Enterprise publications

The European **e-Business Report**

2003 edition

A portrait of
e-business in 15 sectors
of the EU economy

Second Synthesis Report of the

e-business w@tch

European Commission

The European e-Business Market Watch

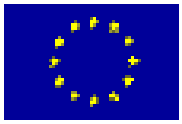
The European e-Business Report

2003 edition

A portrait of e-business
in 15 sectors of the EU economy

2nd Synthesis Report of the *e-Business W@tch*

July 2003



European Commission
Enterprise Directorate General

THE EUROPEAN E-BUSINESS MARKET WATCH

The European Commission, Enterprise Directorate General, launched the e-Business Market Watch (the *e-Business W@tch*) to monitor the growing maturity of electronic business across different sectors of the economy in the European Union. Since January 2002 the *e-Business W@tch* has been covering seven manufacturing and eight financial and service sectors. Results have been published in quarterly sector impact studies and newsletters, along with a set of statistics and other material on e-business. This is the second synthesis report of the *e-Business W@tch*, summarising main results of the sector impact studies and particularly of the second e-Business Survey, carried out in March 2003.

All publications of the *e-Business W@tch* – including this report – are available in electronic format on the Internet either via the Europa server (www.europa.eu.int/comm/enterprise/ict/policy/watch/index.htm) or directly at the *e-Business W@tch* website (www.ebusiness-watch.org). E-mail: info@ebusiness-watch.org.

The *e-Business W@tch* is being implemented on behalf of the European Commission, under a service contract running from December 2001 until July 2003, by empirica GmbH (Bonn) in co-operation with DIW Berlin – German Institute for Economic Research and Databank Consulting (Milan) with the support of Berlecon Research (Berlin).

empirica GmbH
Oxfordstr. 2, D-53111 Bonn
info@empirica.com

DIW Berlin
Königin-Luise-Str. 5, D-14195 Berlin
pkoellinger@diw.de

Databank Consulting spa
Corso Italia 8, I-20122 Milan
dbcons@dbcons.it

Berlecon Research GmbH
Oranienburger Straße 32, D-10117 Berlin
info@berlecon.de

Disclaimer

For further information, contact:

European Commission
Enterprise Directorate-General
e-Business, ICT Industries and Services
B-1049 Brussels

Fax: (32-2) 2967019
E-mail: entr-ict-e-commerce@cec.eu.int

Copies can be requested, free of charge, directly from the *e-Business W@tch* from the following e-mail address: info@ebusiness-watch.org. The report is also available in electronic format and can be downloaded from the 'Publications' section of the *e-Business W@tch* website (www.ebusiness-watch.org).

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).

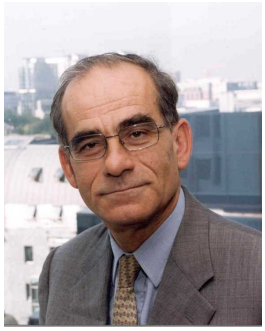
Luxembourg: Office for Official Publications of the European Communities, 2003

ISBN 92-894-5119-X

Printed in Germany

Table of Contents

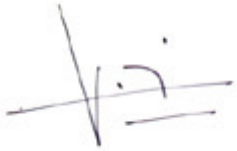
Foreword



The improvement of competitiveness in Europe, through structural renewal and reform, is a critical factor in achieving the Lisbon Strategy goals. In this respect, Information and Communication Technologies (ICT) play an important role to foster innovative products and business processes. What is at stake is the productive use of ICT, not only Internet connections or selling online. Indeed, it is the competitiveness of companies and sectors that needs to be raised and this can be achieved by increasing their productivity through fully exploiting the potential of ICT that have been deployed in the last years. In other words, the challenge has now shifted to incorporating electronic business in both the internal and the external activities of companies – and that is a major structural change.

The *e-Business W@tch* provides valuable statistics and in-depth analysis on the progress made in this respect in various sectors of the European economy. In fact, it has proved that it is predominantly the sector and the size of the company that determine the nature and the level of e-business activities in Europe. National and regional differences have to be viewed in light of the sectoral differences between the national economies. Not all sectors and enterprises lend equally to e-business activities and this has to be taken into account when comparing the e-business performance in different Member States. This is an important lesson to be learned from the analysis of the *e-Business W@tch*, as presented in this report.

Another conclusion is that sectoral specificities and in particular the needs of SMEs should be duly taken into account when defining and implementing policy actions in support of e-business. The policy focus has to be shifted from promoting Internet connections and electronic commerce to facilitating structural change in general. E-business policies are part of enterprise policy, in order to raise productivity and to help industrial sectors and SMEs to better manage the change towards a knowledge-based economy. The *e-Business W@tch* is a very useful tool for basing e-business policies on clear rationale. The next step will be to further develop this tool with the view to providing European enterprises with a basis for self-assessing their e-business performance. This will assist enterprises in their effort to adapt their business strategies in order to reap the full benefits of ICT and e-business.



Jean-Paul Mingasson

Director General
of the Enterprise Directorate General of the European Commission

ENTR-DirectorGeneral@cec.eu.int

Introduction

European policy is increasingly focussed on promoting business practices and new ways of working that will increase the competitiveness of enterprises and provide the economic and social foundation for the knowledge economy in Europe. The eEurope 2002 Action plan provided the basis for targeted actions to stimulate the use of the internet for accelerating e-commerce, acknowledging that "electronic commerce is already developing dynamically in inter-business trading […]" and that "it is important for SMEs not to be left behind in this process […]." The eEurope 2005 Action Plan, endorsed by the Seville European Council in June 2002, confirms and builds further upon these objectives with Action 3.1.2. "A dynamic e-business environment", which defines the goal "to promote take-up of e-business with the aim of increasing the competitiveness of European enterprises and raising productivity and growth through investment in information and communication technologies, human resources (notably e-skills) and new business models".[1]

To help policy-makers define their initiatives, and to monitor the effectiveness of these policies, some indication of progress and of areas requiring active support is essential. Despite the considerable amount of studies and market research on electronic business (and especially on electronic commerce), there used to be a lack of reliable empirical information about the extent, scope, nature of and factors affecting the speed of e-business development at the sector level in an internationally comparative framework.

Therefore the European Commission, DG Enterprise, launched in January 2002 the *e-Business W@tch*. During its 18-month period of operation, the *e-Business W@tch* has presented a set of e-Business Impact Studies for 15 sectors of the economy and carried out two representative surveys of close to 13,000 enterprises from these sectors. The conceptual framework adopted follows a concept developed by the OECD in 1999 which has been widely used in e-business statistics since. It is based on a three-part-analysis of the uptake of information and communication technologies and their application for e-business: (a) infrastructure ("readiness"), (b) activities and (c) impacts (more information available at www.ebusiness-watch.org).

This is the second and Final Synthesis Report of the first period of the *e-Business W@tch*. The executive summary presents an assessment of the overall "e-proximity" of the 15 sectors analysed in 2002/03, using a concept similar to the "e-Business Index" of the Council Resolution on the implementation of the eEurope 2005 Action Plan. Part A summarises the statistical picture, focusing on results of the e-Business Survey 2003, and features an international e-business outlook. Part B of the report presents a synopsis of the Sector Impact Studies, focusing on the recent series of seven sector studies with 2003 data that were not included in the first Synthesis Report from March 2003. Part C adds contributions on specific electronic business issues from various authors, for example on internet trading platforms and on the challenges for small and medium-sized enterprises.

Research presented in this report is intended to contribute in benchmarking progress and in assessing how electronic business developments can be further enhanced to strengthen the competitiveness of European businesses. Special attention is paid to the SME dimension of e-businesses, notably SMEs. The *e-Business W@tch* will continue its operation on similar methodological lines, focusing on the ten most interesting sectors and increasing the dialogue with industry associations and e-business stakeholders across Europe.

[1] eEurope 2002 Action Plan, prepared by the Council and the European Commission for the Feira European Council, 19-20 June 2000; eEurope 2005 Action Plan, COM(2002)263 final

Part A: Synopsis of Main Findings

A.1 Executive Summary

1.1 Main findings and trends in 2002/03

In spite of the continuing overall difficult economic situation and market conditions for business innovation and investment, electronic business continues to show a dynamic development in the European Union. New technological developments (wireless access technologies, for example) on the one hand, and the increasing competitive pressure on companies in a global economy on the other, resulting in a constant search for opportunities to cut costs, are the main drivers. Innovation in electronic business always implies new opportunities as well as challenges for enterprises.

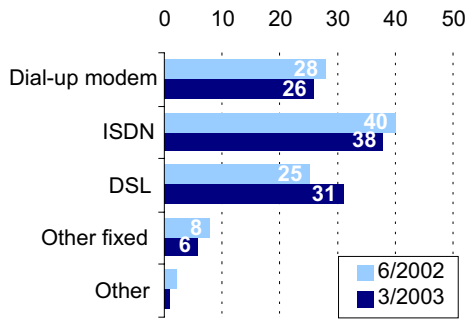
EU companies accounting for close to 60% of employment said in 3/2003 that e-business had already at least some significance for the way they operate. This is an increase by five percentage points compared to June 2002. About 11% said it constituted a significant part of their business activities. The share of companies which attribute significance to electronic business has increased in all size-classes, although in the smallest size-class only marginally.

Improvements in infrastructure – from basic access to quality connections

The e-Business Survey 2003 confirmed that a vast majority of enterprises from all sectors and countries uses computers and has Internet access. 93% of all employees from the seven sectors surveyed in March 2003 work in companies that use computers and 87% in companies with Internet access. As in 2002, the share of "offliners" was found to be highest in retail and in the food and beverages producing industry.

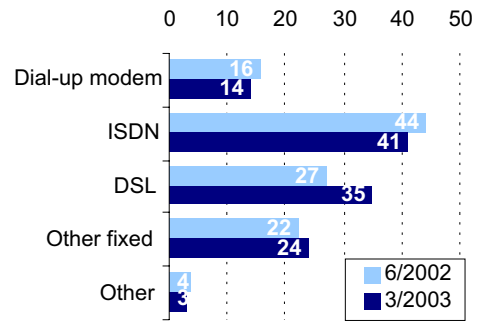
In the 2002/03 report, it was pointed out that "[…] there are still significant differences with respect to the quality of businesses' Internet access, especially with regard to bandwidth", and that the diffusion of broadband connectivity, particularly among SMEs, would be an important issue to be monitored. This objective is backed by the eEurope 2005 Action Plan which dedicates a whole action line to the deployment of broadband. In fact, the e-Business Survey 2003 indicates an incipient migration towards DSL connections among small and medium-sized enterprises. This is a promising trend, although it needs to be confirmed and consolidated by future research. The share of small companies using DSL connections has increased from 25% to 31% of all firms connected to the Internet, the respective share of medium-sized enterprises from 27% to 35%.

Exhibit 1-1: Internet connection mode in small enterprises (0-49 employees) – 2002/03



In % of enterprises. Base: small enterprises with Internet access, EU-4 (D, F, I, UK), 7 sectors. N=1393 (2002); N=1397 (2003).

Exhibit 1-2: Internet connection mode in medium-sized enterprises (50-249 employees)



In % of enterprises. Base: medium-sized enterprises with Internet access, EU-4 (D, F, I, UK), 7 sectors. N=779 ('02); N=819 ('03).

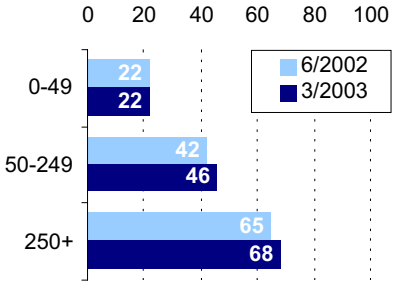
Source: *e-Business W@tch* (2002/03)

From remote to wireless

Enabling remote access to the company's computer network is a second important aspect and indicator of how advanced a firm's ICT infrastructure is. Remote access is a technical prerequisite to facilitate flexible work forms such as mobile work and homebased telework. The technical infrastructure is currently most widespread in high-tech manufacturing and service sectors. In ICT services, for example, more than 70% of employees already work for companies where remote access is possible. The average deployment of remote access was 43% (of employment) in the seven sectors covered in 2003, with an observable increase in medium-sized and large companies compared to 6/2002.

A rather recent development in the area of electronic business is the "wireless revolution". The current furious pace of wireless access technology development presents new opportunities and challenges for enterprises – for innovation of work and production processes on the one hand, and for new business opportunities on the other. Many IT and e-business experts forecast that the "wireless revolution" will dramatically change the way in which the Internet is being used by consumers and companies. However, at the same time, wireless access technologies open up a new field of relevant IT skills which companies need to possess in order to successfully implement and use them. As these technologies become more and more widespread, it will be important to monitor and assess their impact on business processes and companies.

Exhibit 1-3: Companies enabling remote access to their computer system



Base: all enterprises, 7 sectors, EU-4.

Source: *e-Business W@tch* (2002/03)

W@tchlist *– this will be important:*

- Continue monitoring of the diffusion of broadband connectivity, particularly among SMEs
- Assessment of regional ICT infrastructure policy with respect to demand from businesses
- Deployment of remote access to companies' IT networks as a prerequisite to facilitate flexible and mobile work
- Impact of emerging wireless web access technologies on business activities
- Assessment of the IT skills gap in 2003/04 – is it a phenomenon of the past?

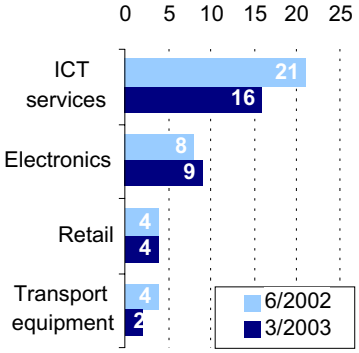
The IT skills gap has narrowed, but not totally disappeared

Results of the e-Business Surveys 2002 and 2003 suggest that the "IT skills gap" is less dramatic than in the Internet and IT boom years of 1999 and 2000. Linear projections from those years which could not anticipate the economic developments since 2001 are no longer valid. The *e-Business W@tch* has evidence that the percentage of companies seeking IT specialists in 2002/03 was even lower than in 2001/02. While 14% of all companies and close to 50% of large companies had reported recruitment activities for the 2001/02 period, only 8% of all companies and 40% of large companies reported demand in 2002/03.

However, in spite of the lower level of activities, the percentage of companies that reported difficulties in finding adequate personnel remained the same. On average, about 5% of all enterprises experienced difficulties (compared to 6% in 2001/02). It can be speculated that the percentage would not differ very much for other qualifications than IT.

At the same time, as the complexity of e-business implementation and integration is increasing (which demands managerial as well as technical know-how), career opportunities for people with a sound qualification mix in areas relevant to e-business will continue to be excellent. Furthermore, demand is likely to increase again once the economy starts to recover (albeit not at the frenzied recruitment level of 2000). It would therefore be short-sighted to step back from ambitious programmes and initiatives launched to improve the skills base.

Exhibit 1-4: Companies with difficulties in finding IT specialists in 2002/03 (selected sectors)



Base: all companies, EU-5 / EU-4.
In % of companies.

Source: *e-Business W@tch* (2002/03)

"Challenge 1: To improve managerial understanding and workforce skills for e-business"

"[…] In general, SMEs face greater difficulties than large companies, both in recruiting ICT and e-business specialists to cope with the associated organisational changes and to train their employees to acquire the skills required to implement these changes. Improving the e-skills of the general workforce is critical to the successful implementation of e-strategies in businesses. There are different paths to this goal, but in most cases a combination of different ways of learning (or "blended learning"), both formal and informal, will be the most effective, typically consisting of traditional training, self-learning and learning-on-the-job. […] a dialogue between all relevant stakeholders on the certification of skills developed through informal and on-the-job training should be fostered."

from: Adapting e-business policies in a changing environment: The lessons of the Go Digital initiative and the challenges ahead. Communication from the Commission, COM(2003)148 final.

E-commerce activities: rapid development of online purchasing

In a special report on "The development of e-commerce in the European Union" in May 2002, the *e-Business W@tch* assessed the maturity of e-commerce in the EU. The report concluded that "[…] a general disappointment with the speed of adoption of electronic commerce in the European Union may not be justified or at least exaggerated since it is partly based on a too limited and simplistic view of what constitutes electronic commerce" while acknowledging that "[…] growth dynamics has been very different across Member States, and that particularly small and medium sized enterprises – even in countries belonging to e-commerce forerunners – are now facing difficulties in taking the next step, which is to implement electronic commerce as an integrated part of their general business processes."

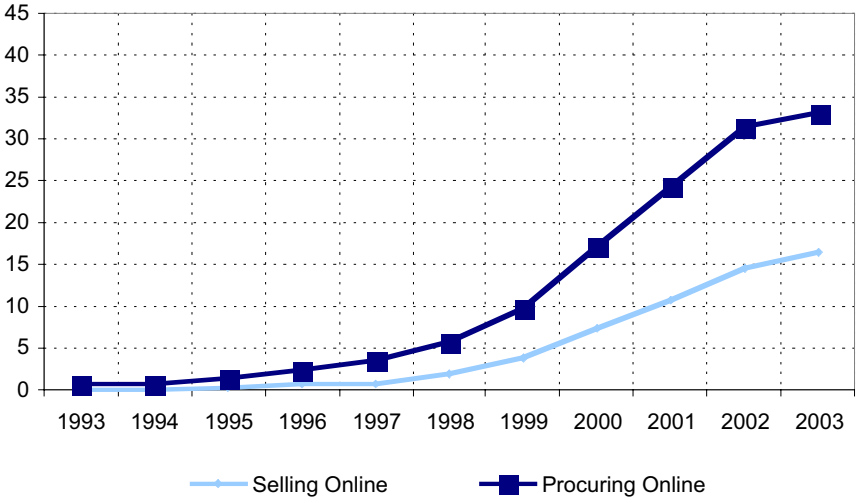
Now, about a year after this initial assessment, this finding is still valid, although a quite dynamic development can be observed in specific areas of e-commerce. The main trends can be summarised in three points:

- Online selling – at least in the narrow sense of making transactions with customers through online networks – has not yet reached the volumes that were anticipated a few years ago during the boom time of the Internet economy. This observation does not only apply to the percentage of companies that offer goods or services online, but also to the volume of online sales (as % of total sales). More than 70% of the companies selling online in 2003 report that online sales account for less than 10% of their total sales. Thus online selling is typically a sideline complementing the main sales channel(s).
- Electronic procurement, on the other hand, has shown a rapid development since the late 1990s, if simple forms of e-procurement such as making online purchases via the website of suppliers are included. One in three enterprises of the seven-sector-sample surveyed in March 2003 and 58% of large enterprises make online purchases of MRO[2] goods or direct production goods.
- With respect to online selling, particularly in the B2C arena, it should not be forgotten that web-influenced sales play a very important role in some retail areas (for example, used cars), but are not covered by most current statistics on "online sales", including the *e-Business W@tch* statistics. Web-influenced sales are sales where customers first search for information about the availability and the price of products and services on the Internet before buying the selected item in a "traditional" way, possibly in the shop that had the best online offer.

