		2 digit	
10.10	AE	10.1	AE	10	AE
10.20	AE	10.2	AE		
10.30	AE	10.3	AE		
11.10	AE	11.1	AE	11	AE
11.20	AE	11.2	AE		
12.00	AE	12.0	AE	12	AE
13.10	AI	13.1	AI	13	AI
13.20	AI	13.2	AI		
14.11	AI	14.1	AI	14	AI
14.12	AI				
14.13	AI				
14.21	AI	14.2	AI		AI
14.22	AI				
14.30	AI	14.3	AI		
14.40	AI	14.4	AI		
14.50	AI	14.5	AI		
15.11	CN	15.1	CN	15	CN
15.12	CN				
15.13	CN				
15.20	CN	15.2	CN		
15.31	CN	15.3	CN		
15.32	CN				
15.33	CN				

4 digit		3 digit		2 digit
15.41	AI	15.4	CN	
15.42	CN			
15.43	CN			
15.51	CN	15.5	CN	
15.52	CN			
15.61	AI	15.6	AI	
15.62	AI			
15.71	AI	15.7	AI	
15.72	CN			
15.81	CN	15.8	CN	
15.82	CN			
15.83	CN			
15.84	CN			
15.85	CN			
15.86	CN			
15.87	CN			
15.88	CN			
15.89	CN			
15.91	CN	15.9	CN	
15.92	AI			
15.93	CN			
15.94	CN			
15.95	CN			

4 digit		3 digit		2 digit	
15.96	CN				
15.97	AI				
15.98	CN				
16.00	CN	16.0	CN	16	CN
17.11	AI	17.1	AI	17	AI ?
17.12	AI				
17.13	AI				
17.14	AI				
17.15	AI				
17.16	AI				
17.17	AI				
17.21	AI	17.2	AI		
17.22	AI				
17.23	AI				
17.24	AI				
17.25	AI				
17.30	AI	17.3	AI		
17.40	CN	17.4	CN		
17.51	CN	17.5	CN		
17.52	AI				
17.53	CN				
17.54	CN				
17.60	CN	17.6	CN		
17.71	CN	17.7	CN		
17.72	CN				
18.10	CN	18.1	CN	18	CN
18.21	CN	18.2	CN		
18.22	CN				
18.23	CN				
18.24	CN				
18.30	CN	18.3	CN		
19.10	CN	19.1	CN	19	CN
19.20	CN	19.2	CN		
19.30	CN	19.3	CN		
20.10	AI	20.1	AI	20	AI
20.20	AI	20.2	AI		
20.30	AI	20.3	AI		
20.40	AI	20.4	AI		
20.51	AI	20.5	AI		
20.52	AI				
21.11	AI	21.1	AI	21	AI
21.12	AI				
21.21	AI	21.2	AI		
21.22	CN				
21.23	AI				
21.24	AI				
21.25	AI				

4 digit		3 digit		2 digit	
22.11	CN	22.1	CN	22	CN
22.12	CN				
22.13	CN				
22.14	CN				
22.15	CN				
22.21	CN	22.2	CN		
22.22	CN				
22.23	CN				
22.24	AI				
22.25	AI				
22.31	CN	22.3	CN		
22.32	CN				
22.33	AI				
23.10	AE	23.1	AE	23	AE
23.20	AE	23.2	AE		
23.30	AE	23.3	AE		
24.11	AI	24.1	AI	24	AI
24.12	AI				
24.13	AI				
24.14	AI				
24.15	AI				
24.16	AI				
24.17	AI				
24.20	AI	24.2	AI		
24.30	AI	24.3	AI		
24.41	AI	24.4	AI		
24.42	CN				
24.51	CN	24.5	CN		
24.52	CN				
24.61	AI	24.6	AI		
24.62	AI				
24.63	AI				
24.64	AI				
24.65	CN				
24.66	AI				
24.70	AI	24.7	AI		
25.11	AI	25.1	AI	25	AI
25.12	AI				
25.13	AI				
25.21	AI	25.2	AI		
25.22	AI				
25.23	AI				
25.24	AI				
26.11	AI	26.1	AI	26	AI
26.12	AI				
26.13	AI				
26.14	AI				

D

4 digit		3 digit		2 digit	
26.15	AI				
26.21	CN	26.2	AI		
26.22	AI				
26.23	AI				
26.24	AI				
26.25	AI				
26.26	AI				
26.30	AI	26.3	AI		
26.40	AI	26.4	AI		
26.51	AI	26.5	AI		
26.52	AI				
26.53	AI				
26.61	AI	26.6	AI		
26.62	AI				
26.63	AI				
26.64	AI				
26.65	AI				
26.66	AI				
26.70	AI	26.7	AI		
26.81	AI	26.8	AI		
26.82	AI				
27.10	AI	27.1	AI	27	AI
27.21	AI	27.2	AI		
27.22	AI				
27.31	AI	27.3	AI		
27.32	AI				
27.33	AI				
27.34	AI				
27.35	AI				
27.41	AI	27.4	AI		
27.42	AI				
27.43	AI				
27.44	AI				
27.45	AI				
27.51	AI	27.5	AI		
27.52	AI				
27.53	AI				
27.54	AI				
28.11	B	28.1	B	28	B ?
28.12	B				
28.21	B	28.2	B		
28.22	B				
28.30	B	28.3	B		
28.40	AI	28.4	AI		
28.51	AI	28.5	AI		
28.52	AI				
28.61	CN	28.6	B ?		

4 digit		3 digit		2 digit	
28.62	B				
28.63	AI				
28.71	B	28.7	AI		
28.72	AI				
28.73	AI				
28.74	AI				
28.75	AI				
29.11	B	29.1	B	29	B
29.12	B				
29.13	B				
29.14	B				
29.21	B	29.2	B		
29.22	B				
29.23	B				
29.24	B				
29.31	B	29.3	B		
29.32	B				
29.40	B	29.4	B		
29.51	B	29.5	B		
29.52	B				
29.53	B				
29.54	B				
29.55	B				
29.56	B				
29.60	B	29.6	B		
29.71	CD	29.7	CD		
29.72	CD				
30.01	B	30.0	B	30	B
30.02	B				
31.10	B	31.1	B	31	AI
31.20	AI	31.2	AI		
31.30	AI	31.3	AI		
31.40	AI	31.4	AI		
31.50	AI	31.5	AI		
31.61	AI	31.6	AI		
31.62	AI				
32.10	AI	32.1	AI	32	CD ?
32.20	B	32.2	B		
32.30	CD	32.3	CD		
33.10	B	33.1	B	33	B ?
33.20	B	33.2	B		
33.30	B	33.3	B		
33.40	CD	33.4	CD		
33.50	CD	33.5	CD		
34.1	B	34.1	B	34	B
34.20	B	34.2	B		
34.30	AI	34.3	AI		