[2] MRO goods are "maintenance, repair and operating goods".

Exhibit 1-5: Diffusion of e-commerce in EU companies, 1993-2003

Computed based on questions on the starting time of online selling / procurement activities.



In % of enterprises. Base: Survey 2003, 7 sectors, companies selling / purchasing online

Source: *e-Business W@tch* (2003)

It is very difficult to assess the total share of online sales compared to the level of traditional forms of ordering and purchasing goods and services, including both B2C and B2B transactions. In the United States, the Census Bureau of the US Department of Commerce estimated e-commerce based sales as a share of total U.S. retail sales at approximately 1.5% in the first quarter of 2003, while the share of online transactions in the B2B area was estimated at a much higher level.[3]

The *e-Business W@tch* does not have figures on absolute (online) sales volumes, but has asked companies that sell online to estimate the percentage of their total sales volume that is actually conducted online, including both sales through websites and through EDI. A simple computation of the answers, assuming that the average share will rather be towards the lower end in each of the ranges offered as options for their answer,[4] suggests that companies from the 15 sectors surveyed in 6/2002 made about 2% of their total sales online (including both B2B and B2C sales).[5] Figures are highest for those sectors where one would, in fact, expect online sales to be particularly important: tourism (5%), media and printing, insurance, ICT services (about 4% each) and retail (3%).

The same computation based on results from the 3/2003 survey (which only included seven sectors) leads to very similar results, suggesting a total share of online sales of 2.3% for the seven sectors. Tourism is again the leading e-commerce sector, with 5%. However, these figures should be used with great care as the computation method is necessarily a crude approximation.

If the same method is used to assess the importance of e-procurement as a share of total procurement, results suggest that EU companies made about 5% of their total purchases online in 2002. This includes MRO goods and direct production goods. The e-procurement leaders are ICT services (10%), the electrical machinery and electronics industry and business services (7% each). Again, figures for 3/2003 point at a very similar share on the aggregate level (6%). Results differ for some sectors, though, most notably for the e-procurement leading ICT industry, where companies reported much higher volumes of goods and services purchased online than in 2002. Notwithstanding the many uncertainties implied by this computation, the figures are very much in line with a similar estimate by the UK Department of Trade and Industry for the UK. The international benchmarking study 2002 "Business in the Information Age" reports that "On average, UK businesses that order online place 15% of the total value of their purchases online." (p. 61). Considering that about 50% of

[3] cf. chapter on "Worldwide Trends in e-Business"

[4] Companies were given five options for their answer: "less than 5% of total sales", "5-10%", "11-25%", "26-50%" and "more than 50% of total sales".

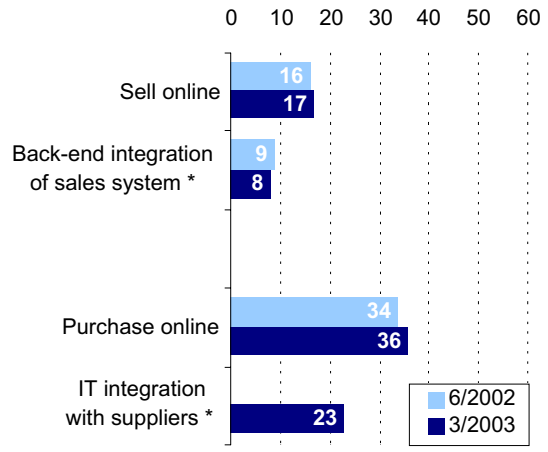
[5] The figure adjusts for the larger sales volumes of large companies by using employment-weighted figures. This is, of course, a crude approximation. As many companies did not provide information about their total turnover, however, it was the next best indicator for the sales volume.

all UK businesses place online orders[6], the share of orders placed online – as % of total procurement – would be around 7-8%, which reflects very closely the estimate of the *e-Business W@tch*, which computes a share of 6.3% for UK businesses in 2002.

E-commerce and e-business integration

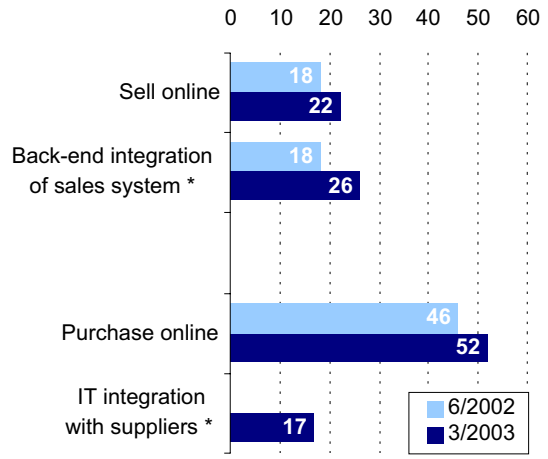
The European E-Business Report 2002/03 pointed out that one of the main challenges for companies was to move from e-commerce as a sideline activity to considering e-business as an IT based integration of business processes in general. The 2003 survey indicates that this process is under way, particularly among companies which have the critical minimum size – e-integration is less important for very small companies. One example that supports this observation is the share of online-sellers among medium-sized companies that reports that the e-commerce system is integrated with their back-end system. The share has increased from 18% (6/2002) to 26% (3/2003). About 20% of all companies that make online purchases themselves have integrated their IT system with the system of a supplier for that purpose.

Exhibit 1-6: E-commerce activities and integration in small enterprises (0-49 employees) – 2002/03



In % of enterprises. Base: small enterprises / * small enterprises selling / purchasing online, EU-4 (D, F, I, UK), 7 sectors. N=1637 for 2002; N=1697 for 2003.

Exhibit 1-7: E-commerce activities and integration in medium-sized enterprises (50-249 employees) – 2002/03



In % of enterprises. Base: medium-sized enterprises / * medium-sized enterprises selling / purchasing online,. EU-4 (D, F, I, UK), 7 sectors. N=798 for 2002; N=834 for 2003.

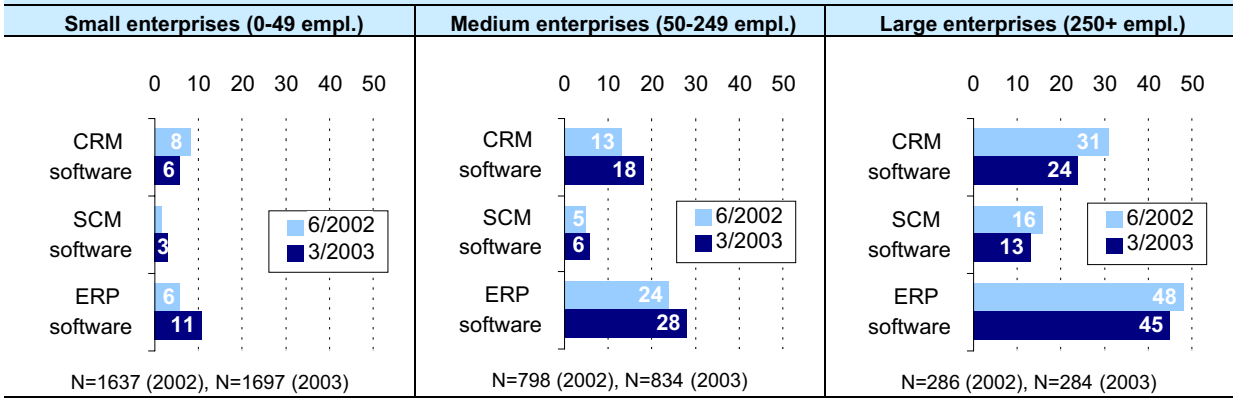
Source: *e-Business W@tch* (2002/03)

Business process integration can be greatly facilitated by – and, particularly in the case of large companies, may demand – quite advanced e-business solutions. Their implementation, however, is cost intensive, requires a high level of managerial skills, and can have a deep impact on processes in the enterprise. Such e-business software includes Customer Relationship Management (CRM), Supply Chain Management (SCM) systems and Enterprise Resource Planning (ERP) systems. There is no clear trend as regards their diffusion between 6/2002 and 3/2003. Medium-sized enterprises report increased use, while figures for large enterprises were lower than in the 2002 survey.

The rather low overall diffusion rates seem to be in contrast with the vast amount of market research and strategic literature on this software market. It must be considered, however, that they present a very important market for large software companies and IT consultants, and, secondly that these software systems are in fact widely used by the large companies in many sectors.

[6] This figure for UK companies is exactly the same in the DTI benchmarking study and in the *e-Business W@tch* survey 2002.

Exhibit 1-8: Diffusion of software solutions for business processes integration by size-class



In % of enterprises. Base: all enterprises in the respective size-class, EU-4.

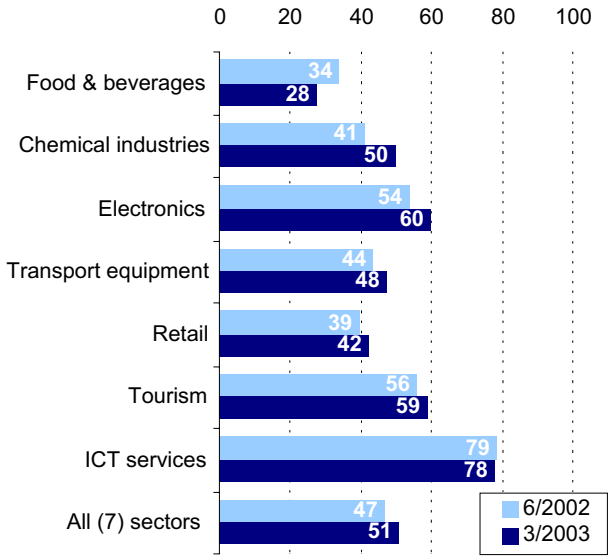
Source: *e-Business W@tch* (2002/03)

Integrating business processes is not restricted to the use of complex e-business software, though. Online technologies are increasingly used for a number of processes which characterise working routines in companies and facilitate exchanging information with customers and suppliers. 42% of employees work in companies that exchange documents electronically with suppliers and customers (2003). 12% of enterprises (accounting for 21% of employment) used online tools for collaboration in designing products, and 10% to forecast product demand, which is most important for industries keeping a stock of produced goods.

Every second enterprise considers e-business as relevant

More than 50% of the companies from the seven sectors surveyed in 3/2003 (accounting for 60% of employment) said that e-business constituted a "significant part" or "some part" of the way they operated. There are great differences, however, between sectors. In fact, in general the perception of companies of how important electronic business has become for their activities reflects very well the more "objective" profile based on indicators on the diffusion of ICT and e-business applications.

Exhibit 1-9: Companies reporting that e-business has at least "some significance" for the way they operate (2002/2003)



In % of enterprises from a sector. Base: all enterprises in the sector, EU-4 (2002), EU-5 (2003).

Source: *e-Business W@tch* (2002/03)

***W@tchlist** – this will be important:*

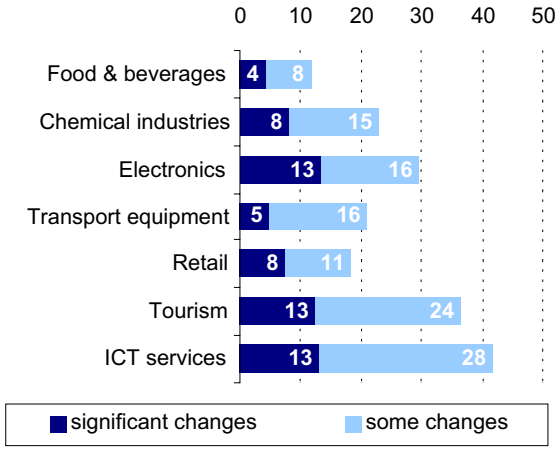
- Learning from others: To promote and disseminate good e-business practice for specific sectors and to consider requirements of SMEs
- Statistical effort to improve metrics for measuring impact, for example the impact of e-business adoption versus non-adoption on competitiveness
- Further monitoring of the impact of electronic business on industry value chains, for example on the distribution of power between different players in the supply chain
- Dis-intermediation or re-intermediation: Examine the role of intermediaries in various sectors and the emergence of new e-intermediaries
- Implications of e-business for competition policy on the national, European and global level

On the other hand, companies are not enthusiastic, but quite down-to-earth in their forecast of the role which electronic business will play in the future. "E-business sceptics", who say that electronic business does not play a significant role today for them and will not do so in the future, still constitute about 50% of all enterprises. This attitude need not necessarily be a pessimistic one in all cases, but can also be seen as an approach that considers e-business as a normality, rather than something which is "very significant".

The impact is currently perceived most significant in those sectors which manufacture or operate IT and electronics themselves (ICT services, electronics industry) and in sectors with a high potential for digitisation of service delivery (publishing, business services). In tourism, the awareness of e-business impacts is also very high. On the other hand, there are late adopters where only about a third of firms reports that e-business is already important. The most “conservative” sectors in this respect are the food and beverages industry, retail and the manufacture of metal products. As a general rule, and as can be expected, "high-tech" sectors which produce ICT components themselves or offer related services have a greater proximity to using information and communication technologies than other sectors. Secondly, there are sectors where e-commerce has had far-reaching impacts on the value and supply chain, for example on the role of intermediaries. Tourism is a good example. Although many tourism sub-sectors are basically "low-tech", the level of e-business awareness and the perceived impact is extraordinarily high.

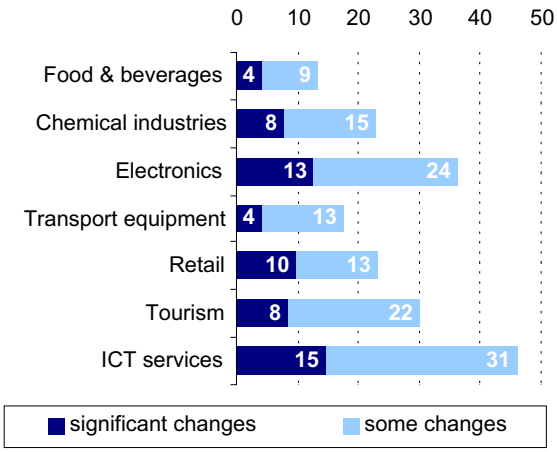
The most significant impacts of e-business concern the internal work processes. More than a quarter of all enterprises say that these have significantly or somewhat changed as a consequence of introducing electronic business processes. However, the assessment of changes on the organisation structure and the relations to customers and suppliers is very similar.

Exhibit 1-10: Impact of e-business on customer relationship (2003)



In % of enterprises.
Base: all enterprises, EU-5 (D, E, F, I, UK), 7 sectors. N=3515.

Exhibit 1-11: Impact of e-business on relationships to suppliers (2003)



In % of enterprises.
Base: all enterprises, EU-5 (D, E, F, I, UK), 7 sectors. N=3515.

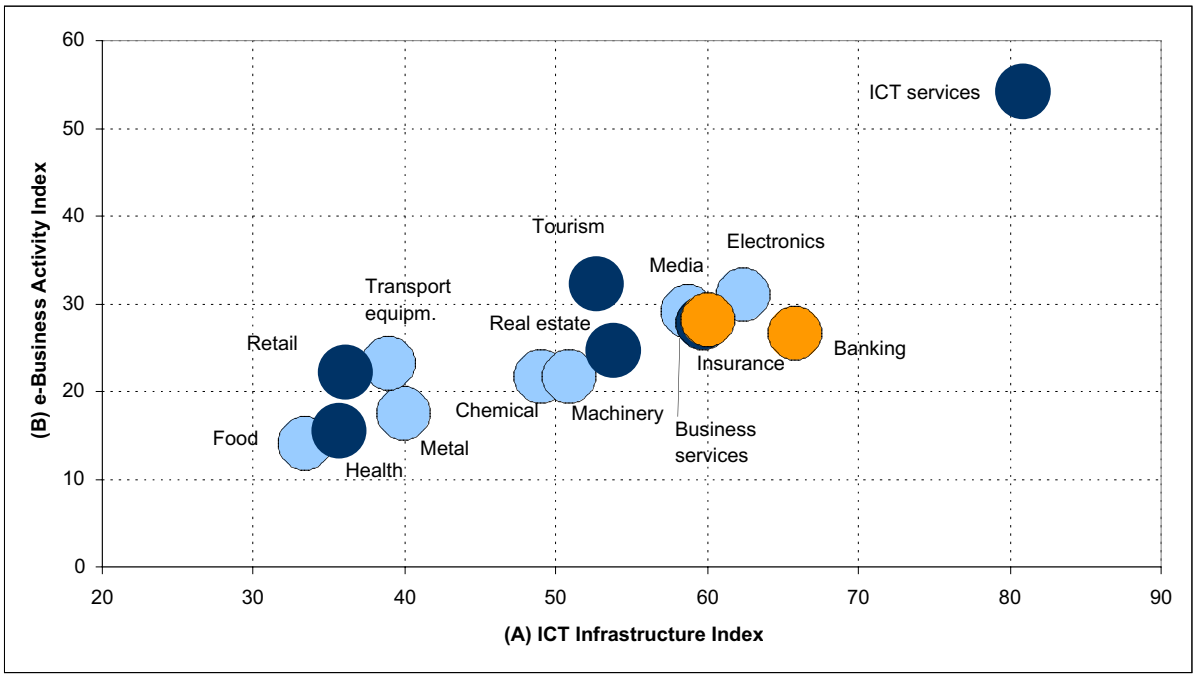
Source: *e-Business W@tch* (2002/03)

1.2 E-champions and late e-adopters: the eEurope E-Business Index for sectors

The eEurope 2005 Action Plan endorsed by the Seville European Council in June 2002 calls for the benchmarking of its main targets. One of these targets is that, "by 2005, Europe should have (…) a dynamic e-business environment". In order to track the progress achieved, a plan for benchmarking the targets of the eEurope 2005 Action Plan was adopted. As a contribution to these benchmarking plans, the Enterprise Directorate General proposed the inclusion of the "E-Business Index", to adequately capture the complexity of the dynamic e-business environment. Eurostat will deliver the data to perform the benchmarking of e-readiness in the EU Member States and of the EU as a whole.