4 digit		3 digit		2 digit	
35.11	B	35.1	B	35	B
35.12	CD				
35.20	B	35.2	B		
35.30	B	35.3	B		
35.41	CD	35.4	CD		
35.42	CD				
35.43	CD				
35.50	CD	35.5	CD		
36.11	CD	36.1	CD	36	CD
36.12	B				
36.13	CD				
36.14	CD				
36.15	CD				
36.21	CD	36.2	CD		
36.22	CD				
36.30	CD	36.3	CD		
36.40	CN	36.4	CN		
36.50	CN	36.5	CN		
36.61	CN	36.6	CN		
36.62	CN				
36.63	CN				
37.10	AI	37.1	AI	37	AI
37.20	AI	37.2			
40.10	AE	40.1	AE	40	AE
40.20	AE	40.2			
40.30	AE	40.3			
41.00		41.0		41	

ANNEX II

Recommendations for the choice of basic information

concerning the production index

D

The following table shows which kind of basic information is applicable to calculate branch specific production indices of good quality. In some cases more than one possibilities may supply a good base and the statistical offices have to decide then which kind of information can be collected most easily from the units.

In certain activities having a very heterogenous structure it may be reasonable to observe more than one basic information e.g. deflated product values and the physical output quantities or turnover and hours worked (hw).

The table shows in principle the recommended basic information at the 4-digit level of NACE Rev.1. If in a given NACE division or group (2- or 3-digit level) all activities (classes) should be treated the same way, only the aggregated level is indicated (in bold italic).

Activity	Description	Input	Physical Output	Deflated Products	Turn-over
10.10	Mining, aggl. of hard coal		✓		
10.20	Mining, aggl. of lignite		✓		
10.30	Extraction, aggl. of peat		✓		
11.11	Extraction of crude petroleum & nat. gas		✓		
11.20	Service incidental to oil, gas	hw			
12.00	Mining of uranium, thorium ores		✓		
13.10	Mining of iron ores		✓		
13.20	Mining of non-ferrous metal ores		✓		
14.11	Quarrying of stone for construction		✓		
14.12	Quarrying of limestone, gypsum, chalk		✓		
14.13	Quarrying of slate		✓		

Activity	Description	Input	Physical Output	Deflated Products	Turn-over
14.21	Operation of gravel and sand pits		✓		
14.22	Mining of clays, kaolin		✓		
14.30	Mining of chemical, fertilizer minerals		✓		
14.40	Production of salt		✓		
14.50	Other mining, quarrying n.e.c.		✓		
15	***Manufacture of food products and beverages***		✓		
16.00	Tobacco products		✓		
17.11	Prep., spinning of cotton-type fibres		✓	✓	
17.12	Prep., spinning of woollen-type fibres		✓	✓	
17.13	Prep., spinning of worsted-type fibres		✓	✓	
17.14	Prep., spinning of flax-type fibres		✓	✓	
17.15	Throwing, preparation of silk		✓	✓	
17.16	Sewing threads		✓	✓	
17.17	Other preparation of textile fibres		✓	✓	
17.21	Cotton-type weaving		✓	✓	
17.22	Woollen-type weaving		✓	✓	
17.23	Worsted-type weaving		✓	✓	
17.24	Silk-type weaving		✓	✓	
17.25	Other textile weaving		✓	✓	
17.30	Finishing of textiles			✓	✓
17.40	Made-up textile articles		✓	✓	
17.51	Carpets, rugs		✓	✓	
17.52	Cordage, rope, twine, netting		✓	✓	
17.53	Nonwovens, articles of nonwovens		✓	✓	
17.54	Other textiles, n.e.c.		✓	✓	
17.60	Knitted, crocheted fabrics		✓	✓	
17.71	Knitted, crocheted hosiery		✓	✓	
17.72	Knitted, crocheted pullovers, cardigans etc		✓	✓	
17.75	Other knitted, crocheted articles		✓	✓	
18	***Manufacture of wearing apparel; dressing and dyeing of fur***		✓	✓	
19.10	Tanning, dressing of leather		✓	✓	
19.20	Luggage, handbags, saddlery, harness		✓	✓	
19.30	Footwear		✓	✓	
20.10	Sawmilling, impregnation of wood		✓	✓	
20.20	Veneer sheets, plywood etc.		✓	✓	
20.30	Builders' carpentry, joinery		✓	✓	
20.40	Wooden containers		✓	✓	
20.51	Other products of wood		✓	✓	
20.52	Articles of cork, straw, plaiting		✓	✓	

Activity	Description	Input	Physical Output	Deflated Products	Turn-over
21.11	Pulp		✓		
21.12	Paper, paperboard		✓		
21.21	Corrugated paper, paperboard		✓	✓	
21.22	Household, sanitary goods		✓	✓	
21.23	Paper stationery		✓	✓	
21.24	Wallpaper		✓	✓	
21.25	Other articles of paper		✓	✓	
22.1	***Publishing***				✓
22.21	Printing of newspapers	✓	✓		✓
22.22	Printing n.e.c.	✓	✓		✓
22.23	Bookbinding and finishing		✓		✓
22.24	Reproduction and composing		✓		✓
22.25	Other activities related to printing		✓		✓
22.31	Reproduction of sound recording		✓		✓
22.32	Reproduction of video recording		✓		✓
22.33	Reproduction of computer media		✓		✓
23.10	Coke oven products		✓		
23.20	Refined petroleum products		✓		
23.30	Processing of nuclear fuel		✓		
24.1	***Manufacture of basic chemicals***		✓		
24.20	Pesticides		✓	✓	
24.30	Paints, varnishes, printing ink etc.		✓	✓	
24.41	Basic pharmaceutical products		✓	✓	
24.42	Pharmaceutical preparations		✓	✓	
24.51	Soap, detergents, cleaning prep.		✓	✓	
24.52	Perfumes, toilet preparations		✓	✓	
24.61	Explosives		✓	✓	
24.62	Glues, gelatine		✓	✓	
24.63	Essential oils		✓	✓	
24.64	Photographic chemical material		✓	✓	
24.65	Prepared unrecorded media		✓	✓	
24.66	Other chemical products n.e.c.		✓	✓	
24.70	Man-made fibres		✓	✓	
25.11	Rubber tyres, tubes		✓	✓	
25.12	Retreading, rebuilding of rubber tyres		✓		
25.13	Other rubber products		✓	✓	
25.21	Plastic plates, sheets, tubes, profiles		✓	✓	
25.22	Plastic packing goods		✓	✓	
25.23	Builders' ware of plastic		✓	✓	
25.24	Other plastic products		✓		
26.11	Flat glass		✓		

Activity	Description	Input	Physical Output	Deflated Products	Turn-over
26.12	Shaping, processing of flat glass		✓		
26.13	Hollow glass		✓		
26.14	Glass fibres		✓	✓	
26.15	Other glass incl. technical glassware		✓	✓	
26.21	Ceramic household, ornamental articles		✓	✓	
26.22	Ceramic sanitary fixtures		✓	✓	
26.23	Ceramic insulators, insulating fittings		✓	✓	
26.24	Other technical ceramic products		✓	✓	
26.25	Other ceramic products		✓	✓	
26.26	Refractory ceramic products		✓	✓	
26.30	Ceramic tiles, flags		✓	✓	
26.40	Bricks, tiles, in baked clay		✓	✓	
26.51	Cement		✓		
26.52	Lime		✓		
26.53	Plaster		✓		
26.61	Concrete products for construction		✓		
26.62	Plaster products for construction		✓		
26.63	Ready-mixed concrete		✓		
26.64	Mortars		✓		
26.65	Fibre cement		✓		
26.66	Other articles of concrete, plaster		✓		
26.70	Cutting, shaping, finishing of stone		✓		
26.81	Production of abrasive products		✓		
26.82	Other non-metallic mineral products		✓		
27	***Manufacture of basic metals***		✓		
28.11	Metal structures, parts of structures		✓	✓	
28.12	Builders' carpentry, joinery of metal	✓	✓	✓	
28.21	Tanks, reservoirs, containers of metal		✓	✓	
28.22	Central heating radiators, boilers		✓	✓	
28.30	Steam generators		✓	✓	
28.40	Forging,pressing,stamping,roll forming		✓	✓	
28.51	Treatment, coating of metals		✓	✓	
28.52	Mechanical engin. on a contract basis	hw	✓		
28.61	Cutlery		✓	✓	
28.62	Tools	✓	✓	✓	
28.63	Locks, hinges		✓	✓	
28.64	Other domestic hardware		✓	✓	
28.71	Steel drums, similar containers		✓	✓	
28.72	Light metal packaging		✓	✓	
28.73	Wire products		✓	✓	
28.74	Fasteners, screw machine products		✓	✓	

Activity	Description	Input	Physical Output	Deflated Products	Turn-over
28.75	Other fabricated metal products		✓	✓	
29.11	Engines and turbines	hw		✓	
29.12	Pumps and compressors	hw		✓	
29.13	Taps and valves			✓	
29.14	Bearings, gears, gearing elements			✓	
29.21	Furnaces, furnace burners		✓	✓	
29.22	Lifting, handling equipment		✓	✓	
29.23	Non-domestic cooling equipment		✓	✓	
29.24	Other general purpose machinery		✓	✓	
29.31	Agricultural tractors		✓	✓	
29.32	Other agricultural machinery		✓	✓	
29.40	Machine-tools			✓	
29.51	Machinery for metallurgy			✓	
29.52	Machinery for mining, quarrying			✓	
29.53	Machinery for food processing			✓	
29.54	Machinery for textile, leather prod.			✓	
29.55	Machinery for paper, paperboard prod.			✓	
29.56	Other special purpose machinery			✓	
29.60	Weapons and ammunition		hw		✓
29.71	Electric domestic appliances		✓	✓	
29.72	Non-electric domestic appliances		✓	✓	
30.01	Office machinery			✓	
30.02	Computers			✓	
31.10	Electric motors, transformers	hw	✓	✓	
31.20	Electricity distrib. & control apparatus	hw	✓	✓	
31.30	Insulated wire and cable		✓	✓	
31.40	Accumulators, primary cells, batteries			✓	
31.50	Lighting equipment, electric lamps			✓	
31.61	Electrical equipment for engines			✓	
31.62	Other electrical equipment			✓	
32.10	Electronic valves, tubes			✓	
32.20	Television, radios transmitters		✓	✓	
32.30	Television, radio receivers, video mach.			✓	
33.10	Medical, surgical equipment			✓	
33.20	Instrum. for measuring, checking, test.			✓	
33.30	Industrial process control equipment			✓	
33.40	Optical instruments, photogr. equipment		✓	✓	
33.50	Watches, clocks		✓	✓	
34.10	Motor vehicles			✓	
34.20	Bodies (coachwork) for motor vehicles			✓	
34.30	Parts, accessories for motor vehicles			✓	

Activity	Description	Input	Physical Output	Deflated Products	Turn-over
35.11	Building, repairing of ships	hw			
35.12	Building, repairing of pleasure boats	hw			✓
35.20	Railway, tramway locomotives	hw			
35.30	Aircraft, spacecraft	hw			
35.41	Motorcycles		✓	✓	
35.42	Bicycles		✓	✓	
35.43	Invalid carriages		✓	✓	
35.50	Other transport equipment		✓	✓	
36.11	Chairs and seats			✓	✓
36.12	Other office and shop furniture			✓	✓
36.13	Other kitchen furniture			✓	✓
36.14	Other furniture			✓	✓
36.15	Mattresses				✓
36.21	Striking of coins, medals				✓
36.22	Jewellery, related articles				✓
36.30	Musical instruments			✓	✓
36.40	Sports goods			✓	✓
36.50	Games, toys			✓	✓
36.61	Imitation jewellery				✓
36.62	Brooms, brushes				✓
36.63	Other manufacturing n.e.c.				✓
37.10	Recycling of metal waste, scrap		✓		
37.20	Recycling of non-metal waste, scrap		✓		
40.10	Production, distrib. of electricity		✓		
40.20	Gas; distribution of gas		✓		
40.30	Steam, hot water supply		✓		
41.00	Collection, distribution of water		✓		

ANNEX III

Classification of Types of Constructions (CC)

1			BUILDINGS
	11		Residential buildings
		111	One-dwelling buildings
		1110	One-dwelling buildings
		112	Two- and more dwelling buildings
		1121	Two-dwelling buildings
		1122	Three- and more dwelling buildings
		113	Residences for communities
		1130	Residences for communities
	12		Non-residential buildings
		121	Hotels and similar buildings
		1211	Hotel buildings
		1212	Other short-stay accommodation buildings
		122	Office buildings
		1220	Office buildings
		123	Wholesale and retail trade buildings
		1230	Wholesale and retail trade buildings
		124	Traffic and communication buildings
		1241	Communication buildings, stations, terminals and associated buildings
		1242	Garage buildings
		125	Industrial buildings and warehouses
		1251	Industrial buildings
		1252	Reservoirs, silos and warehouses
		126	Public entertainment, education or hospital and institutional care buldings
		1261	Public entertainment buildings
		1262	Museums and libraries
		1263	School, university and research buildings
		1264	Buildings for hospital and institutional care
		1265	Sports halls
		127	Other non-residential buildings
		1271	Non-residential farm buildings
		1272	Buildings used as places of worship and for religious activities
		1273	Historic or protected monuments
		1274	Other buildings not elsewhere classified