Based on the methodology proposed by DG Enterprise, the *e-Business W@tch* has calculated in a pilot the E-Business Index from a sectoral perspective for the 15 sectors monitored in 2002 and 2003, using the survey results of the 2002 e-Business Survey. The Index is composed of two subindices, namely the ICT Infrastructure Index and the e-Business Activity Index.[7]

Exhibit 1-12: The E-Readiness of 15 sectors of the EU economy (based on the eEurope 2005 E-Business Index)



light circles: manufacturing sectors; dark circles: service sectors / financial services (orange)

Source: *e-Business W@tch* (2003)

It is clear that this kind of statistical aggregation necessarily conceals a more differentiated picture of e-business within a sector. In transport equipment manufacturing and in the food and beverages sector, for example, large companies and multinationals in particular are among the leaders in exploiting advanced e-business applications, while smaller companies are much less advanced. As a result, if component indicators are defined as "…% of enterprises (having adopted … or engaging in a specific e-business activity)", the indicator is biased towards the situation in smaller companies which are larger in number. With this caveat in mind, results of the pilot are still useful to demonstrate the different role and importance of ICT across various sectors of the economy. We have grouped sectors into four categories according to their "e-proximity" in 2002/03:

[7] Some of the component indicators had to be adapted in order to comply with the availability of data sources. For a detailed description of the approach and a discussion of methodological issues see the contribution by Simon Robinson in part D of the report.

Exhibit 1-13: Tentative typology of sectors according to their "e-proximity"

The e-champion(s)	The e-intensive sectors	The e-specific sectors	The late e-adopters
• ICT services	• Electrical machinery & electronics • Banking / leasing • Insurance & pension funding • Media & printing • Business services	• Tourism • Real estate • Machinery and equipment • The chemical industries	• Transport equipment • Metal products • Food, beverages & tobacco • Retail • Health and social services

The e-champion(s)

- *ICT services* (***Index: 68***)

The sector which makes the most intensive use of information and communication technologies and e-business applications is the **ICT sector** itself. This was to be expected, as the sector is predestined for e-business in many ways (cf. Sector Reports). In this regard, the ICT sector is a special case with respect to e-business and should not be used as a benchmark for other business activities of a totally different nature. However, notwithstanding these differences, there may be some lessons to be learned from telecommunications and computer services companies. One such lesson is how to exploit ICT for managing business processes, for example when dealing with a large number or customers by making customer service more efficient through using online as a key sales and communication channel.

Although ICT services companies had to manage falling demand for their products in 2001 and 2002 rather than concentrating on the implementation of new e-business strategies, they are still the e-leaders in many respects. In fact, they focused on areas where ICT and e-business investments promised to help cushion the impact of the demand downturn. It certainly helped them that they are familiar with concept and technology, as they are suppliers of the most essential elements for conducting e-business themselves.

The e-intensive sectors

- *Electrical machinery & electronics* (***Index: 47***)
- *Banking / leasing* (***Index: 46***)
- *Insurance & pension funding* (***Index: 44***)
- *Media & printing* (***Index: 44***)
- *Business services* (***Index: 44***)

This group includes the two **financial services** sectors (banking, insurance and pension funding), which are intensive users of ICT networks in general and of specific applications, for example – as they are dealing with a large number of customers – CRM software. Optimising customer relationship is a major focus of e-business in both sectors, and – as can be expected – in fact they report far above average impacts of e-business on customer relationship. Internal processes (such as handling claims in insurance companies) are another important ICT application area for financial service companies promising massive cost savings.

Two sectors which belong to the "converging industries" – the media and the electronics industry (including consumer electronics) – are also among the e-intensive sectors, but with a different focus and profile. The **electrical machinery and electronics** industry is a fast and advanced adopter of sophisticated electronic business applications for improving supply chain and production processes. For example, the sector is the leader – even ahead of ICT services – in using IT supported ERP, and is one of the forerunners in implementing advanced e-procurement systems.

In a very different way, **media and printing** companies also use e-business for their supply chain processes. Here, many of the goods and services traded between companies or between companies and consumers can be digitised and are therefore predestined for being delivered, sold or bought electronically. A good ICT infrastructure is therefore an important requirement for companies in this sector.

Finally the **business services** sector is among the e-intensive sectors, albeit not in all respects. This sector is in itself quite heterogeneous, and different e-business applications are not equally suitable for all sub-sectors. A special characteristics of this sector – which partly explains its comparatively high Index value – is that even small businesses are quite advanced in using ICT, in contrast to other sectors, where the digital divide between small and big firms is much larger.

The e-specific sectors

- *Tourism* ***(Index: 43)***
- *Real estate* ***(Index: 39)***
- *Machinery and equipment* ***(Index: 36)***
- *Media & printing* ***(Index: 44)***
- *Chemical industries* ***(Index: 35)***

This group is constituted by sectors which are very different by nature and consequently focus on specific aspects of electronic business each. The **tourism** sector, for example, shows a high e-Business Activity Index – mainly because it is a leader in online selling. The large players and tourism networks have been pioneers in adopting and developing new ICTs since the 1970s (Computer Reservation Systems). After Global Distribution System in the 1980s, the Internet has now become the new channel for interactions. It is impacting on the role of traditional intermediaries and has favoured the entry of new e-intermediaries.

The other service sector in this group is the **real estate sector**. Although the nature of business activities and the structure of the sector value chain are quite different from tourism, there are some similarities as well. For both sectors, the Internet is an increasingly important marketing channel to inform potential customers about the offer, be it destinations in tourism or property in real estate. The difference is that reservations are easily made online in tourism while property is not typically "sold" online (in the sense of performing the act of buying), which is the reason why real estate scores (statistically) low in the category "companies making online sales".

There are also two manufacturing sectors in the group of "e-specific" sectors. The e-business profile of the **chemical industries** differs very much between the large players and the smaller companies of the sector. Several companies in the chemical industries use e-business extensively. These companies – large and established household names – make up the largest share of media coverage about e-business in the sector. As they do not constitute the majority of enterprises, however, their dominance in the media may bias the perception of the state of e-business in the chemical industries. On the aggregate level, the chemical industries are still below expectations and also below their e-business potential. The current e-business focus in the sector is on improving the efficiency of business processes.

The **machinery and equipment** manufacturing sector is very much shaped by small and medium sized companies, operating in highly competitive domestic markets with increasing competition from overseas producers. Efficient management of supply chains constitutes the fabric of the sector. Against this background, many within the industry predicted a fertile ground for e-business investment and a widespread e-transformation of the sector. Scenarios illustrated the rise of Internet based sales, procurement and information exchanges, with production in the middle being linked to both. In fact, e-procurement is by far the most widely used application, while the adoption of e-sales was significantly lower. All in all, the sector has still untapped e-potential. This is an important challenge for EU companies to stay competitive in the context of a fierce global competition in this sector.

The late e-adopters

- *Transport equipment* ***(Index: 31)***
- *Metal products* ***(Index: 29)***
- *Retail* ***(Index: 29)***
- *Health and social services* ***(Index: 26)***
- *Food, beverages & tobacco* ***(Index: 24)***

Finally, there is a group of sectors where the diffusion of ICT and e-business applications is significantly lower compared to the other sectors. Quite unexpectedly, the **transport equipment manufacturing** sector is among them. Although large automotive companies and OEMs (original equipment manufacturers) act as e-business pioneers not only in the sector itself, SMEs are still rather reluctant. This can partly be explained by the fact that production in transport equipment subsectors other than the automotive industry is characterised by the domination of small production lots, often individually ordered products. The use of tools designed to address large customer groups, such as the Internet, does not play a significant role for these manufacturers on the sales side.

The potentials of e-business suggest that there should be a strong interest in the **metal products** industry to engage in new ways of doing business, but e-business is not yet a big issue in this sector. Opportunities were mainly discussed during the Internet boom time around 2000, but the topic seems to have lost its appeal for many enterprises from the sector. One of the reasons is that business in this sector is frequently conducted on the basis of personal and long-standing relationships with suppliers and customers. Firms are often specialised in a number of niche products and serve rather small market segments. The number of suppliers and customers for each individual firm is limited, leaving little room for efficiency gains from e-business tools such as CRM or e-procurement.

The **retail sector** is also characterised by a considerable gap between the actual and potential deployment of e-business, since the network organisation of the sector should constitute the ideal application area for e-business applications. The sector is characterised by rather low sales margins, and competition is therefore based on the reduction of purchase prices and on the optimisation of stock of products (and capital). In fact, the main areas in which retailers are investing in applications are supply chain configurations, management of store operations and interaction with customers. The low index value is partly a result of many micro enterprises in the sector which cause diffusion of ICT to be low if expressed in "% of enterprises".

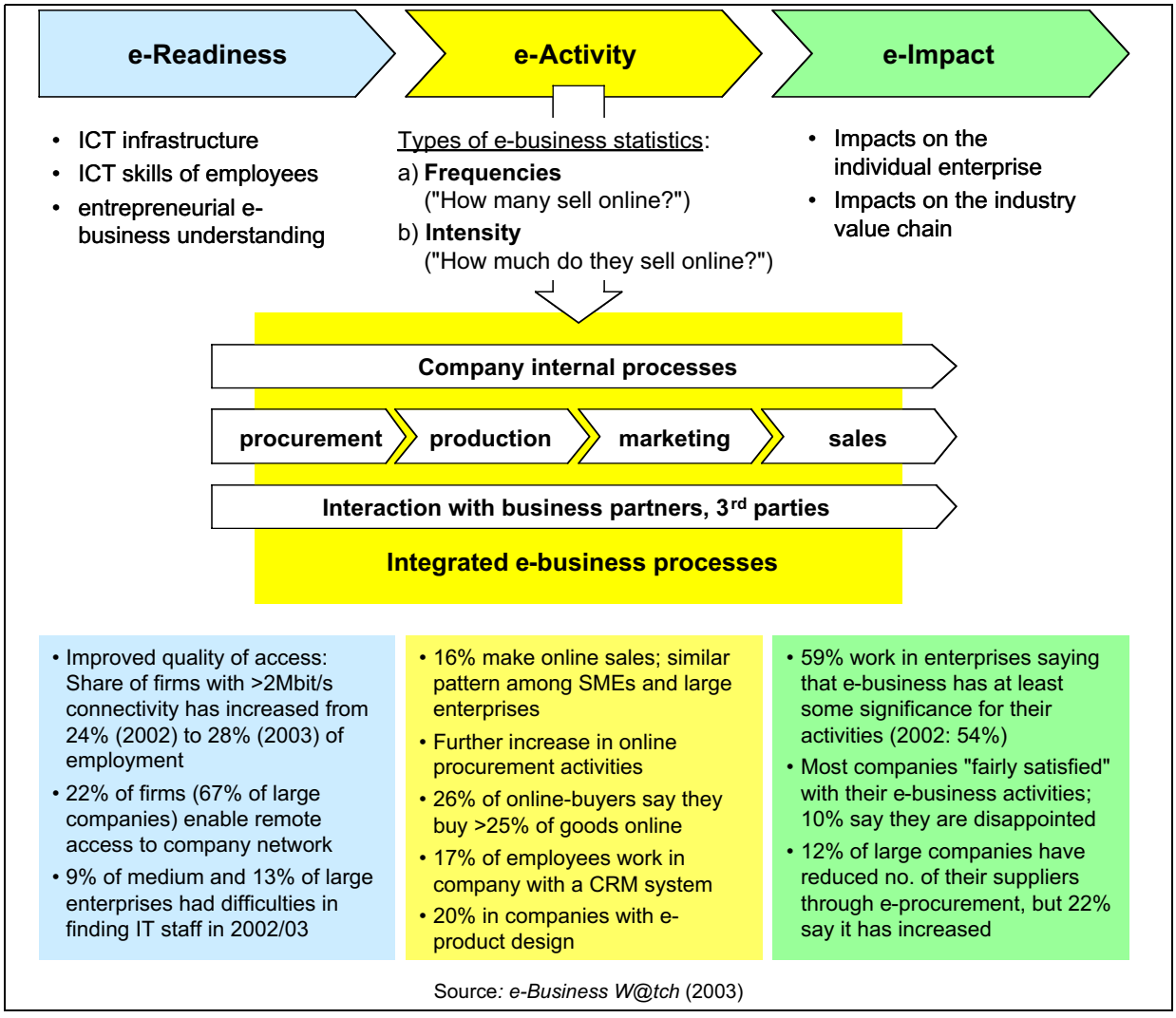
The same applies to the **food and beverages** industry, where large multinational companies (usually leaders in their sectors) are the most technologically advanced companies, while smaller companies lag behind in adopting ICT, particularly upstream of the various product lines. In this sector, e-business mainly involves in-house company processes and procedures. Sophisticated technologies and applications, however, are less pervasive than in other manufacturing sectors.

In recent years the **health and social services** sector has made considerable progress towards accessing more advanced, digital telecommunications networks via ISDN, DSL or fixed connections, and access to Internet services has equally improved. A variety of issues, however, hamper the wider application of e-business solutions, and the sector as a whole, in spite of its economic significance, is trailing behind almost all other economic sectors. Key hurdles for advanced applications in the health sector are technical infrastructure issues: legacy medical and task-specific information systems, stand-alone systems for various administrative tasks, or investments in EDI, and mainframe computers rather than client-server platforms.

A.2 E-Business in the EU in 2003: the statistical picture

This chapter provides an overview of the state of adoption of electronic business by enterprises from the EU economy. It is largely based on the two surveys which the *e-Business W@tch* carried out in June 2002 and March 2003. As the e-Business Survey 2003 focused on 7 sectors, comparisons between the two surveys will be restricted to the total of these sectors.[8] Analysis for further sectors – 15 in total – was presented in detail the E-Business Report 2002/03. The recent survey confirms that the nature and role of electronic business differ considerably by business activity in many ways. The application of ICT for business purposes depends, for instance, on whether companies are dealing with large numbers of consumers or mainly with smaller numbers of other businesses, on the kinds of goods or services they produce, and on the sector specific value chain.

The structure of the presentation in this chapter is based on a widely used conceptual framework for the analysis of electronic business proposed by the OECD[9]. The analysis of e-activities mirrors a simplified company value chain. Analysis looks at how ICTs are used to support business processes within the enterprise, interaction with business partners, procurement and production processes and finally marketing and sales activities.



Source: *e-Business W@tch* (2003)

[8] cf. Annex: Methodology of the e-Business Survey 2003

[9] cf. Colecchia, Alessandra / Pattinson, Bill / B. K. Atrostic (2000): Defining and Measuring Electronic Commerce. A discussion paper, OECD, Paris. February.

2.1 ICT infrastructure and skills development in EU enterprises

Signs of migration towards broadband connectivity

The e-Business Survey 2003 confirms that a vast majority of enterprises from all sectors and countries uses computers and has Internet access. 93% of all employees from the seven sectors surveyed in March 2003 work in companies that use computers and 87% in companies with Internet access. Figures are slightly lower than in 2002, but the difference is within the confidence interval of the survey and should not be interpreted as a decline in connectivity.[10]

In fact, the basic equipment of companies with computers and Internet access has reached a point of saturation. Many of those who are not connected in 2003 are likely to remain offline. These are mainly micro enterprises with less than 5 employees and very specific business activities where it is difficult to gain advantage from using online technologies. As in 2002, the share of "offliners" is highest in retail and in the food and beverages producing industry.

The high figures for basic PC and Internet diffusion do not say anything about the quality of the equipment and the intensity of usage, however. In fact, the e-Business Survey 2003 indicates that EU companies are upgrading their Internet connections. In particular, survey results suggest a migration from ISDN to DSL connections. In 3/2003, 31% of companies from the EU-4 (D, F, I, UK) with Internet access used a DSL connection, which is an increase by 6 percentage points since 6/2002. In the same period, the share of ISDN connections decreased from companies representing 39% to 32% of employment.[11] The significance of this positive trend is further strengthened when considering that the sample of businesses in the survey 3/2003 does otherwise not have a higher propensity towards ICT and e-business than in 2002 (see footnote). It should be noted, however, that a good deal of this increase stems from the automotive industries, where a considerably higher share of medium-sized and large enterprises from the sector reported broadband access in 2003 than in 2002.

The Industry Connectivity Index and the SME Connectivity Index[12] - a pilot by the *e-Business W@tch* - show that companies from sectors where ICTs are an important part of the products and services are best equipped with Internet access. The bandwidth improvement in connectivity from 6/2002 to 3/2003 is not yet pronounced enough, however, to cause major changes in the index across all sectors. This can be explained by the fact that the Index only computes an increase in bandwidth with more than 2 Mbit/s, but most DSL connections – while presenting a considerable improvement compared to analogue dial-up connections – do not fall within this range.

Exhibit 2-1: Industry Connectivity Index and SME Connectivity Index for seven sectors (2002/03)

	Industry Connectivity Index		SME Connectivity Index	
	6/2002 (EU-4)	3/2003 (EU-5)	6/2002 (EU-4)	2003 (EU-5)
Food, beverages and tobacco	37	37	28	25 *
The chemical industries	54	52	37	34
Electrical machinery and electronics	60	58	42	41
Transport equipment	46	62 **	30	33
Retail	38	38	29	29
Tourism	41	42	37	37
ICT services	69	71	52	52

The index considers (a) the diffusion of Internet access in a sector and (b) the quality of their access in terms of bandwidth. It can take a maximum value of 100.

* decrease is partly due to different sample composition in 2003

** share of medium-sized and large enterprises from the sector reporting broadband access was much higher in 2003 than in 2002

Source: *e-Business W@tch* (2003)

[10] cf. Annex 3: Methodology of the Surveys, Specific note 1

[11] The change in % of enterprises is less pronounced, though, from 40% (2002) to 38% (2003).

[12] cf. Annex 3: Methodology of the Surveys, Specific note 2

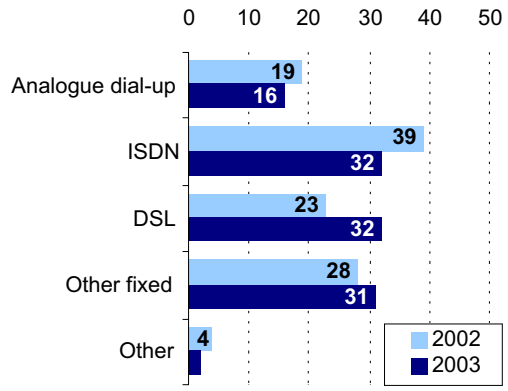
Exhibit 2-2: Computer usage and Internet connectivity

EU-5 by sector (2003)	Computer	Internet access	* Analogue modem	* ISDN	* DSL	* other fixed connect.
Food, beverages and tobacco	91	82	21	38	35	20
The chemical industries	99	97	13	24	30	39
Electrical machinery and electronics	100	98	8	23	33	45
Transport equipment	99	99	11	24	42	32
Retail	87	77	17	35	33	21
Tourism	93	88	21	33	37	12
ICT services	100	98	14	20	37	54
EU-5 by size-class (2003)						
0-49 employees	87	76	25	34	37	5
50-249 employees	100	98	13	39	39	22
250+ employees	100	97	8	23	34	47
EU-5 by country (2003)						
Germany	95	93	4	34	32	41
Spain	96	86	15	20	53	8
France	86	73	30	25	35	30
Italy	98	92	19	32	43	12
UK	92	87	23	32	23	31
Totals (2002 / 2003)						
2003 Total (EU-5, 7 sectors)	93	87	16	30	35	28
2003 Total (EU-4, 7 sectors)	93	87	16	32	32	31
2002 Total (EU-4, 7 sectors)	95	90	19	39	23	28

Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector / country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)". Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. *Base: enterprises with Internet access. EU-5 = D, E, F, I, UK. EU-4 = D, F, I, UK.

Source: *e-Business W@tch* (2003)

Exhibit 2-3: Migration from ISDN to DSL connections



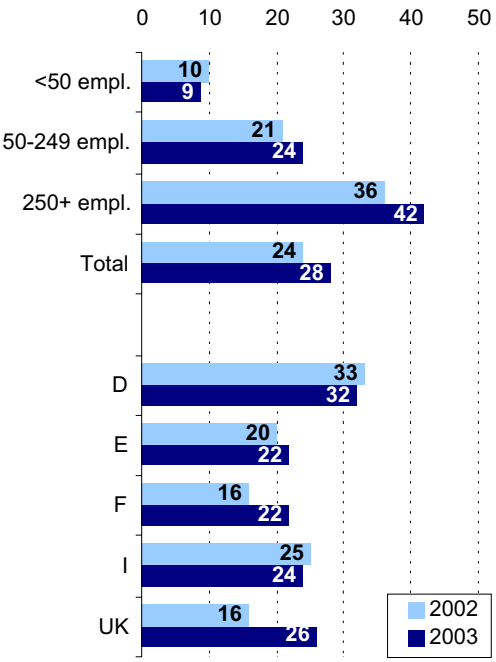
Notes on left figure:

Figures employment-weighted (read: "enterprises comprising …% of employment "). Base: enterprises with Internet access, EU-4 (D, F, I, UK), 7 sectors. N=2457 for 2002; N=2489 for 2003.

Notes on right figure:

Figures for countries and totals are employment-weighted (read: "enterprises comprising …% of employment within a country"). Figures for size-classes are to be read as "% of enterprises (within a size-class)". Base: all enterprises, EU-4 (D, F, I, UK), 7 sectors. N=2721 for 2002; N=2815 for 2003.

Exhibit 2-4: Companies connected to the Internet with >2 Mbit/s



Source: *e-Business W@tch* (2003)

As enterprises have connected to the Internet, the use of e-mail and of the WWW have become nearly ubiquitous in the world of business, and a vast majority of enterprises – except the smallest ones – have implemented a local area network (LAN) to connect their computers. Close to 60% of all enterprises with more than 50 employees, and 77% of large enterprises use an intranet. In large enterprises, the use of Internet applications for communication (e-mail) and information gathering (WWW) and of internal computer networks (LAN) are getting close to 100% diffusion. From a sectoral perspective, manufacturing sectors and the ICT services industry are more intensive intranet users than the businesses in the tourism and retail sectors.[13]

Exhibit 2-5: Usage of network applications and infrastructure

EU-5 by sector (2003)	E-mail	WWW	Intranet	Extranet	LAN	WAN
Food, beverages and tobacco	75	68	41	14	57	32
The chemical industries	94	91	62	27	81	49
Electrical machinery and electronics	98	95	77	25	89	57
Transport equipment	98	93	81	18	87	62
Retail	70	63	34	8	45	18
Tourism	85	77	32	10	46	18
ICT services	98	96	84	50	89	69
EU-5 by size-class (2003)						
0-49 employees	68	58	23	6	34	7
50-249 employees	96	90	58	21	81	30
250+ employees	97	93	77	30	90	66
EU-5 by country (2003)						
Germany	88	88	50	17	66	41
Spain	81	58	40	17	56	22
France	68	65	48	24	52	34
Italy	88	75	51	17	64	26
UK	85	85	52	12	63	37
Totals (2002 / 2003)						
2003 Total (EU-5, 7 sectors)	83	77	49	17	61	34
2003 Total (EU-4, 7 sectors)	83	80	50	17	62	36
2002 Total (EU-4, 7 sectors)	87	83	54	19	67	37

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

From access to remote access

Enabling employees remote access to the company's computer network is a pre-requisite for mobile and flexible forms of work. Remote access facilitates applications such as the retrieval of data restored in intranets and access to e-mails. This function may enhance the companies' business process efficiency. In fact, remote access is already widely deployed among enterprises. 46% of employees work in enterprises that have enabled this function (2003).[14] Two thirds of all large enterprises enable the remote log-in to their computer networks and more than one fifth of small firms (with <50 employees).

In companies comprising 30% of employment access is bound to a fixed network, while 14% also allow remote wireless access. 7% plan to introduce remote access by 3/2004. The realisation of implementation plans reported back in 6/2002 does not show in results of the 2003 survey at first sight, mainly because of the stagnation among small enterprises. There is indication for some progress in adoption among medium-sized (from 42% to 45% of enterprises in the seven sectors surveyed in 2003) and from 65% to 67% among large enterprises, but figures are within the statistical confidence interval.

[13] cf. Annex 3: Methodology of the Surveys, Specific note 3

[14] This does of course not mean that *all* employees in these companies have remote access. This functionality is only relevant for teleworkers and mobile workers, for example.

Remote access is particularly important in high-tech manufacturing and service sectors. In ICT services, more than 70% of employees already work for companies where remote access has been accomplished. High-tech sectors such as ICT services and electronics also show the highest adoption of wireless access technologies. In fact, remote access may be a good indicator for overall connectivity in general, as low connectivity sectors (food & beverages, retail) are clearly lagging behind in this respect.

Exhibit 2-6: Remote access to the company network

EU-5 by sector (2003)	Remote access to company's computer system	Wireless access to company's computer system	Plan to enable remote access
Food, beverages and tobacco	44	14	4
The chemical industries	59	13	8
Electrical machinery and electronics	63	27	9
Transport equipment	70	9	12
Retail	25	10	7
Tourism	30	10	4
ICT services	74	29	9
EU-5 by size-class (2003)			
0-49 employees	21	7	5
50-249 employees	45	12	9
250+ employees	67	22	8
EU-5 by country (2003)			
Germany	54	19	7
Spain	30	13	3
France	30	3	9
Italy	37	11	9
UK	52	19	5
Totals (2002 / 2003)			
2003 Total (EU-5, 7 sectors)	43	14	7
2003 Total (EU-4, 7 sectors)	46	14	7
2002 Total (EU-4, 7 sectors)	44	14	7

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: enterprises using computers. N=3318 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

The demand for ICT specialists in 2003

As in 2002, the *e-Business W@tch* also asked companies in 3/2003 whether they had been recruiting ICT specialists within the past 12 months period. Answers suggest that the percentage of companies seeking IT staff in 2002/03 was lower than in 2001/02. While 14% of all companies and close to 50% of large companies had reported recruitment activities for the 2001/02 period, only 8% of companies and 40% of large companies reported demand in 2002/03.

Companies which had recruited (or tried to) were asked whether they experienced any difficulties in finding qualified staff. In spite of the reduced recruitment efforts in 2002/03, the percentage of companies that reported difficulties in finding adequate personnel remained the same. According to survey results, about 5% of all enterprises in the seven sectors experienced difficulties (compared to 6% in 2002). This is because a significantly higher share of companies recruiting reported "great difficulties" in the 2003 survey.

Explanations for these changes are not readily at hand. It should be noted that the survey could not consider what type of expertise companies were particularly looking for – for example whether they were looking for more traditional IT staff such as network engineers, or whether they were searching for e-business specialists who combine technical with entrepreneurial skills. Earlier studies in the field suggested that the biggest contribution to demand was expected to come from the emergence of e-business (cf. EITO 2000). This is still a plausible assumption. The fact that the level of recruiting difficulties experienced remained about the same in 2003 indicates that the overall demand for e-business skills has not come to an end in spite of the economic downturn.

Exhibit 2-7: IT skills gap: recruitment efforts and difficulties experienced

EU-5 by sector (2003)	Have recruited / tried to recruit IT specialists in 2002/03	* … of those have experienced great difficulties	* … of those have experienced some difficulties	% of total with difficulties in finding IT specialists
Food, beverages and tobacco	4	2	35	1
The chemical industries	10	2	20	2
Electrical machinery and electronics	16	26	32	9
Transport equipment	7	8	27	2
Retail	7	35	23	4
Tourism	7	16	13	2
ICT services	33	16	32	16
EU-5 by size-class (2003)				
0-49 employees	8	25	23	4
50-249 employees	24	8	29	9
250+ employees	40	10	22	13
EU-5 by country (2003)				
Germany	4	31	14	2
Spain	10	6	8	1
France	4	46	26	3
Italy	15	33	32	10
UK	8	15	28	3
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	9	25	23	4
2003 Total (EU-4, 7 sectors)	8	31	29	5
2002 Total (EU-4, 7 sectors)	14	17	27	6

Notes: All figures in "% of enterprises (within a sector / size-class / country)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. * enterprises having recruited IT specialists
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

Strategies for developing IT skills in companies

Hiring professionals, however, is only one aspect of developing IT skills in the company. Continuously improving the general IT skills of the existing staff is also important. In any of the 15 sectors surveyed, a great majority of enterprises say they support IT training schemes (76% of employees work in such enterprises). As a rule of thumb, sectors which are among the most active recruiters of IT staff are at the same time the most active supporters of IT training for their employees, for instance the financial sectors, ICT services and the electrical machinery and electronics sector.

The expressed interest and intensity of support for IT training was lower in 2003 than in 2002. The general economic situation may have caused companies to cut down on their training budgets. However, figures should be interpreted with care.[15]

While there is not a big difference between medium-sized and large enterprises with respect to the training opportunities offered to employees, small enterprises are somewhat lagging behind. However, a part of this apparent skills development gap can be explained by the simply circumstance that the share of companies with very limited IT equipment is higher among small and particularly micro-enterprises. IT training is of limited or no relevance for this group of firms.

The survey in 2002 showed that enterprises, although supportive in developing the IT skills of their employees, clearly regard "learning on the job" as the most important way to improve the IT skills base in the company. About 60% of enterprises said that learning on the job was very important. In comparison, only about half as many companies regard formal training schemes as very important for their IT skills development. This item was not asked in 2003, but it is unlikely that the general preference of learning-by-doing over formal training schemes should have changed.

[15] cf. Annex 3: Methodology of the Surveys, Specific note 3.

Among the different methods of training and skills development, letting employees use some working time for IT learning activities is most popular. It is likely that this activity will – in many cases to a large extent – include informal "learning-by-doing" and not necessarily formalised and organised e-learning activities. However, formalised computer and IT training activities are also offered by more than half of all medium-sized and large companies.

Exhibit 2-8: IT skills development: Company support for employee training

EU-5 by sector (2003)	Support of any IT training measure	In-house computer / IT training	Training by third parties	Use of working time for learning activities
Food, beverages and tobacco	67	32	48	51
The chemical industries	86	56	61	61
Electrical machinery and electronics	93	65	64	71
Transport equipment	93	58	84	73
Retail	62	29	35	47
Tourism	68	33	41	56
ICT services	94	73	74	91
EU-5 by size-class (2003)				
0-49 employees	53	21	28	43
50-249 employees	86	51	58	69
250+ employees	93	63	73	70
EU-5 by country (2003)				
Germany	76	44	52	50
Spain	62	15	42	49
France	73	48	48	63
Italy	69	40	46	62
UK	81	51	56	71
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	74	42	50	59
2003 Total (EU-4, 7 sectors)	76	46	51	60
2002 Total (EU-4, 7 sectors)	82	54	58	65

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

2.2 E-processes within the company and of the "extended enterprise"

Company internal e-processes

Survey results show that the most significant impacts of e-business currently concern the internal work processes. In fact, most enterprises can benefit from using ICTs for making internal work processes more efficient. Efficiency gains can be based on implementing simple applications and processes, not requiring sophisticated and expensive e-business software. These applications are useful, available and affordable for smaller and particularly medium-sized companies. But large enterprises are still most likely to make use of these applications as the efficiency gains from IT-supported internal business processes tend to increase with the company size.

Sharing documents to perform collaborative work, for instance, has become quite common among enterprises except for the smallest ones. 40% of employees work in companies where document sharing is possible in order to facilitate collaborative work processes.[16] The diffusion of IT solutions for other, more specific applications is less advanced: Companies accounting for 22% of employment use

[16] The survey question did not specify whether real-time sharing of documents needs to be enabled, i.e. that more than one person can edit a document at the same time.

online technologies to track working hours and production time, 21% to support the human resources management, 13% to automate the travel reimbursement of employees and 14% for e-learning. There are special, more sophisticated e-business software solutions for supporting internal business processes (for example, CRM software or Knowledge Management tools), but these are not yet as widely diffused (see chapter on "integration and sophistication of e-business").

Exhibit 2-9: Use of IT / online applications to improve the efficiency of internal business processes

EU-5 by sector (2003)	to share documents / collaborative work	to automate travel re-imbursement	to track working hours / production time	to support human resources management	for e-learning
Food, beverages and tobacco	34	6	17	13	6
The chemical industries	55	18	34	29	8
Electrical machinery and electronics	54	26	36	36	26
Transport equipment	50	17	41	33	18
Retail	26	7	9	11	9
Tourism	32	5	9	13	11
ICT services	72	36	52	47	37
EU-5 by size-class (2003)					
0-49 employees	18	3	6	6	6
50-249 employees	45	11	27	21	12
250+ employees	61	22	34	34	19
EU-5 by country (2003)					
Germany	39	19	28	19	19
Spain	37	11	14	18	10
France	35	1	14	17	7
Italy	34	12	20	18	10
UK	47	14	23	28	17
Totals (2002 / 2003)					
2003 Total (EU-5, 7 sectors)	39	13	21	20	14
2003 Total (EU-4, 7 sectors)	40	13	22	21	14
2002 Total (EU-4, 7 sectors)	45	13	25	22	19

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)". Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

E-processes of the extended enterprise

The main idea behind the concept of an “extended enterprise” is that a company is not only constituted by its management, employees and means of production, but also by a functioning network of business partners, including its suppliers and customers. The co-ordination and management of this network often include third-party relationships maintained on behalf of the client.

In a knowledge-based economy, enterprises must not only strive to improve their internal processes, but also need to manage this network efficiently and provide all members of the network with exactly the information they need. ICT based applications play a major role in the management of complex third party relationships. In the 1990s, e-mail caused a revolution in the speed of communication (multiplying the "communication turnover"). Building on this, new applications have been developed to facilitate the co-operation among businesses and the co-ordination of projects involving different partners. Several rather sophisticated e-business solutions and concepts such as EDI networks, supply chain management (SCM), and many Internet trading platforms address these issues of an extended enterprise.

A necessary prerequisite for online collaboration with external business partners, and specifically for e-commerce, is the digitisation of information to be exchanged between trading partners. To allow for automatic processing, the information has to be digitised in structured, consistent form rather than being unstructured digital information. Standards help in organising and exchanging information in a way that is consistent across enterprises and IT systems.

42% of employees work in companies that exchange documents electronically with suppliers and customers (2003). 12% of enterprises (accounting for 21% of employment) used online tools for collaboration in designing products, and 10% to forecast product demand, which is most important for industries keeping a stock of produced goods.