2			CIVIL ENGINEERING WORKS
	21		**Transport infrastructures**
		211	Highways, streets and roads
		2111	Highways
		2112	Streets and roads
		212	Railways
		2121	Long-distance railways
		2122	Urban railways
		213	Airfield runways
		2130	Airfield runways
		214	Bridges, elevated highways, tunnels and subways
		2141	Bridges and elevated highways
		2142	Tunnels and subways
		215	Harbours, waterways, dams and other waterworks
		2151	Harbours and navigable canals
		2152	Dams
		2153	Aqueducts, irrigation and cultivation waterworks
	22		**Pipelines, communication and electricity lines**
		221	Long-distance pipelines, communication and electricity lines
		2211	Long-distance oil and gas pipelines
		2212	Long-distance water pipelines
		2213	Long-distance telecommunication lines
		2214	Long-distance electricity lines
		222	Local pipelines and cables
		2221	Local gas supply lines
		2222	Local water supply pipelines
		2223	Local waste water pipelines
		2224	Local electricity and telecommunication cables
	23		**Complex constructions on industrial sites**
		230	Complex constructions on industrial sites
		2301	Constructions for mining or extraction
		2302	Power plant constructions
		2303	Chemical plant constructions
		2304	Heavy industrial plants, not elsewhere classified
	24		**Other civil engineering works**
		241	Sport and recreation constructions
		2411	Sports grounds
		2412	Other sport and recreation constructions
		242	Other civil engineering works not elsewhere classified
		2420	Other civil engineering works not elsewhere classified

ANNEX IV

Glossary

of Frequently Used Terms in the Domain of Construction

Contractor

A firm which undertakes works as part of a construction project by virtue of a contract with a client.

Client ("Maître d'ouvrage")

Natural or legal person for whom a structure is constructed.

Project supervisor (*"Maître d'oeuvre"*)

Person or organisation responsible for the supervision of a construction site after having drawn up the structure plans.

Quantity surveyor

Professional responsible for evaluating the progress of work in terms of quality and value, on the basis of the technical documents relating to a given structure.

Standard operations

The supply of a component of the structure, defined in terms of its function in the structure and its constituent materials. Examples might include

- Construction of 50 m^2 of wall in 20 cm hollow breeze block
- Supply and setting of 60 m^2 traditional pantile roofing
- Installation of an insulated 200-litre electric hot water tank.

Construction[1)]

Structure connected with the ground, made from construction materials and components, and/or for which construction work is carried out.
The classification of constructions provides for two types of such structures: buildings and civil engineering structures.

Building[1)]

Building is a permanently-constructed roofed structure capable of being used independently, designed to offer protection from the elements with a view to occupation or use by man, or to providing shelter for animals, goods, equipment of industrial activities.

Civil engineering structures[1)]

All structures other than buildings: infrastructure works such as railways, highways, airport runways, tunnels, dams, bridges, canals, electricity transmission systems, drilling platforms, mineshafts, recreation installations, etc.

Residential building[1)]

A residential building is a building exclusively or principally destined for dwelling purposes; in the latter case it is regarded as a residential building if more than 50% of the habitable/useful floor area or of the volume to be constructed is used for dwelling purposes.

This definition has been proposed in the introduction to the Classification of Types of Constructions (CC).

Non-residential building[1)]

A non-residential building is a building exclusively or principally destined for purposes other than residential; in the latter case it is regarded as a non-residential building if more than 50% of the useful floor area or of the volume to be constructed is used for purposes other than residential.

1) Definition proposed in the introduction to the Classification of Types of Constructions (CC).

Dwelling[2)]

A dwelling is a room or suite of rooms and its accessories in a permanent building or structurally separated part thereof which by the way it has been built, rebuilt, converted, etc, is intended for private habitation. It should have a separate access to a street (direct or via a garden or grounds) or to a common space within the building (staircase, passage, gallery, etc). Detached rooms or habitation which are clearly built, rebuilt, converted etc, to be used as a part of the dwelling should be counted as part of the dwelling. (A dwelling may thus be constituted of separate buildings within the same enclosure, provided they are clearly intended for habitation by the same private household eg a room or rooms above a detached garage, occupied by servants or other members of the household.)

Thus a distinguishing feature of a dwelling is that it has a separate entrance either at ground level or to a common space in a multi-occupation building.

Room[2)]

A room is an area within a dwelling formed by partition walls from floor to ceiling or roof. It must be large enough to accommodate an adult's bed (not less than $4m^2$) with not less than 2.00 m headroom over at least half its floor area. This category includes normal bedrooms, dining rooms, sitting rooms, attic rooms, kitchens and other separate rooms whose pupose is residential. "Corner-kitchens," corridors, verandas, hallways, etc. and bathrooms do not count as "rooms."

Useful floor area[2)]

This is the floor area of a building measured within the external walls, excluding cellars, non-habitable attics and, in multiple dwellings, all communal areas.

Habitable floor area

The habitable floor area of a dwelling is the total floor area, measured inside the outer and dividing walls, of all habitation rooms and ancillary rooms, such as kitchens, bathrooms, toilets, corridors, lobbies and staircases and, in multi-dwelling houses, all the common areas, but excluding cellars, lofts, non-habitable attics, open balconies and garages.
This definition is proposed in the Council Directive (78/166/EEC) of February 1978. It is essentially identical to that of **useful floor space** postulated under the E.C.E. system except that the E.C.E. definition excludes common areas in multi-dwelling buildings.

2) The definition has been proposed by the Conference of European Statisticians and the Committee for Housing, Building and Planning in the European Programme of Current Housing Statistics **(E.C.E.)**

Living floor space

The living (i.e. habitable) floor space is the total space within habitable rooms which are defined as having an individual size of not less than 4 sq. metres with a height over the major area of the ceiling of at least 2 metres. Excluded from computation under this second definition are kitchenettes (which are not defined so as to be distinguishable from kitchens but are presumably taken to be rooms of less than 4 sq. metres by 2 metres), bathrooms, toilets, corridors, lobbies and verandas.
This definition is postulated by the E.C.E. It is more restrictive than the definition of habitable floor area.

Volume constructed

The volume constructed of a residential or non-residential building is the floor area including outer walls, multiplied by the height, measured from the ground of the lowest floor - which is the cellar or, if there are no cellars nor similar spaces, the ground floor - to the mid-height of the roof, or, if it is a flat roof, to its upper surface; the corresponding volume of the accessories as well as the annexes, calculated in the same way, has to be added. Internal spaces not roofed are to be excluded.

ANNEX V

Draft Council Regulation concerning Short-Term Statistics

This version of the draft legal text is shows the proposal of the Commission as it was submitted to the European Council in June 1997. During the discussions at the Council meetings considerable changes are possible.