It strikes that, compared to the same sample of sectors in the e-Business Survey 2002, the level of using online technologies for business processes of this type was lower in 3/2003, most notably as regards the exchange of documents with suppliers and customers. At the same time, however, the percentage of companies reporting e-procurement activities has increased, which seems to be inconsistent with the former finding. This may indicate that the instruments for monitoring electronic business activities within the supply chain, particularly for other activities than e-selling or purchasing, need to be critically examined and, if necessary, adjusted to new requirements.

Exhibit 2-10: E-processes of the extended enterprise

EU-5 by sector (2003)	E-product design *	Online collaboration to forecast product demand	Online management of capacity / inventory	Online exchange of documents with suppliers	Online exchange of documents with customers
Food, beverages and tobacco	11	12	13	44	41
The chemical industries	15	14	21	43	44
Electrical machinery and electronics	21	17	20	47	43
Transport equipment	44	20	19	55	59
Retail	12	11	13	41	22
Tourism	13	11	12	37	31
ICT services	44	26	21	50	61
EU-5 by size-class (2003)					
0-49 employees	12	10	9	37	28
50-249 employees	18	13	16	42	39
250+ employees	22	18	22	49	44
EU-5 by country (2003)					
Germany	20	10	12	38	34
Spain	12	16	16	51	42
France	21	18	13	45	42
Italy	18	12	19	34	28
UK	24	19	20	53	43
Totals (2002 / 2003)					
2003 Total (EU-5, 7 sectors)	20	14	16	44	37
2003 Total (EU-4, 7 sectors)	21	14	16	42	37
2002 Total (EU-4, 7 sectors)	24	18	19	50	44

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

* E-product design = online collaboration of business partners for designing products / services

Source: *e-Business W@tch* (2003)

2.3 Development of e-commerce

Procuring online – the B2B (r)evolution continues

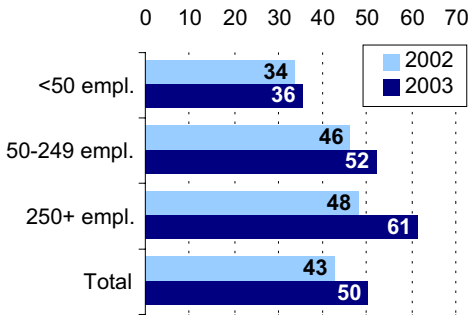
The share of companies that say that they procure at least some of their direct or indirect production goods online has further increased from companies comprising 43% of employment (June 2002) to 50% in March 2003. This confirms the assessment already presented in the 2002/03 Report of the *e-Business W@tch* that "the real e-business (r)evolution, […] is probably taking place in the business-to-business (B2B) arena." In fact, the forecast published in the report (based on adoption plans reported by companies back in 2002) seems to have materialised, while the forecast for online selling and for the implementation of special e-business software has not.

The increase observed in the 2002/03 period has taken place mainly among medium-sized and particularly among large enterprises. However, the share of small enterprises that make online purchases has also slightly increased, and the gap between size-classes is still much less pronounced than in other e-business indicators. Electronic procurement is not a domain of the large players.

The increase in online purchasing activities has occurred in all sectors except in the ICT services sector, which has already reached a high level of activity where further diffusion will necessarily occur at lower growth rates. The frequency of companies making online purchases has increased considerably in some sectors, particularly in the chemical industries (from 30% to 38% of all enterprises in the EU-4) and in the transport equipment manufacturing sector (from 33% to 37%). However, the dramatic increase in the transport equipment manufacturing sector if weighted by employment (as shown in the chart below) should be interpreted with care. But even if employment-weighting may overemphasize the dimension[17], the trend towards e-procurement is clear and significant.

However, an increase in the number of companies that make online purchases need not mean at the same time that the volume of supply goods and services purchased online increases at the same pace, as many companies will start their e-procurement activities cautiously with only limited volumes traded. In fact, the Online Purchases Index, a pilot by the *e-Business W@tch* that considers both frequency and intensity of purchasing online (see below), has only moderately increased.

Exhibit 2-11: Adoption of online purchasing 2002-2003 (by size-class)



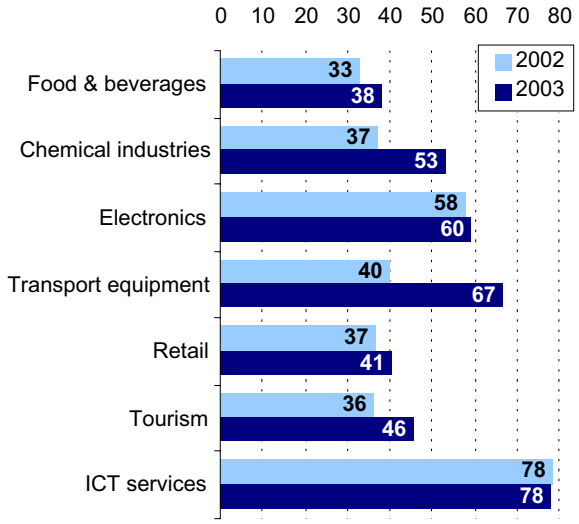
Notes on left figure:

Figures in % of enterprises within a size-class, except for total ("enterprises comprising …% of employment "). Base: all enterprises, EU-4 (D, F, I, UK), 7 sectors. N=2721 for 2002; N=2815 for 2003.

Notes on right figure:

Figures weighted by employment ("enterprises comprising …% of employment "). Base: all enterprises, EU-4 (D, F, I, UK). N~400 per sector.

Exhibit 2-12: Adoption of online purchasing 2002-2003 (by sector)



for Transport equipment, cf. Annex 3: Methodology of the Surveys, Specific note 4

Source: *e-Business W@tch* (2003)

The Online Purchasing Index

This Index is a pilot by the *e-Business W@tch*. It computes the percentage of enterprises that order goods or services from suppliers online with a weight according to the share of their online purchases (as % of their total purchases). The Index can take a maximum value of 100.

For the definition for the calculation of the Index, see Annex 3: Methodology of the Surveys, Specific note 6.

Online Purchasing Index	6/2002	3/2003
Food & beverages	8	7
The chemical industries	10	14
Electrical machinery / electronics	20	22
Transport equipment	12	16
Retail	14	13
Tourism	13	16
ICT services	38	41

[17] cf. Annex 3: Methodology of the Surveys, Specific note 4

Exhibit 2-13: Online purchasing activities

EU-5 by sector (2003)	Make online purchases	* MRO goods	* direct production goods	Plan to start purchasing online by 3/2004
Food, beverages and tobacco	36	67	41	6
The chemical industries	51	58	50	5
Electrical machinery and electronics	59	72	61	3
Transport equipment	63	66	55	5
Retail	37	53	55	6
Tourism	44	62	51	6
ICT services	76	70	59	5
EU-5 by size-class (2003)				
0-49 employees	33	59	60	4
50-249 employees	50	73	47	7
250+ employees	58	63	50	5
EU-5 by country (2003)				
Germany	63	69	57	6
Spain	27	42	45	3
France	30	65	58	6
Italy	35	61	58	6
UK	59	58	49	6
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	47	62	54	6
2003 Total (EU-4, 7 sectors)	50	64	55	6
2002 Total (EU-4, 7 sectors)	43	67	53	7

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. * enterprises purchasing online.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

* "MRO goods" are maintenance, repair and operating goods, for instance office supply goods. "Direct production goods" are raw materials and components used to produce the goods and services which the company sells to its customers.

Source: *e-Business W@tch* (2003)

Exhibit 2-14: Channels used for e-procurement

EU-5 by sector (2003)	Company website of suppliers	B2B electronic marketplace(s)	Extranet(s) of suppliers	EDI
Food, beverages and tobacco	80	31	14	11
The chemical industries	83	24	19	13
Electrical machinery and electronics	78	50	32	15
Transport equipment	84	49	31	42
Retail	84	25	32	28
Tourism	84	23	24	43
ICT services	91	33	51	28
EU-5 by size-class (2003)				
0-49 employees	83	28	27	43
50-249 employees	83	27	30	17
250+ employees	81	36	29	21
EU-5 by country (2003)				
Germany	80	41	34	29
Spain	76	35	33	37
France	73	32	26	15
Italy	89	25	41	19
UK	95	17	23	25
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	84	31	31	25
2003 Total (EU-4, 7 sectors)	84	31	31	24
2002 Total (EU-4, 7 sectors)	no data	no data	no data	no data

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: enterprises purchasing online. N=1522 for EU-5, 7 sectors.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

Websites of suppliers are still the preferred channel for making online purchases, but electronic B2B marketplaces, extranets and EDI also play an important role (see table above). The configuration of channels used differs between sectors, depending on the legacy of these systems within sectors, the specific relationships between business customers and suppliers, and on the kinds of goods and services traded.

The broad adoption and increasing sophistication of e-procurement activities raises the question of impacts on individual enterprises and sector value chains. The potentially positive impacts which companies try to achieve include savings on procurement costs, better relations with suppliers, more efficient internal business processes and variations in the number of active suppliers. In fact, these are the areas where companies procuring online observe the most positive impacts. Close to 60% of all enterprises report positive effects with respect to procurement costs and the efficiency of internal processes.

Exhibit 2-15: Impact of e-procurement (3/2003)

Area of impact	"Very positive"	"Fairly positive"	"Fairly / very negative"
Procurement costs	16	43	4
Relations to suppliers	12	38	6
Internal business processes	16	41	2
Costs of logistics and inventory	12	28	3

Base: EU-5 (D, E, F, I, UK), 7 sectors. In % of enterprises procuring online, excl. "don't know", "no answer". N~1400 per item.

Source: *e-Business W@tch* (2003)

There is some controversy as to whether e-procurement will lead to concentration, as several international players have announced strategies to drastically decrease the number of their suppliers by using marketplaces for e-procurement. As already observed in 2002, survey results do not immediately support this evidence. However, the picture differs between sectors. In the electronics industry, for instance, more people work in companies reporting that the number of their suppliers has decreased because of e-procurement than in enterprises which have broadened their supplier base.

Exhibit 2-16: Impact of e-procurement on the diversity of suppliers

EU-5 by sector (2003)	No. of suppliers has increased	No. of suppliers has decreased	No. of suppliers has remained the same
Food, beverages and tobacco	30	6	64
The chemical industries	17	12	70
Electrical machinery and electronics	13	18	68
Transport equipment	47	3	49
Retail	22	7	71
Tourism	29	4	67
ICT services	25	17	58
EU-5 by size-class (2003)			
0-49 employees	31	5	64
50-249 employees	25	9	66
250+ employees	22	12	66
EU-5 by country (2003)			
Germany	27	9	63
Spain	31	4	65
France	23	2	75
Italy	26	10	64
UK	25	13	63
Totals (2002 / 2003)			
2003 Total (EU-5, 7 sectors)	26	9	65
2003 Total (EU-4, 7 sectors)	26	9	65
2002 Total (EU-4, 7 sectors)	20	11	69

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

E-marketing and e-sales activities

Online marketing and sell-side e-commerce have not developed as dynamically as e-procurement. The figures for 3/2003 are very much in line with the data reported back in 6/2002:

- The share of companies from the 7 sectors covered by this study which have some type of a presence on the Internet equalled 71% of employment in 2002 and 69% in 2003.
- 16% of companies (comprising 21% of employment) said they made online sales in 2002, 17% (comprising 19% of employment) in 2003.

This confirms findings of other surveys[18] that the percentage of companies which let customers order goods and services online does not rapidly increase. This may come as a surprise when considering that a majority of enterprises (except micro-enterprises) has some sort of a presence on the Internet. It was expected that they would start using their Internet presence as an online sales channel over time. But there is increasing evidence that the development does not follow this somewhat simplistic path.

Exhibit 2-17: Marketing online: Companies with a website

EU-5 by sector (2003)	Have a website	Plan to have a website by 3/2004	* Use a content management system (of those having a website)
Food, beverages and tobacco	56	13	8
The chemical industries	84	5	21
Electrical machinery and electronics	87	6	34
Transport equipment	88	3	26
Retail	48	12	32
Tourism	74	10	33
ICT services	90	3	43
EU-5 by size-class (2003)			
0-49 employees	44	13	29
50-249 employees	80	9	25
250+ employees	89	4	29
EU-5 by country (2003)			
Germany	78	8	22
Spain	56	14	43
France	56	6	24
Italy	62	8	40
UK	70	11	34
Totals (2002 / 2003)			
2003 Total (EU-5, 7 sectors)	67	9	30
2003 Total (EU-4, 7 sectors)	69	8	28
2002 Total (EU-4, 7 sectors)	71	11	23

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. * enterprises with a website
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

However, concluding that B2C (business-to-consumer) e-commerce will not have any significant impact on sectors and companies in the future would fail to acknowledge important trends. In fact, location is becoming a less important factor in many retail areas (except for food and everyday life commodities), which is a huge challenge for local retailers. Recent market research suggests that online shopping is in fact increasing fast – albeit (i) at a still rather low level if measured as a share of the total sales volume, and (ii) only in selected markets. A key to understanding the real impact of the net on consumer sales may in fact be to shift the focus from measuring mere transactions to the broader concept of "net-influenced" sales. This approach considers the important role of the Internet during the pre-purchase stages, for instance for browsing the offer and comparing prices.

[18] A similar observation was reported, for example, by the Eurostat survey on e-business 2002 compared to the findings in 2001. Here too, the percentage of companies selling online has not increased over a one year period.

A good example to study trends and impacts in e-commerce are auction platforms on the Internet, with eBay as the worldwide leader setting the trends. These platforms tend to evolve from former peer-to-peer auctioneers into e-marketplaces with a dual function: While peer-to-peer selling and auctioning continue to flourish, commercial companies ("power-sellers") increasingly trade their goods and services at the same time on such platforms (either for fixed prices, or in auctions). In some segments, particularly in consumer electronics, online sales have already reached an enormous market share, and marketplaces such as eBay have a significant piece of this cake. The online seller Amazon.com has recently started to imitate the eBay model by offering customers to sell used books through their website and collecting commissions from successful transactions. Amazon handles the whole process from placing the offer to managing the payment as a trusted third party. It does not take much fantasy to imagine similar models for other sectors than books and DVDs, and, in fact, Amazon is continuously extending the scope of its offer.

These developments are also relevant for online selling in the B2B arena. Businesses use similar or even the same Internet trading platforms for their own purchases. However, there are of course important differences in the structure of B2C and B2B buyer-seller relationships.

Exhibit 2-18: Selling online and related services

EU-5 by sector (2003)	Sell online	* Use secure server (SSL) for online sales	* Enable online payment	* Provide after sales services online
Food, beverages and tobacco	6	25	13	19
The chemical industries	9	63	39	58
Electrical machinery and electronics	14	59	31	83
Transport equipment	16	48	24	4
Retail	16	52	29	48
Tourism	36	47	42	33
ICT services	28	71	46	62
EU-5 by size-class (2003)				
0-49 employees	16	42	36	47
50-249 employees	22	55	28	39
250+ employees	18	61	36	45
EU-5 by country (2003)				
Germany	26	50	19	40
Spain	16	65	53	60
France	12	42	42	36
Italy	14	54	38	43
UK	19	57	54	44
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	19	53	36	43
2003 Total (EU-4, 7 sectors)	19	51	34	41
2002 Total (EU-4, 7 sectors)	21	62	36	49

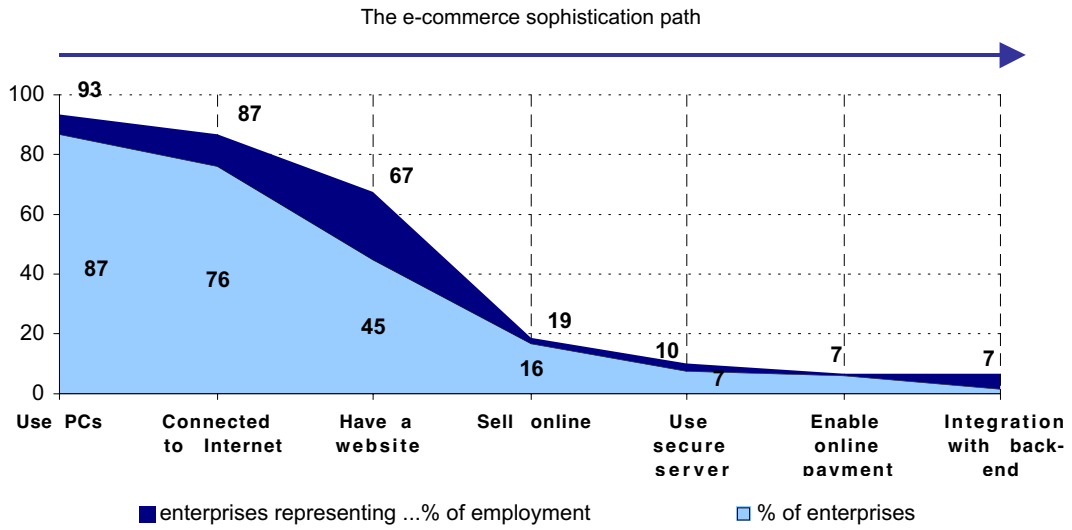
Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. * enterprises selling online.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

A critical success factor for e-commerce activities is that systems have to comply with a check-list of basic requirements. These include content-related aspects (for example, a user-friendly design of the website, the display of all relevant information) and technical requirements (for example whether the ordering process is conducted via a secure server). Advanced e-commerce systems will probably enable online payment (in most cases either by credit card payment or by direct debit) and automatically confirm the receipt of order and payment by e-mail. At the company, the process will be integrated with the back-end system and automatically trigger business processes (for example accounting, delivery).

The e-Business Survey 2003 finds that 16% of companies make online sales, 7% use secure servers, 6% enable online payment and only 1% of all companies have implemented an e-commerce system that is integrated with their backend-system.