D

The Council of the European Union,

Having regard to the Treaty establishing the European Community, and in particular Article 213 thereof,

Having regard to the draft Regulation submitted by the Commission,[3)]

Having regard to the opinion of the European Parliament,[4)]

Having regard to the opinion of the economic and social committee,[5)]

Having regard to the opinion of the European Monetary Institute,[6)]

(1) Whereas the Council Directive No. 72/211 (EEC) of 30 May 1972[7)] and Council Directive No. 78/166 (EEC) of 13 February 1978[8)] which aimed to provide a body of coherent statistics, have not been able to take account of economic and technical changes;

3) Official Journal * *** of **.**.****, p. *.

4) Official Journal * *** of **.**.****, p. *.

5) Official Journal * *** of **.**.****, p. *.

6) Official Journal * *** of **.**.****, p. *.

7) Official Journal L 128 of 3.06.1972, p. 28.

8) Official Journal L 52 of 23.02.1978, p. 17.

(2) Whereas the European Union has in the meantime made further progress towards integration; whereas new economic, competition, social, environmental and enterprise policies and guide-lines call for initiatives and decisions based on valid statistics; whereas the information provided for under existing Community legislation or available in the various Member States is partly inadequate or insufficiently comparable to serve as a reliable basis for the work of the Communities;

(3) Whereas the future European Central Bank (ECB) needs rapid short term statistics in order to assess the economic development in the Member States in the context of a single European monetary policy;

(4) Whereas standardisation is required to meet Community needs for information concerning economic convergence;

(5) Whereas it is necessary to have reliable and rapid statistics available in order to report on the economic development in each Member State of the Union in the framework of the economic policy of the Union;

(6) Whereas businesses and their professional associations need such information in order to understand their markets and to know their activity and performance relative to their sector, at national and international level;

(7) Whereas in its Decision 93/464 of 22 July 1993 [9] the Council adopted a framework programme for priority actions in the field of statistical information for 1993 to 1997;

(8) Whereas the compilation of national accounts according to Council Regulation No. 223/96 of 26 June 1996 [10] concerning the European System of National and Regional Accounts in the European Community (ESA95) requires the development of comparable, complete and reliable statistical sources;

(9) Whereas in Decision 92/326/EEC of 18 June 1992 [11] the Council adopted a two-year program (1992 to 1993) for the development of European statistics on services; whereas this program includes the compilation of harmonised statistics at national and regional levels, particularly for the distributive trades;

(10) Whereas in accordance with the principle of subsidiarity the creation of common statistical norms that permit the production of harmonised statistics is an action which can only be undertaken efficiently at Community level and that they will be applied in each Member State under the authority of the bodies and institutions in charge of compiling official statistics;

(11) Whereas the best method of ascertaining the business cycle consists of compiling statistics which conform to common methodological principles and with common definitions of characteristics; whereas it is only from co-ordinated compilation that harmonised statistics can be drawn up with reliability, speed, flexibility and the level of detail required to meet the needs of the Commission and of enterprises;

(12) Whereas the statistical data compiled within the Community system must be of a satisfactory quality and this quality, as well as the burden it entails, must be comparable from one Member State to another, and whereas it is therefore necessary to establish jointly the criteria enabling these requirements to be met; Whereas short-term statistics must be consistent with the

9) Official Journal L 219 of 28.08.1993, p. 1.

10) Official Journal L 310 of 13.11.1996, p. 39.

11) Official Journal L 179, 1.7.1992, p. 131.

results transmitted in accordance with Council Regulation No. 58/97 of 20 December 1996[12] concerning structural business statistics;

(13) Whereas it is necessary to simplify the administrative procedures for enterprises, particularly smaller enterprises, including the promotion of new technologies for data collection and compilation; whereas the use of existing administrative data for statistical purposes is one of the measures to decrease the burden on enterprise; whereas if a direct data collection from businesses is indispensable for compiling the statistics, the methods and techniques must ensure that the data are reliable and up to date, without giving rise for the parties concerned, in particular for small and medium sized businesses, to a burden out of proportion to the results which users of the said statistics can reasonably expect;

(14) Whereas it is necessary to have a legal framework common to all business activities and domains of business statistics covering also the activities and domains for which statistics are not yet developed; whereas the scope of the statistics to be compiled can be defined by reference to Council Regulation No. 93/696[13] on the statistical units for the observation and the analysis of the production system in the European Community and Council Regulation No. 3037/90[14] on the statistical classification of activities in the European Community (NACE Rev.1) amended by Commission Regulation No. 761/93[15];

(15) Whereas, in order to enable the rules for the collection and statistical processing of data and for processing and transmission of the variables to be clarified further, it is necessary to confer upon the Commission, assisted by the Statistical Programme Committee set up by Decision 89/382/EEC (Euratom),[16] the power to adopt measures for the application of this Regulation,

(16) Whereas the statistical Programme Committee has been consulted in accordance with article 3 of the aforesaid Decision,

has adopted this Regulation:

D

Article 1
General aims

(1) The objective of this Regulation is to establish a common framework for the production of short-term Community Statistics on the Business cycle.

(2) The statistics comprise information (variables) which are necessary to provide a uniform basis for the analysis of the short term evolution of output and demand, the production factors and prices.

Article 2
Scope

(1) This Regulation shall apply to all market activities in Sections C to K and M to O of the statistical classification of economic activities in the European Community (NACE Rev.1) as established by Regulation (EEC) No 3037/90

12) Official Journal L 14 of 17.01.1997, p. 1.

13) Official Journal L 76, 30.3.1993, p. 1.

14) Official Journal L 293, 24.10.1990, p. 1.

15) Official Journal L 83, 3.4.1993, p. 1.

16) Official Journal L 181, 28.6.1989, p. 47.

(2) Statistical units of the types listed in Section I of the Annex to Regulation No 93/696 and which are classified under one of the activities referred to in paragraph 1 shall be included in the scope of this Regulation. The use of particular units for the compilation of statistics is specified in the Annexes to this Regulation.

Article 3
Modules

(1) The specific requirements for the variables are described in modules set out in the annexes to this Regulation.

(2) The following information is laid down in each module where relevant:

a. the specific activities for which the statistics are to be compiled;

b. the types of statistical unit to be used for the compilation of the statistics;

c. the lists of variables;

d. the form of the variables;

e. the frequency of the variables;

f. the level of detail of the variables;

g. the deadlines for data transmission;

h. the list of voluntary pilot studies;

i. the first reference period;

j. the maximum length of the transition period which may be conceded.

Article 4
Collection of data

(1) Member States shall obtain the necessary data for the compilation of the variables listed in the modules.