Exhibit 2-19: Starters and high-end e-commerce users: From using PCs to back-end integration of e-commerce (2003)



Base: all enterprises, EU-5, 7 sectors (N=3515). Reporting period: 3/2003.
Figures weighted by employment ("enterprises comprising …% of employment")

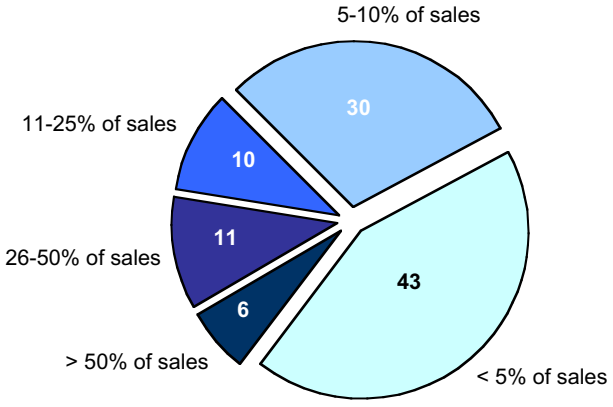
Source: *e-Business W@tch* (2003)

As e-commerce systems are in many cases still very basic and do not comply with most of the more advanced requirements, it does not come as a surprise that more than 40% of all companies selling online estimate that the share of their online sales (the sales volume as % of their total sales) is less than 5%. In a way, they are still in an experimental stage of testing and playing around. However, more than 25% of online sellers report shares of more than 10%.

Exhibit 2-20: Share of online sales as % of total sales (2003)

Base: enterprises selling online, EU-5, 7 sectors (N=486). Reporting period: 3/2003.
Figures in % of enterprises selling online.

Source: *e-Business W@tch* (2003)



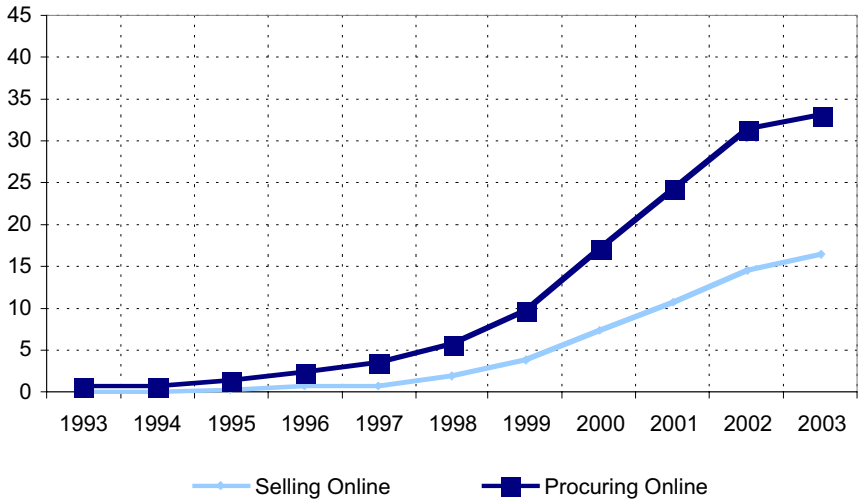
An outlook on the further adoption of e-commerce activities (based on plans reported by companies in 2003) shows the same phenomenon as in 2002: Plans for online selling indicate a sharp increase of activity over the next 12 months period. However, it is questionable whether these intentions will materialise. In the 2002/03 period, company plans suggested a similar growth rate, which did not come true. In contrast to online selling, the 2002/03 increase in companies that make online purchases is in line with the intentions articulated in the 2002 survey. If plans are realised in the 12 months period ahead to a similar extent, online procurement activities will rise to more than 50% (employment-weighted) by the end of the first quarter 2004.

The following exhibit shows the adoption curve of online selling and purchasing based on information from those companies currently practising e-commerce when they started selling/procuring online. If the diffusion curve follows the same path, extrapolation allows the forecast that by mid 2004 about 18% of all companies will make online sales. Quite in contrast, simply adding the percentage of companies that reported plans to start selling online by 3/2004 to the current figure would suggest an enormous increase to 25% of companies.

Exhibit 2-21: Diffusion of e-commerce in EU companies, 1993-2003

Computed based on questions on the starting time of online selling / procurement activities.

Values for 2003 are 3/2003 and can be higher at the end of the year.



In % of enterprises. Base: Survey 2003, 7 sectors, companies selling / purchasing online

Source: *e-Business W@tch* (2002/03)

As already pointed out in the section on e-procurement, the change in the percentage of companies that make online sales need not translate 1:1 into the volume of goods and services that are sold online. In fact, even a lower share of companies trading their products online could theoretically go hand in hand with higher volumes traded online, if specialised online companies emerge while other companies step back from unsuccessful e-commerce activities. The Online Sales Index, a pilot by the *e-Business W@tch* that considers both frequency and intensity of online sales (see below), has slightly increased on the overall level. The index shows very well the outstanding position of the tourism sector in the e-commerce arena.

The Online Sales Index

This Index is a pilot by the *e-Business W@tch.* It computes the percentage of enterprises that sell order goods or services to their customers online with a weight according to the share of their online sales (as % of their total sales). The Index can take a maximum value of 100.

For the definition for the calculation of the Index, see Annex 3: Methodology of the Surveys, Specific note 7.

Online Sales Index	6/2002	3/2003
Food & beverages	2.2	2.2
The chemical industries	4.0	2.9
Electrical machinery / electronics	5.2	4.2
Transport equipment	3.1	7.6
Retail	6.3	4.0
Tourism	13.3	13.8
ICT services	11.3	8.8

2.4 Integration and sophistication of e-business processes

Some progress in the integration of e-commerce activities

In the E-Business Report 2002/03, we have concluded that the next stage and challenge in the e-business (r)evolution which many companies have to manage is about integrating the "e" into their general business processes. A good deal of the productivity impact of ICTs lies in their potential to make processes efficient. The ultimate goal of electronic business is that relations between the company, its customers (be it other businesses or consumers), suppliers and co-operating partners as well as internal processes (within the enterprise) will be smoothly tied to each other with the support of information technology and communication networks. This covers supply chain management, marketing and sales, logistics and delivery, after sales services, as well as other more horizontal business functions (for example knowledge management and finance).

For monitoring the status and progress of this development, the *e-Business W@tch* has introduced new questions in its e-Business Survey 2003. For instance, companies procuring online were asked whether their IT system was integrated with the system(s) of supplier(s) for placing orders, which was the case in companies comprising 23% of employment. About 30% of online-sellers report that their IT system was integrated with the system(s) of customer(s) for receiving orders.

In fact, there is evidence for progress in this respect, at least among medium-sized and large enterprises. In 2003, 58% of large companies selling online said that ordering processes were integrated with their back-end systems (compared to 30% in 6/2002), and 26% of medium-sized online sellers (18% in 2002). The result is an increase by nearly 50% if weighted by employment.

Exhibit 2-22: Integration of e-commerce processes

EU-5 by sector (2003)	Incoming online orders integrated with backend system	Information about online orders by e-mail	Information about online orders by fax	IT system integrated with system of customer(s) for receiving orders	* IT system integrated with system of supplier(s) for placing orders
Food, beverages and tobacco	24	34	14	37	16
The chemical industries	37	42	1	43	12
Electrical machinery and electronics	60	25	3	25	22
Transport equipment	78	10	2	58	22
Retail	41	48	5	23	27
Tourism	18	63	6	23	15
ICT services	39	48	1	51	33
EU-5 by size-class (2003)					
0-49 employees	8	73	8	24	24
50-249 employees	25	60	9	36	17
250+ employees	58	26	0	36	22
EU-5 by country (2003)					
Germany	40	47	4	31	21
Spain	14	63	8	39	29
France	35	46	5	19	18
Italy	15	73	4	35	27
UK	47	36	3	31	23
Totals (2002 / 2003)					
2003 Total (EU-5, 7 sectors)	35	49	5	31	23
2003 Total (EU-4, 7 sectors)	38	47	4	30	22
2002 Total (EU-4, 7 sectors)	26	57	5	no data	no data

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: enterprises selling online. N=542 for EU-5, 7 sectors. N~100 per sector in one country. * enterprises purchasing online (N=1522 for EU-5, 7 sectors). EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

Exhibit 2-23: Method of processing online orders (2002/03)

Base: enterprises selling online, EU-4 (D, F, I, UK), 7 sectors (N=429 in 2002, N=436 in 2003). Reporting periods: 6/2002, 3/2003.
Figures weighted by employment ("enterprises comprising …% of employment").

Source: *e-Business W@tch* (2003)

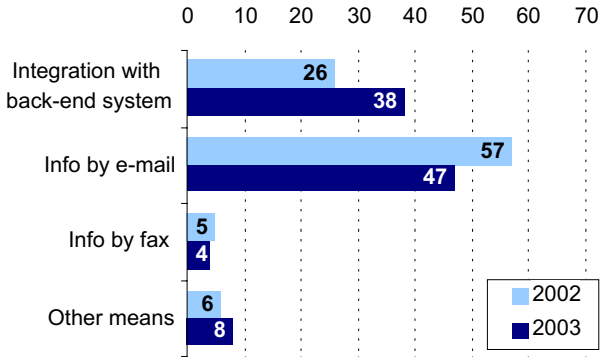
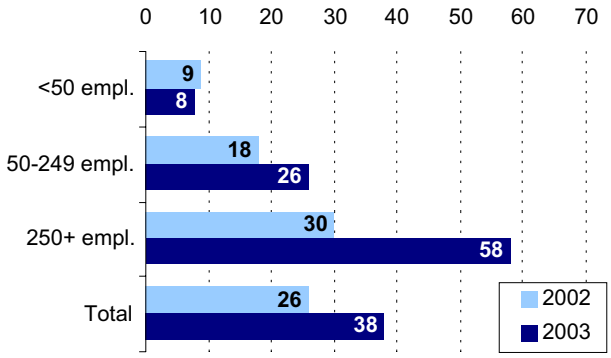


Exhibit 2-24: Processing online orders is integrated with the back-end system (2002/03)

Base: enterprises selling online, EU-4 (D, F, I, UK), 7 sectors (N=429 in 2002, N=436 in 2003). Reporting periods: 6/2002, 3/2003.
Figures for size-classes in % of enterprises selling online, figures for total weighted by employment.

Source: *e-Business W@tch* (2003)



Customer Relationship Management and Supply Chain Management

There is a great amount of sophisticated e-business software available in the market that promises to help enterprises making their business processes more efficient.

Online interaction with customers can collect and furnish a wealth of data on customers' behaviour and needs. Customer Relationship Management (CRM) solutions promise the ability to synthesize these data and to provide a universal view of the customer. The business for CRM software vendors followed a similar path as the dot-com boom and bust of the years 1999 to 2001. Market research reports suggest that companies are now cautiously stepping back into the CRM arena and that vendor revenues should start to rise again. Gartner Dataquest estimates that CRM software sales fell by about 19% in 2002, dropping from US$ 3.7 billion in 2001 to US$ 3.0 billion.[19]

Supply Chain Management (SCM) solutions are supposed to help businesses to reduce costs, increase revenue, and improve service both to their suppliers and customers by matching supply and demand through integrated and collaborative planning tools. Electronic communication between retailer and supplier is not a new phenomenon. The exchange of business communications by means of standards like EDIFACT or EDI has recently been enhanced by web-based front-ends for the placement of customer orders. The Internet has then given companies a whole range of new capabilities, such as tracking freight across the countries or measuring inventory flows from a network of suppliers from all over the world. Information systems have also been used as a leverage to apply key concepts such as ECR (Efficient Consumer Response) or Quick Response.

Enterprise Resource Planning (ERP) systems allow the cover of all major business activities within a company, including product planning, parts purchasing, inventory management, order tracking, human resources, projects management, and finance. ERP evolved from material requirement planning (MRP) around 1990.

[19] Quoted by eMarketer (www.emarketer.com). eMarketer reports that CRM software vendors were hit particularly hard when the technology bubble burst in late 2000. During the boom phase, several companies had overbought enterprise applications, leaving many with unused CRM software on their shelves.

The e-Business Survey 2003 does not show a measurable, significant increase in the adoption of CRM, SCM and ERP software among EU enterprises in 2002/03. Figures are very much like those of 2002. Figures suggest that more medium-sized companies use SCM and CRM software, but the share of large companies has decreased, which levels out on the employment-weighted total.[20]

Exhibit 2-25: Diffusion of advanced e-business software solutions for integrating business processes

EU-5 by sector (2003)	CRM	SCM	ERP	KM
Food, beverages and tobacco	10	5	21	4
The chemical industries	16	14	48	12
Electrical machinery and electronics	24	11	46	11
Transport equipment	25	20	72	11
Retail	7	5	12	7
Tourism	13	3	7	5
ICT services	42	15	27	32
EU-5 by size-class (2003)				
0-49 employees	6	4	9	5
50-249 employees	17	7	28	9
250+ employees	23	13	44	13
EU-5 by country (2003)				
Germany	22	12	39	13
Spain	7	12	11	13
France	14	5	21	5
Italy	11	5	27	10
UK	16	5	12	9
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	15	8	24	10
2003 Total (EU-4, 7 sectors)	17	7	26	10
2002 Total (EU-4, 7 sectors)	20	9	26	10

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

CRM = Customer Relationship Management; SCM = Supply Chain Management;
ERP = Enterprise Resource Planning; KM = Knowledge Management

Source: *e-Business W@tch* (2003)

2.5 Significance and impact of e-business in 2003

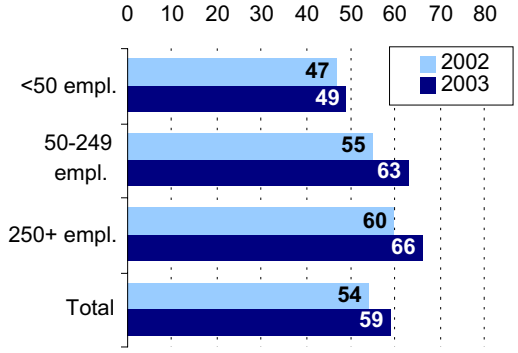
Companies observe increasing significance of e-business

All in all, companies accounting for close to 60% of employment said in 3/2003 that e-business had already at least some significance for the way they operate. This is an increase by 5 percentage-points compared to 6/2002. About 11% said it constituted a significant part of their business activities. The share of companies which attribute significance to electronic business has increased in all size-classes, although in the smallest size-class only marginally. Sectors differ considerably in their perception of e-business importance. In most cases, the findings reflect very well the overall picture as it evolves from "hard" indicators about ICT infrastructure and e-business activities. Unsurprisingly, the ICT services and the electronics industry are among the sectors where e-business is perceived as much more important than, for example, in the food and beverages industry.

In the transport equipment manufacturing sector, the situation has changed considerably. The share of the sample who attribute at least some significance to e-business has increased from 44% of companies (2002) to 49% (2003). Due to a few very large enterprises in the 2003 sample, the increase is somewhat overemphasized if expressed in employment-weighted figures.

[20] cf. Annex 3: Methodology of the Surveys, Specific note 5

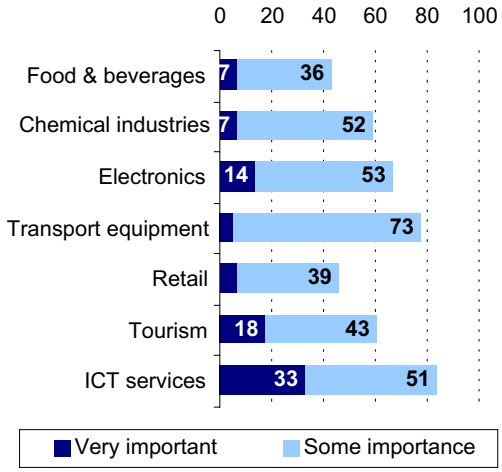
Exhibit 2-26: Companies saying that e-business has at least some significance for the way they operate (6/2002 – 3/2003)



Notes on figures (left and right):

Figures for Total and Sectors employment-weighted (read: "enterprises comprising …% of employment "), for size-classes in % of enterprises. Base: all enterprises, EU-4 (D, F, I, UK), 7 sectors. N=2721 for 2002; N=2815 for 2003.

Exhibit 2-27: Importance of e-business across sectors (as perceived by companies)



Source: *e-Business W@tch* (2003)

Exhibit 2-28: Significance of e-business as perceived by companies (2003)

EU-5 by sector (2003)	… plays a significant part of how the company operates	… plays some part of how the company operates	… does not play a role today	Sceptics: … does not play an important role today and will not in the future
Food, beverages and tobacco	7	36	55	61
The chemical industries	7	52	40	51
Electrical machinery and electronics	14	53	32	46
Transport equipment	5	73	21	58
Retail	7	39	52	55
Tourism	18	43	38	40
ICT services	33	51	15	38
EU-5 by size-class (2003)				
0-49 employees	14	35	49	48
50-249 employees	15	48	36	49
250+ employees	11	55	33	52
EU-5 by country (2003)				
Germany	14	58	28	61
Spain	17	30	47	30
France	4	37	58	70
Italy	23	38	38	40
UK	8	49	42	40
Totals (2002 / 2003)				
2003 Total (EU-5, 7 sectors)	12	46	41	50
2003 Total (EU-4, 7 sectors)	11	48	40	53
2002 Total (EU-4, 7 sectors)	11	43	44	52

Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country.
EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK.

Source: *e-Business W@tch* (2003)

The increase in the perceived significance of e-business is confirmed by the e-Business Significance Index, a pilot by the *e-Business W@tch*, which has increased from 31 to 33 within the eight months period between the two surveys. The index is a barometer for the general attitude, as it is based on the subjective perception by companies on the significance of e-business and not on "hard facts".

The E-Business Significance Index

This Index – a pilot by the *e-Business W@tch* – computes the percentage of enterprises that say that "e-business constitutes a significant/some part of the way they operate" with a weight depending on whether they say a "significant part" or "some part". The Index can take a maximum value of 100.

For the definition for the calculation of the Index, see Annex 3: Methodology of the Surveys, Specific note 8.

E-Business Significance Index	6/2002	3/2003
Food & beverages	21	21
The chemical industries	25	31
Electrical machinery / electronics	37	39
Transport equipment	29	35
Retail	26	26
Tourism	38	39
ICT services	50	56

Satisfaction with e-business in 2003

The *e-Business W@tch* asked companies how satisfied they were with the results of their e-business activities. By and large, the level of satisfaction is the same in 2003 as in 2002. Businesses overall seemed to be satisfied, if unenthusiastic. In total, about nine out of ten enterprises said they were "very satisfied" or "fairly satisfied" with their e-business ventures. That leaves about 10% of enterprises that were "disappointed" with the effects of their e-business activities. Neither sectors nor size-classes differ significantly in their satisfaction with electronic business.

Exhibit 2-29: Satisfaction with e-business achievements and impacts

EU-5 by sector (2003)	very satisfied	fairly satisfied	fairly disappointed	very disappointed	Average *
Food, beverages and tobacco	9	85	6	0	+1.0
The chemical industries	10	79	11	0	+0.9
Electrical machinery and electronics	13	76	11	0	+0.9
Transport equipment	10	81	9	0	+0.9
Retail	16	75	9	1	+1.0
Tourism	22	70	8	1	+1.0
ICT services	19	69	12	0	+0.9
EU-5 by size-class (2003)					
0-49 employees	20	70	9	1	+1.0
50-249 employees	10	81	8	0	+0.9
250+ employees	14	79	8	0	+1.0
EU-5 by country (2003)					
Germany	13	75	11	1	+0.9
Spain	25	71	4	0	+1.2
France	10	80	10	1	+0.9
Italy	21	69	10	0	+1.0
UK	15	77	8	0	+1.0
Totals (2002 / 2003)					
2003 Total (EU-5, 7 sectors)	16	75	9	0	+1.0
2003 Total (EU-4, 7 sectors)	14	75	10	1	+0.9
2002 Total (EU-4, 7 sectors)	14	70	13	2	+0.8

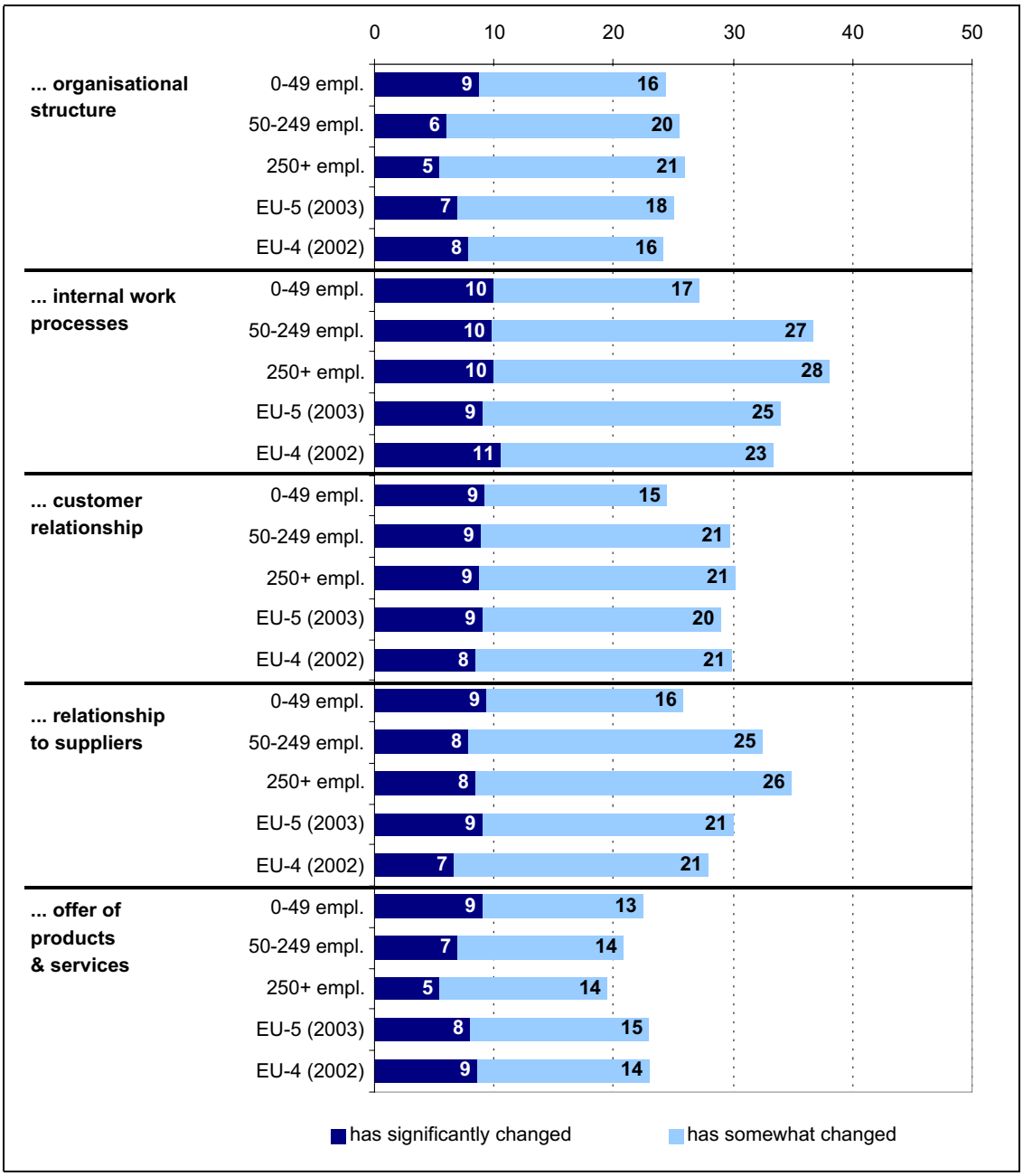
Notes: Figures for sectors, countries and totals are employment-weighted (read: "enterprises comprising …% of employment (within a sector/country)"). Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises. N=3515 for EU-5, 7 sectors. N~100 per sector in one country. EU-5 includes D, E, F, I, UK. EU-4 includes D, F, I, UK. Average can range from +2 (all companies very satisfied) to –2 (all companies very disappointed).

Source: *e-Business W@tch* (2003)

The impact of e-business on different business areas

The most significant impacts of e-business concern the internal work processes. More than a quarter of all enterprises (comprising 34% of employment) say in 3/2003 that these have significantly or somewhat changed through e-business practices. Medium-sized and large enterprises in particular have already experienced effects in this respect. While in general the impact is less pronounced in smaller enterprises, there is an exception as regards the impact of e-business on the offer of products and services. By and large, figures for 2003 confirm the findings from 2002. The aggregate figures are nearly identical for both e-Business Surveys.

Exhibit 2-30: Impact of e-business as perceived by companies (6/2002 and 3/2003)



Notes: Figures for totals are employment-weighted (read: "enterprises comprising …% of employment ").
Figures for size-classes are to be read as "% of enterprises (within a size-class)".
Base: all enterprises, 7 sectors, EU-5 for 2003, EU-4 for 2002. N=3515 (2003), N=2721 (2002).

Source: *e-Business W@tch* (2003)

A.3 Worldwide trends in e-business

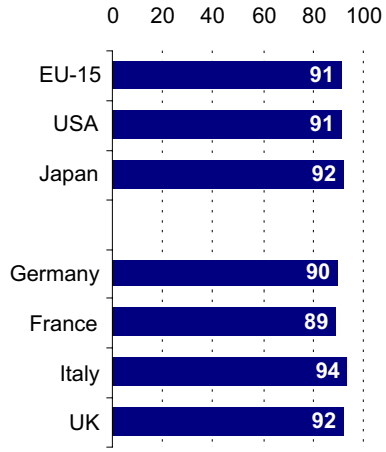
This chapter undertakes a brief assessment of the development of electronic business in the EU compared to the situation in the United States and in Japan. The analysis is based on statistics and analysis from a number of publicly available international statistical sources and reports, preferably from official statistics or international benchmarking reports such as the "Global Information Technology Report" by the World Economic Forum.

3.1 ICT infrastructure in companies

Without an adequate network infrastructure, both on the macro-level (the regional networks) and on the micro-level (the connectivity of enterprises), businesses cannot reap the benefits of information and communication technologies. The deployment of networks, and their quality, on the regional infrastructure level is to a large extent an expression of the overall economic prosperity of an economy. However, infrastructure can vary within countries with a similar GDP/head, depending on the legacy of networks, different policy approaches and geographic factors. It is a task and challenge for infrastructure and economic policy to promote and enable the development of competitive and sustainable market conditions for network infrastructure needed by businesses, and, at the same time, promote the effective demand and use of this infrastructure by businesses. It is acknowledged that ICT cannot by itself promote economic growth, but it is in many sectors an indispensable "tool-box" for improving productivity.

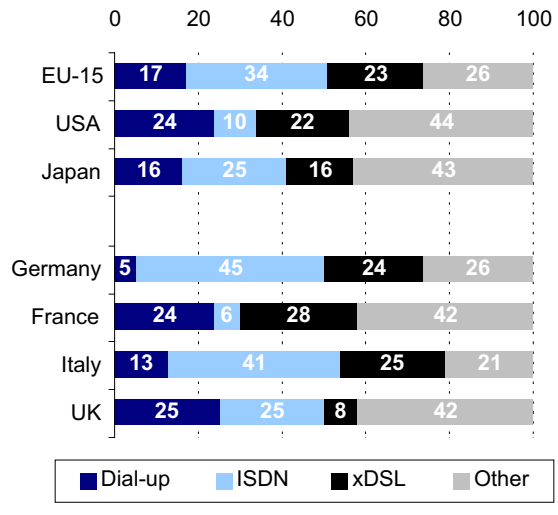
In all advanced information economies, access to the Internet has become ubiquitous in the world of business and has already reached a saturation point. There is no difference between Europe, the USA and Japan in that respect. Differences exist, however, as regards the preferred method of Internet connection. On the whole, there is a migration towards higher bandwidth connection methods, and it is to be expected that the average bandwidth available to companies will also reach a similar level in the more advanced countries. The EU average will decrease in 2004 as the average bandwidth available to companies in the Acceding Countries can be expected to be notably lower.

Exhibit 3-1: Enterprises with access to the Internet (2002)



Base: all enterprises. Weighted by employment ("enterprises comprising …% of employment").
Data for USA and Japan by UK Online for business.

Exhibit 3-2: Method of connection to the Internet (2002)



Base: all enterprises with access to the Internet. Weighted by employment ("enterprises comprising …% of employment").
All data except EU-15 by UK Online for business.

Sources: International Benchmarking Study 2002 (UK DTI) / *e-Business W@tch*

The diffusion of LANs, intranets and extranets is also at a very similar level in companies from European countries, the USA and Japan. The difference for LANs shown in Exhibit 3-2 is likely to be attributed to the different sources, as the UK DTI International Benchmarking Study reports higher levels of LAN diffusion for all countries than the *e-Business W@tch*, from which data for the EU-15 and the European countries were taken. Regarding intranet usage, data from these two sources are more consistent. Europe and the USA are head to head, while companies from Japan had a slightly lower intranet usage in 2002 (by a few percentage points).

Exhibit 3-3: Enterprises using a Local Area Network (2002)

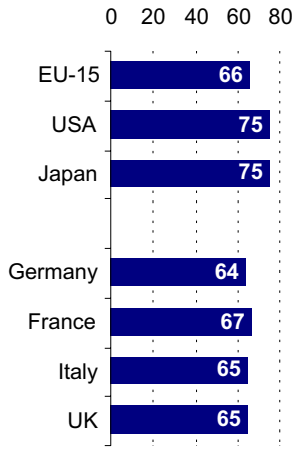


Exhibit 3-4: Enterprises using an intranet (2002)

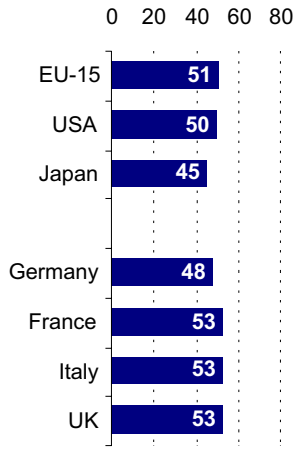
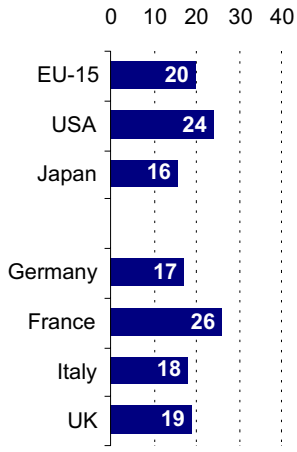


Exhibit 3-5: Enterprises using an extranet (2002)



Base: all enterprises. Weighted by employment ("enterprises comprising …% of employment").
Data for USA and Japan by UK Online for business.

Sources: International Benchmarking Study 2002 (UK DTI) / *e-Business W@tch* (2002)

A general conclusion from these observations may be that a mere benchmarking of ICT diffusion, at least on the basic level, does not show significant differences between the more advanced regions any more. Differences, if any, are to be found in the nature of their application and the level of e-activities. Even advanced regions and sectors differ in the intensity and sophistication with which their companies use ICT to support business processes.

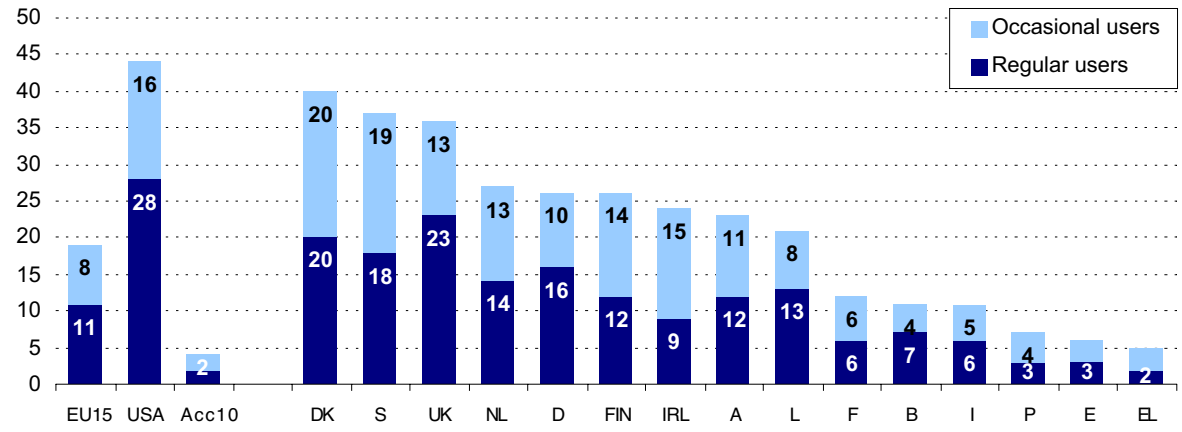
3.2 International developments in e-commerce

The demand side of B2C e-commerce

From a demand side perspective, e-commerce is still much more popular in the USA than in the Europe. The "SIBIS" IST-Project found in 2002 that, on average, 20% of the EU population said they bought goods or services online. Only Denmark, Sweden and the UK, where already more than a third of the population does so, came close to the figure for the USA (44%). In particular, the percentage of regular e-commerce users is much higher in the United States than in most European countries.

Although cultural factors may contribute to differences, this indicator from the SIBIS survey clearly demonstrates the digital divide between most of the current EU Member States and the 10 Acceding Countries. Among them, Estonia is most advanced with respect to the adoption of online selling among the population. Here, e-commerce is more widely diffused (15% users) than in some of the EU-15 Member States. In most of the Acceding Countries, however, the level of consumer e-commerce activity is low, in most cases below 5% of the population. This evidence reflects the lower diffusion of Internet access in households, which limits the potential user base. The currently low demand level has implications for companies in these countries which sell primarily to consumers, as their motivation to launch B2C e-commerce services may be lower than in other EU countries where consumer demand for e-commerce has reached critical mass.

Exhibit 3-6: E-commerce users (2002)



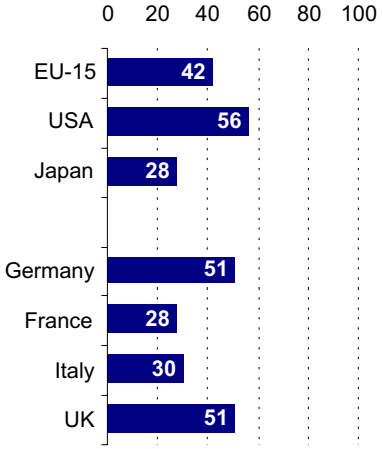
Base: All respondents. Acc10 = the acceding countries

Source: SIBIS (Project in the IST Programme of the EU, IST-26276): General Population Survey 2002. www.sibis-eu.org

The B2B market: electronic procurement

In the business-to-business arena, statistics suggest that electronic procurement activity is highest in the USA. The International Benchmarking Study 2002 by the UK DTI finds that 56% of US companies purchase supply goods or services online, compared to only 28% in Japan and 42% in the EU-15 (*e-Business W@tch*). Those Japanese companies, however, that buy online, seem to use e-procurement more intensively than their US, and particularly than their European, counterparts. More than 50% of Japanese companies that buy online say the share of their online purchases is more than 10% of total purchases, compared to 43% in the USA and 30% in Europe.

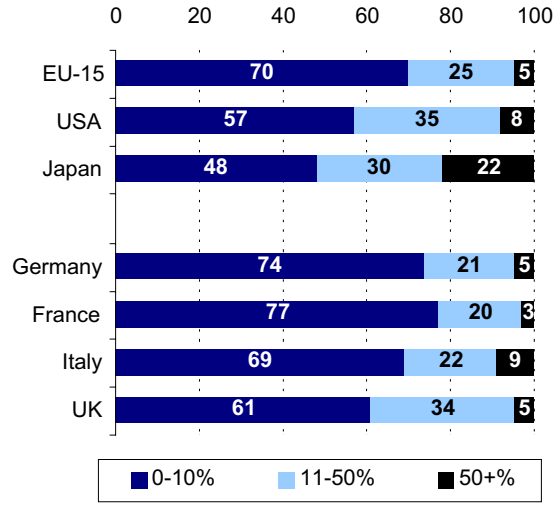
Exhibit 3-7: Enterprises purchasing supply goods / services online (2002)



Base: all enterprises. Weighted by employment ("enterprises comprising …% of employment").