(2) Member States may obtain the necessary data using a combination of different sources specified below, applying the principle of administrative simplification:

(a) compulsory surveys: the legal units, to which the statistical units called upon by the Member States belong or of which they are composed, shall be obliged to give accurate and complete information within the prescribed deadlines;

(b) other sources which are at least equivalent as regards accuracy and quality;

(c) missing data may be estimated if this does not lower substantially the quality of the variables.

(3) Member States shall promote conditions which reduce the response burden on the reporting units. For this purpose Member States shall take the necessary measures to allow and facilitate access by the authorities responsible for the collection of data, to administrative sources within their State, in particular periodic information contained in VAT declarations, including information in the tax register.

(4) The Member States, in co-operation with the Commission, shall promote the conditions for increased use of electronic data collection and automatic data processing.

Article 5
Periodicity

All variables are provided on a monthly or quarterly base as specified in the modules.

Article 6
Level of detail

The variables are to be supplied in accordance with NACE Rev.1 at the level of detail as set out in the modules.

Article 7
Processing

Member States shall process the completed data collected by means of surveys or obtained from other sources into comparable variables

a. following the rules laid down in the modules and

b. taking account of the guidelines laid down in the methodological manual referred to in Article 11.

Article 8
Transmission

(1) Member States shall transmit the variables provided for in Article 7 of this Regulation, including confidential data, to the Statistical Office of the European Communities in accordance with the existing Community provisions on transmission of data subject to statistical confidentiality. The existing Community provisions on the transmission of data subject to statistical confidentiality shall apply to the treatment of the variables, insofar as they include confidential data.

(2) The transmission to the Statistical Office of the European Communities shall be carried out by electronic or other appropriate means within a period of time from the end of the reference period which is laid down in the modules and which shall be no longer than 6 months.

(3) In any case, the variables shall be transmitted to the Statistical Office of the European Communities not later than the day they are ready for publication in the Member State.

Article 9
Quality

(1) The Member States shall ensure that the transmitted variables reflect the true situation of the total population of units. For this purpose the surveys or other sources must cover as many units as necessary to ensure a sufficient degree of representativeness.

(2) The accuracy of the variables has to be measured by each Member State according to a common methodology. This methodology will be established by the Commission after consultation of the Committee referred to in Article 17 and will be laid down in the methodology manual referred to in Article 11.

(3) The quality of the variables is to be tested regularly by comparing them with other statistical information, notably the variables transmitted in accordance with Regulation No. 58/97. In addition they are to be checked for internal consistency. Deviations between first published data and final data are to be minimised.

(4) If any of these tests result in a deviation from the common methodology, the Member States shall remedy the deviation.

Article 10
Change of base year

(1) At least every five years, for the years ending with a 0 or a 5, Member States are obliged to adapt the weighting systems of the composite indices and in the appropriate case the choice of representative products.

(2) All variables must be rebased on the new base year within three years after the end of this new base year. The weights used in the adopted weighting systems shall be transmitted to the Commission within three years after the end of the new base year.

Article 11
Methodological manual

In co-operation with the Committee referred to in Article 17, a methodological manual which

a. explains the rules set up in the modules and also

b. contains the necessary recommendations concerning short term statistics,

will be published by the Commission.
This manual will be revised at regular intervals.

Article 12
Transition period and derogations

(1) Transition periods may be conceded, not extending more than five years from the beginning of the first reference periods for the compilation of the statistics.

(2) During the transition periods derogations from the provisions of this Regulation may be accepted by the Commission insofar as the national statistical systems require major adaptations.

Article 13
Reports

(1) Member States shall transmit to the Commission on request any relevant information to evaluate and compare the degree of accuracy and quality of the transmitted variables; in particular they shall notify on request of the criteria for the design of the samples and the estimation algorithm.

(2) The Commission shall, within three years of the date of entry into force of this Regulation and again every three years thereafter, submit a report to the European Parliament and the Council on the statistics compiled pursuant to this Regulation and in particular on their quality and the burden on business.

Article 14
Co-ordination in the Member States

In each Member State one national authority shall co-ordinate

- the transmission of variables (Article 8),
- the quality measurement (Article 9) and
- the transmission of relevant information (Article 13(1)).

Article 15
Pilot studies

(1) The Commission will, in accordance with the procedure laid down in Article 17 of this Regulation, institute a series of pilot studies to be completed by the Member States. These pilot studies are specified in the modules.

(2) These pilot studies will be carried out in order to assess the feasibility of obtaining more data, taking into account the benefits of the availability of the data in relation to the cost of collection and the burden on business.

(3) The Commission will inform the Council of the results of the pilot studies and will if necessary submit to it proposals on new requirements for the modules.

Article 16
Implementation

The Commission shall determine, under the procedure laid down in Article 17, the measures for implementing this Regulation, including the measures for adjustment to economic and technical developments concerning the collection and statistical processing of data, the processing and the transmission of the variables, taking into consideration the principle that the benefits of the measure must outweigh its cost, and provided that major additional resources are not involved either for the Member States or for enterprises as compared with the original provisions of this Regulation, in particular:

a. the use of particular units (Article 2),

b. the updating of the list of variables (Article 3),

c. the definition and the appropriate forms of the transmitted variables (Article 3),

d. the frequency of compilation of the statistics (Article 5),

e. the levels of breakdown and aggregation to be applied to the variables (Article 6),

f. the transmission deadlines (Article 8),

g. the accuracy of the variables (Article 9),

h. the transition periods and derogations granted during the transition period (Article 12),

i. the pilot studies (Article 15),

D

Article 17
Committee procedure

(1) The Commission shall be assisted by the Statistical Programme Committee set up by Decision 89/382/EEC, Euratom, hereinafter referred to as "the Committee".

(2) The representative of the Commission shall submit to the Committee a draft of the measures to be taken. The Committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148 (2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal from the Commission.

The votes of the representatives of the Member States within the Committee shall be weighted in the manner set out in that Article. The Chairman shall not vote.

(3) The Commission shall adopt measures which shall apply immediately. How-

ever, if these measures are not in accordance with the opinion of the Committee, they shall be communicated by the Commission to the Council forthwith. In that event:

a. The Commission shall defer application of the measures which it has decided for a period of three months from the date of communication.

b. The Council, acting by a qualified majority, may take a different decision within the time limit referred to in the previous paragraph.

Article 18
Repealing provisions

The Directives 72/211 (EEC) of 30 May 1972 and 78/166 (EEC) of 13 February 1978 shall cease to apply after the transmission of all of the data for the reference periods within 1997.

Article 19
Entering into force

This Regulation shall enter into force on the twentieth day after its publication in the Official Journal of the European Communities.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

MODULE A:
Industry

a. Scope

This module is applicable for all activities of mining, manufacturing and energy, listed in sections C to E of NACE Rev.1.

b. Observation Unit

(1) The observation unit for all variables in this module is the kind-of-activity unit.

(2) For enterprises with few persons employed in secondary activities the National Statistical Offices may use the enterprise as the observation unit.

(3) Exceptions for the observation unit can be decided by the Commission after consultation of the Committee referred to in Article 17.

c. List of Variables

(1) The statistics in this module comprise the following variables:

Variable	Name
110	production
120	turnover
121	domestic turnover
122	export turnover
130	new orders received
131	domestic new orders
132	export new orders
210	persons employed
220	hours worked
230	gross wages and salaries
310	output prices

311	output prices of the domestic market
312	output prices of the export market

(2) The information on orders (No 130, 131, 132) are only required for the following divisions of NACE Rev.1: 17, 18, 21, 24, 27, 28, 29, 30, 31, 32, 33, 34, 35.

(3) The information concerning output prices (No 310, 311, 312) is not required for the following groups of NACE Rev.1: 12.0, 22.1, 23.3, 29.6, 35.1, 35.3.

d. Form

(1) The variables are to be supplied in the following form:

Variable	Unadjusted	Working day adjusted	Seasonally adjusted
110	✓	✓	✓
120	✓		✓
121	✓		✓
122	✓		✓
130	✓		✓
131	✓		✓
132	✓		✓
210	✓		✓
220	✓		✓
230	✓		✓
310	✓		
311	✓		
312	✓		

(2) All variables can be supplied either as an index or as absolute figures.

e. Frequency

The variables are to be supplied with the following frequency:

Variable	Frequency
110	monthly
120	monthly
121	monthly
122	monthly
130	monthly
131	monthly
132	monthly
210	at least quarterly
220	at least quarterly
230	at least quarterly
310	monthly
311	monthly
312	monthly

D

f. Level of detail

(1) All variables are to be supplied at least at 2-digit level of NACE Rev.1.

(2) For Section D, the index of production and the index of output prices will be supplied at both the 3 and 4-digit level of NACE Rev.1, with the following exceptions:

a) If value added in a class of NACE Rev 1 Section D in a given base year represents, in a Member State, less than 3% of the European Community total, the index of production (No 110) and the index of output prices (No 310, 311, 312) need not to be supplied for this class.

b) If value added in a group of NACE Rev 1 Section D in a given base year represents, in a Member State, less than 3% of the European Community total, the index of production (No 110) and the index of output prices (No 310, 311,

312) need not to be supplied for this group.

(3) If necessary for European Community policy requirements, the Commission may, in accordance with the procedure laid down in Article 17 of this Regulation, request ad hoc collection of the data referred to in paragraph 2.

(4) In addition, all variables are to be supplied for main industrial groupings, the definition of which (reference to NACE Rev.1 activities) are decided after consultation of the Committee referred to in Article 17.

g. Deadlines for data transmission

(1) The variables shall be transmitted within the following deadlines after the end of the reference period:

Variable	Deadlines
110	45 calendar days
120	60 calendar days
121	60 calendar days
122	60 calendar days
130	50 calendar days
131	50 calendar days
132	50 calendar days
210	50 calendar days
220	60 calendar days
230	60 calendar days
310	35 calendar days
311	35 calendar days
312	35 calendar days

(2) The deadline may be up to 15 calendar days longer for those activities where, in a given base year, the value added of the activities in a Member State represents less than 2% of the Community total.

h. Pilot Studies

In accordance with Article 15 voluntary pilot studies are launched in the order of priorities on the following subjects:

1. The break-down of export market variables into intra EC and extra EC,
2. short term investment information,
3. short term information concerning birth and death of enterprises,
4. a monthly frequency for employment information,
5. data on stock of orders,
6. data on inventories,
7. order information for more activities than listed in c.(2),
8. the calculation of output prices for the activities excluded in c.(3).

i. First reference period

The first reference period for which all variables are to be supplied is January 1998 for monthly data, the first quarter 1998 for quarterly data.

j. Transition period

For production (No 110), new orders received (No 130, 131, 132) and domestic output prices (No 311) a transition period of no longer than two years may be conceded by the Commission. For all other variables the transition period may be up to five years.

MODULE B: Construction

a. Scope

This module is applicable for all activities of construction listed in section F of NACE Rev.1.

b. Observation Unit

(1) The observation unit for all variables in this module is the kind-of-activity unit.

(2) For enterprises with few persons employed in secondary activities the National Statistical Offices may use the enterprise as the observation unit.

(3) Exceptions for the observation unit can be decided by the Commission after consultation of the Committee referred to in Article 17.

c. List of Variables

(1) The statistics in this module comprise the following variables:

Variable	Name
110	production
115	production of building construction
116	production of civil engineering
130	new orders received
135	new orders received for building construction
136	new orders received for civil engineering
210	persons employed
220	hours worked
230	gross wages and salaries
310	output prices
320	construction costs
321	material costs
322	labour costs
411	building permits: number of dwellings
412	building permits: square meters of useful floor area

(2) The information concerning new orders (No 130, 135, 136) is not required for groups 45.3 to 45.5 of NACE Rev.1.

(3) Approximations for the variables can be defined by the Commission after consultation of the Committee and laid down in the methodological manual referred to in Article 11.

D

d. Form

(1) The variables are to be supplied in the following form:

Variable	Unadjusted	Seasonally adjusted
110	✓	✓
115	✓	✓
116	✓	✓
130	✓	✓
135	✓	✓
136	✓	✓
210	✓	✓
220	✓	✓
230	✓	✓
310	✓	
320	✓	
321	✓	
322	✓	
411	✓	✓
412	✓	✓

(2) All variables except the building permits (No 411 and 412) can be supplied in the form of indices or in absolute figures.

(3) The building permits (No 411 and 412) are to be supplied in absolute figures.

e. Frequency

The variables are to be supplied with the following frequency:

Variable	Frequency
110	monthly
115	monthly
116	monthly
130	at least quarterly
135	at least quarterly
136	at least quarterly
210	at least quarterly
220	at least quarterly
230	at least quarterly
310	at least quarterly
320	at least quarterly
321	at least quarterly
322	at least quarterly
411	monthly
412	monthly

f. Level of detail

(1) The variables No 110, 130, 210, 220 and 230 are to be supplied at least at the 2-digit level of NACE Rev. 1.

(2) The output prices and construction costs (Variables No 310, 320, 321 and 322) are only mandatory for new residential buildings excluding residencies for communities.

(3) Following the classification of constructions, the number of dwellings present in building permits (No 411) is to be supplied for:

- (i) one dwelling residential buildings
- (ii) two and more-dwelling residential buildings

(4) The building permits (No 412) are to be supplied for:

- (i) one dwelling residential buildings
- (ii) two and more-dwelling residential buildings
- (iii) residencies for communities
- (iv) offices buildings
- (v) other buildings

This is to be compiled using the square meters of useful floor area or an alternative size measure.

(5) The building permits (No. 411 and 412) are not to be supplied for civil engineering.

g. Deadlines for data transmission

The variables shall be transmitted within the following deadlines after the end of the reference period:

Variable	Deadline
110	60 calendar days
115	60 calendar days
116	60 calendar days
130	90 calendar days
135	90 calendar days
136	90 calendar days
210	90 calendar days
220	90 calendar days
230	90 calendar days
310	90 calendar days
320	90 calendar days
321	90 calendar days
322	90 calendar days
411	60 calendar days
412	60 calendar days

h. Pilot Studies

In accordance with Article 15 voluntary pilot studies are launched in the order of priorities on the following subjects:

1. on the possibilities to break down production (No 110) into new work and repair & maintenance,
2. on providing new orders information (No 130, 135 and 136) and prices (No 310, 320, 321 and 322) at a monthly frequency,
3. on the possibilities to break down the variables No 210, 220 and 230 into building and civil engineering,
4. on the possibilities to have price information (No 310, 320, 321 and 322) for other types of construction than residential buildings, as well as for repair and maintenance work,
5. on the possibilities to break down the production of building construction (No 115) into residential and non-residential buildings
6. on short term investment information,
7. on short term information concerning birth and death of enterprises.

i. First reference year

The first reference period for which all variables are to be supplied is January 1998 for monthly data, the first quarter 1998 for quarterly data.

j. Transition period

For the variables No 110, 130 and 310 a transition period of no longer than two years may be conceded by the Commission. For all other variables the transition period may be up to five years.

For the periodicity of variable No 110 (production index) to be monthly, a transition period of up to five years may be conceded.

MODULE C: Retail Trade

a. Scope

This module is applicable for the retail trade sector except trade of motor vehicles and motorcycles, in other words all activities listed in groups 52.1 to 52.6 of NACE Rev.1 (distributive trade).

b. Observation Unit

(1) The observation unit for all variables in this module is the enterprise.

(2) The Member States shall also collect, compile and transmit variables for enterprises which, according to their main activity, are not classified in NACE Rev.1 52.1 to 52.6, but which nevertheless carry out significant retail trade activities.

(3) The Member States shall determine the appropriate manner for the implementation of paragraph (2). The Member States shall inform the Commission of the action they have taken to meet the requirements of paragraph (2).

c. List of variables

The statistics in this module comprise the following variables:

Variable	Name
120	turnover
210	persons employed
330	deflator of sales

d. Form

(1) All variables are to be sent in the form of indices or absolute figures.

(2) The variables are to be supplied in the following form:

Variable	Unadjusted	Work. day adjusted	Seasonally adjusted
120	✓	✓	✓
210	✓		✓
330	✓		

e. Frequency

The variables are to be supplied with the following frequency:

Variable	Frequency
120	monthly
210	quarterly
330	monthly

f. Level of detail

The variables are to be supplied according to the regroupings of activities, defined below according to the NACE Rev.1 classification classes and groups:

- class 52.11
- class 52.12
- group 52.2
- group 52.3
- sum of classes 52.41, 52.42 and 52.43
- sum of classes 52.44, 52.45 and 52.46
- sum of classes 52.47 and 52.48
- class 52.61

Aggregated variables are required for:

- sum of class 52.11 and group 52.2
- sum of class 52.12 and groups 52.3 to 52.6
- sum of groups 52.1 to 52.6.

g. Deadlines for data transmission

The preliminary variables shall be transmitted within 3 months after the end of the reference period, the revised variables within 6 months after the end of the reference period. Special estimated advanced variables shall be transmitted within 2 months at the aggregated level of retail trade.

h. Pilot Studies

In accordance with Article 15 voluntary pilot studies are launched on the following subjects:

1. on the possibilities of faster data supply,
2. on the kind-of-activity unit as observation unit,
3. on short term investment information,
4. on short term information concerning birth and death of enterprises.

i. First reference year

The first reference period for which all variables are to be supplied is January 1998 for monthly data, the first quarter 1998 for quarterly data.

j. Transition period

For aggregated turnover (No 120) a transition period of no longer than two years may be conceded by the Commission. For all other variables the transition period may be up to five years.

MODULE D: Other Services

a. Scope

(1) Pilot studies are to be carried out by the end of 2002 in order to know for which NACE Rev.1 activities short term statistics need to be compiled because a business cycle can be observed.

(2) The pilot studies shall be applicable for all activities listed in sections G to K and O of NACE Rev.1, except groups 52.1 to 52.6.

(3) The pilot studies will be carried out in order to assess the feasibility of collecting data, taking into account the benefits of the availability of the data in relation to the cost of collection and the burden on business.

(4) The specifications laid down in points b) to g) below are to be examined in the pilot studies and shall be reviewed after the pilot studies have been completed.

(5) After the pilot studies have been completed, the Commission, after consultation of the Committee in accordance with the procedure laid down in Article 17 of this Regulation, shall determine the NACE Rev.1 activities for which short term statistics are to be completed for the activities covered by this annex.

b. Observation Unit

The observation unit for all variables in this module should be the enterprise.

c. List of variables

The statistics in this module should comprise the following variables:

Variables	Name
120	turnover
210	persons employed

d. Form

The variables should be collected in the form of indices, both unadjusted and seasonally adjusted.

e. Frequency

The variables should be supplied on a quarterly basis.

f. Level of detail

The variables should be supplied according to the divisions (2-digit level) of NACE Rev.1.

g. Deadlines for data transmission

Variables should be transmitted to the Commission within 6 months after the end of the reference period.

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5 Agricultura, silvicultura y pesca (verde)
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3 Väestö- ja sosiaalitilastot (keltainen)
4 Energia ja teollisuus (sininen)
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C Rekeningen en enquêtes
D Studies en onderzoeken
E Methoden
F Statistieken in het kort

SV Klassifikation av Eurostats publikationer

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0 Diverse (rosa)
1 Allmän statistik (mörkblå)
2 Ekonomi och finans (lila)
3 Befolkning och sociala förhållanden (gul)
4 Energi och industri (blå)
5 Jordbruk, skogsbruk och fiske (grön)
6 Utrikeshandel (röd)
7 Handel, tjänster och transport (orange)
8 Miljö (turkos)
9 Forskning och utveckling (brun)

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A Årsböcker och årlig statistik
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DE Gliederung der Veröffentlichungen von Eurostat

THEMENKREIS

0 Verschiedenes (rosa)
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5 Land- und Forstwirtschaft, Fischerei (grün)
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FR Classification des publications d'Eurostat

THÈME

0 Divers (rose)
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9 Recherche et développement (brun)

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PT Classificação das publicações do Eurostat

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Methodology of industrial short-term statistics — Rules and recommendations

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1998 — V, 207 pp. — 21 x 29.7 cm

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