Data for USA and Japan by UK Online for business.

Exhibit 3-8: Percentage of the total value of goods and services ordered using online technologies (%) (2002)



Base: all enterprises purchasing goods/services online. Weighted by employment ("enterprises comprising …% of employment").

Data for USA and Japan by UK Online for business.

Sources: International Benchmarking Study 2002 (UK DTI) / *e-Business W@tch* (2002)

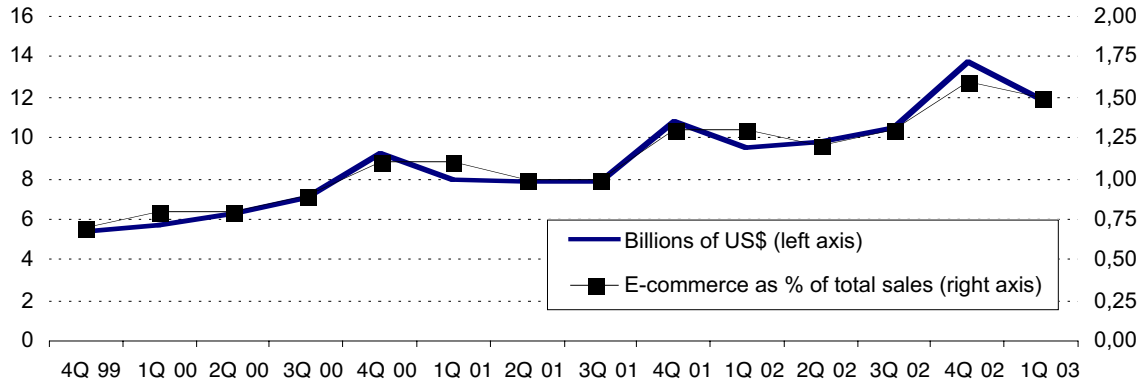
Development of electronic commerce in the USA[21]

In a news bulletin from March 2003 (cf. E-Stats, 19th March 2003), the Census Bureau of the US Department of Commerce (DoC) summarises the situation of e-commerce in the USA in 2001 as follows:[22]

- E-commerce outperformed total economic activity in three of four major economic sectors measured between 2000 and 2001.
- Business-to-Business activity, which depends critically on Electronic Data Interchange (EDI), dominates e-commerce.
- All industry groups in each sector participate in e-commerce.

In a release from May 2003, the Census Bureau presents figures for U.S. retail e-commerce sales for the first quarter of 2003. Not adjusted for seasonal, holiday, and trading-day differences, the total volume is estimated at US$ 11.921 billion, which means an increase of 25.9% from the first quarter of 2002. Total retail sales for the first quarter of 2003 were estimated at $772.2 billion, an increase of 4.4%.[23] According to this estimate, e-commerce sales in the first quarter of 2003 accounted for 1.5% of total sales, while in the first quarter of 2002 e-commerce sales were 1.3% of total sales. In the fourth quarter of 2002 e-commerce sales were 1.6% of total sales.

Exhibit 3-9: Estimated quarterly U.S. retail e-commerce sales (1999-2003)



Data not adjusted for seasonal, holiday, and trading-day differences

Source: US Department of Commerce

Based on data from the 2001 Annual Survey of Manufactures, the DoC also provides statistics about e-commerce as a percentage of the total value of shipments from manufacturing companies. The sectors where e-commerce has reached the highest shares are the transportation equipment sector (48% of total shipment value in 2001), the food and beverages sector (38%) and the electrical equipment sector (25%). In total, e-commerce is estimated at 18.3% of shipment value in the manufacturing sectors (18.0% in 2000). Transportation equipment alone accounted for more than 36% of the e-commerce based shipments in 2001.[24]

The same statistics are available for merchant wholesale trade sales, where e-commerce is found to account for 10% of total sales in 2001 (8.8% in 2000). 86% of e-commerce in merchant wholesale trade sales is EDI based. The report points out that e-sales by Merchant Wholesalers grew strongly

[21] Most of the statistical evidence presented in this section is based on data released by the Census Bureau of the US Department of Commerce.

[22] Data and findings presented are based on an impressive sample of over 125,000 manufacturing, wholesale, services, and retail businesses.

[23] News release by Department of Commerce, Washington, May 23, 2003.

[24] cf. http://www.census.gov/eos/www/papers/2001/2001estatstables.pdf (accessed in July 2003)

from 2000 to 2001 while total sales declined. E-sales were up by 12%, compared to a 1% decline in total sales. More than half of the growth in e-sales came from Drugs and Druggists' Sundries, where e-sales grew by US$19 billion and sales grew by $33 billion.

In Selected Services Sectors, the share of e-commerce based revenues is reported to be much lower than in manufacturing and wholesale trade, namely less than 1% of total revenues. The only sector within the services sectors where e-commerce has reached a significant share is travel arrangement and reservation services, where nearly a quarter of all revenues (24%) stem from e-commerce, according to the 2001 Service Annual Survey. Four groups account for 49% of total Selected Service e-revenues. Travel Arrangement and Reservation Services account for 17%, Publishing, including newspaper, periodical, book, and software publishers, for 13%. Securities and Commodity Contracts Intermediation and Brokerage and Computer Systems Design and Related Services are each 10% of total e-revenues.

Development of electronic commerce in Japan[25]

The Establishment and Enterprise Census[26] from October 2001 found that 10.5% of enterprises in Japan had introduced e-commerce. 8.4% used the Internet for their e-commerce activities, 2.6% networks other than the Internet. 8% of enterprises said they sold goods or services online to other businesses, 4% to consumers. (Kitada, 2002)

Regarding the volumes of goods and services traded online, business to business e-commerce is believed to account for the largest part of online commerce. The e-Commerce Survey 2001 finds that the scale of the B2B market expanded to around 34 trillion yen in 2001, including the service-related segments added into the survey. That was an increase of about 58% compared to 21.6 trillion yen for 2000. Even when limiting the scope to the segments that were included in the previous surveys, it was an amount of 33.6 trillion yen (56% increase). This almost satisfied the target growth rate of 60% that was set by the "e-Japan Strategy".[27]

Particularly noteworthy sectors in the 2001 survey were the automotive industry and the industrial machines manufacturing sector, but also the paper and office goods and the service-related segments transport and travel services. In the automotive industry, manufactures of the finished goods were found to migrate from EDI to Internet for the procurement of supply goods. Both suppliers and manufacturers of the final goods seemed to benefit from e-procurement by cutting costs and improving administrative efficiency.

The same study reports that the volume of business to consumer (B2C) e-commerce market increased steadily and largely since 1998, when the first survey was conducted, from 64.5 billion Yen (1998) to 336 billion (1999), 824 billion (2000) and to 1,484 billion in 2001. From a sectoral perspective, the typical e-commerce segments such as computers and related products, books and music showed a smaller growth rate than in previous years, while clothing, travel, entertainment and real estate showed remarkable growth rates and contributed to a rapid expansion of the B2C market.

The business to government (B2G) segment amounted to about 6 billion yen in 2001 and was expected to grow rapidly for the years to come and to surpass 6 trillion yen in 2006. A main driver in that segment is seen in the fact that the Ministry of Land and Transport decided to complete an electronic bidding system by 2004, which will be used for almost all of the public works which the ministry will commission. In the construction segment in particular, it is expected that the online bidding amount for public works held by the central government agencies as well as the local governments will rapidly increase from around 2003 with the progress of the e-Japan strategy. The Ministry of Land and Transport plans to utilize on-line bidding system for almost all of the public works for which it is responsible for placing an order.

---

[25] This section is based on data and findings from the "E-commerce survey 2001 in Japan", carried out by the METI Ministry of Economy, Trade and Industry.

[26] The Census is conducted every five years by the Statistical Survey Department of the Japanese Statistics Bureau.

[27] cf. Press Release by the METI, Ministry of Economy, Trade and Industry, February 2002 (http://www.ecom.or.jp/ecom_e/press/press20020219_2.htm)

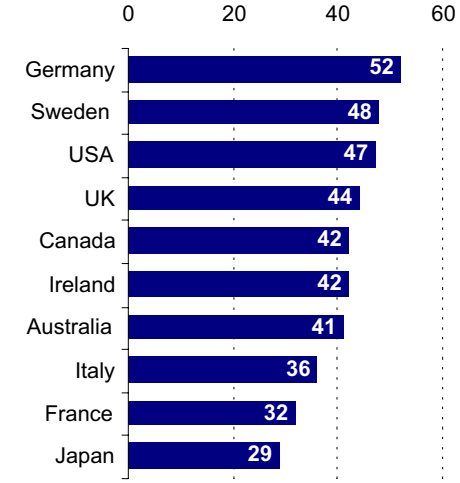
3.3 The E-Readiness of enterprises – EU economies in the lead

As the *e-Business W@tch* focuses on sectors rather than on countries as the main unit of observation, we present on this page two innovative benchmarking concepts from other sources that focus on benchmarking the state and progress of electronic business. Both studies show that enterprises in European countries that lead the e-development are just as "e-ready" as the United States (and ahead of Japan). The networked economies in Germany, Sweden, Finland, the Netherlands, the UK and Denmark are among the global Top-10 with respect to their e-business activities and the advanced state of the underlying ICT systems.

The **International Benchmarking Study** (IBS) 2002 by the UK Department for Trade and Industry presents a "Sophistication Indicator" as an attempt to measure the sophistication of a business's use of new technologies. The indicator computes numerous sub-indicators relating to a range of activities using ICTs and derives a total score for each business. As this was a pilot, IBS remarks that results should be "[…] regarded as indicative and treated with appropriate caution." Countries benchmarked in the IBS 2002 include the G7 and Ireland, Sweden and Australia.

According to this pilot, Germany was the country with the highest average sophistication score in 2002, followed by Sweden and the USA. Surprisingly, Japan has the lowest score. It is worth developing this indicator further and it will be interesting to compare results with the first benchmarking results for countries in the eEurope 2005 benchmarking based on the E-Business Index (cf. contribution in Part C of this report) .

Exhibit 3-10: The Sophistication Indicator (2002)

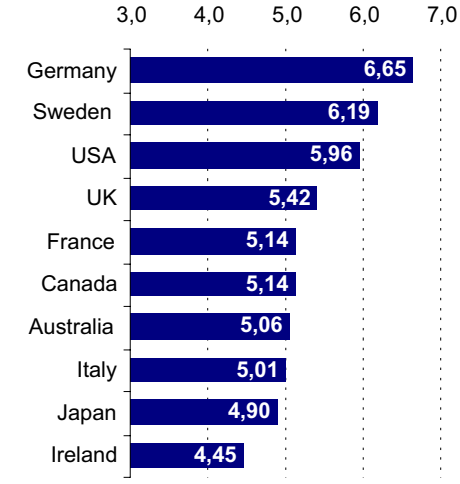


Source: International Benchmarking Study 2002 (UK DTI)

The **Global Information Technology Report** (2002-2003) issued by the World Economic Forum presents the "Networked Readiness Index" for 82 countries. The Index is composed by three sub-indices for the environment, the readiness and the usage. These are again split into three components. The Sub-index that comes closest to what eEurope defines as eReadiness and to the pilot by the UK International Benchmarking Study (IBS) 2002 is the Business Usage Sub-Index. The index computes 8 indicators which measure the level of deployment and use of ICT across all businesses in a nation, for example the level of B2B and B2C e-commerce.

It is remarkable that results for this sub-index are very consistent with the ranking of the IBS. Taking out only the 10 countries benchmarked by the IBS 2002, the ranking of the Global IT Report shows exactly the same four countries on top. France performs better in this Index than in the IBS Sophistication Index. 10 out of the top-15 countries are from Europe, with Germany and Sweden taking the global lead.

Exhibit 3-11: The Networked Readiness Component Index: Business usage (2002)



Source: The Global Information Technology Report (2002-2003)

References (for chapter A.3 Worldwide trends in e-business)

Business in the Information Age. International Benchmarking Study 2002. Report by HI Europe (formerly Total Romtec), produced for the UK Department for Trade and Industry.

Measuring the Information Society in the EU, the EU Accession Countries, Switzerland and the US. SIBIS Pocket Book 2002/03. IST-26276-SIBIS. Project in the IST Programme of the European Union. www.sibis-eu.org

The Global Information Technology Report 2002-2003. Readiness for the Networked World. Ed. by Soumitra Dutta, Bruno Lanvin, Fiona Paua, World Economic Forum. Oxford University Press.

The Global Competitiveness Report 2002-2003. Ed. by Peter K. Cornelius, World Economic Forum. Oxford University Press.

E-commerce 2001 Highlights. In: E-Stats, 19 March 2003, US Department of Commerce. www.census.gov/estats

US Department of Commerce (2002). Digital Economy 2002. Report by the Economics and Statistics Administration of the DoC, February 2002.

METI Japanese Ministry of the Economy, Trade and Industry (2002). Market survey of e-commerce in 2001 in Japan.

Kitada, Hiroyuki (2002). Japanese ICT Statistics and New JSIC with the Information and Communication Division. Paper presented at the 17th Meeting of the Voorburg Group on Service Statistics, 23-27 September 2002.

Part B: A Sectoral Perspective on Electronic Business in Europe in 2003

B.1 The food, beverages and tobacco industry

1.1 Economic profile and trends

The sector consists of two major activities within the NACE Rev. 1 classification: the manufacture of food products and beverages and the manufacture of tobacco products. Food accounts for more than 80% of the total production value of the sector, whilst beverages represent about 11%. Tobacco represents about 6-7% of total production.

NACE Rev.1		Activity
Division	Group	
15		Manufacture of food products and beverages
	15.1	Production, processing and preserving of meat and meat products
	15.2	Processing and preserving of fish and fish products
	15.3	Processing and preserving of fruit and vegetables
	15.4	Manufacture of vegetable and animal oils and fats
	15.5	Manufacture of dairy products
	15.6	Manufacture of grain mill products, starches and starch products
	15.7	Manufacture of prepared animal feeds
	15.8	Manufacture of other food products
	15.9	Manufacture of beverages
16		Manufacture of tobacco products

The EU is the world's largest producer of food and beverages, with combined production estimated (for 2001) at 675 billion Euro. Added value, calculated at factor cost, has been estimated at 160 billion Euro for 2001. Germany and France achieve the highest production value with 143 and 124 billion Euro (2001) respectively.

The structure of the food and beverages industry shows a relatively small number of multinational companies on the one hand and a large number of small enterprises on the other. In general, over 80% of the enterprises operating in this sector are small companies (with less than 50 employees). This is particularly accentuated in the Mediterranean area. In Italy and Spain, the percentage of small companies amounts to 88% and 82%, respectively.

Market trends

The current and persistent market environment penalises SMEs and mandates few sophisticated suppliers with the ability to maintain the life cycle of the product, to support it with modern distribution, and to source from international suppliers of raw ingredients, which puts increasing pressure on local producers.

Currently, the increasing competition puts the least technologically developed companies in a weak position, in most cases SMEs. For example, food safety and quality assurance require the installation of new monitoring mechanisms that SMEs hardly can afford. Moreover, the increased use of computers, the Internet, and web technologies and applications require specific personnel skills and investments in network technologies. A relatively moderate proportion of SMEs are already aware of new developments, but fewer smaller enterprises exhibit a readiness to adopt. Coupled with structural inefficiencies (i.e. islands of operations) found in most EU food industries, which place agribusiness enterprises in a rather disadvantage position, SMEs strive to respond by adopting their products and services, market strategies and partners.

SMEs are likely to respond to such threats by (a) developing their own brands, (b) positioning their products to niche markets and (c) meeting market demand for organic produce on traditional farms. ICTs & e-business have provided a channel to support marketing and distribution of niche products. Furthermore, e-business improves communication with consumers, advances business operations, and enhances business relations profoundly.

1.2 Usage of ICT & e-business in 2003

1.2.1 The role of ICT and e-business

The role and use of ICT technologies mirrors the structure of the industry, that is the dominance by large multinationals, where the creation of industrial groups (tied to mergers and subsidiaries) has encouraged the installation of interconnected local networks. In the large multinationals, the role of ICTs is evolving from mere instrumentation for reducing production costs and it is becoming a growing support for strategic decisions and greater e-business interaction and models.

Sophisticated technologies and applications are less pervasive than in other manufacturing sectors, focusing mainly on intra-organisational processes and procedures. Core sector business areas are: supply, production, logistics, services, and marketing & sales. Other critical areas now being targeted for improvement are: packaging processes, the control of quality in Hazard Analysis and Control Critical Points (HACCP), the quality of the product, and the reverse supply chain management of returned products.

Production in food and beverages tends to be characterised by small batch processes that are hard to consolidate and integrate. As in other sectors (for instance in machinery, but also in manufacturing in general), the capital-intensive and incremental developments of food production have created "islands" of activity that have proved difficult and costly to integrate, and consequently will not be directly connected to suppliers or to customers in the short term.

E-business solutions focus predominately on the business interface and on integrating activities such as accounting, administration, and stock control. Large software houses have developed flexible ERP systems for many food manufacturers. It is mostly the larger agribusinesses that deploy this software, though there are examples of bespoke (low-cost, low-complexity friendly interface) applications created by small in-house IT teams (often in medium-sized enterprises).

In the large multinationals, the role of ICTs is evolving from mere instrumentation for reducing production costs and it is becoming a growing support for strategic decisions and greater e-business interaction and models. However, the degree of diffusion of ICT within the EU food industry depends heavily upon the adoption behaviour of SMEs which are the predominant institutional type.

Companies are under continuous pressure to optimise internal processes and to integrate them with those of customers and suppliers. Integration is stimulated through the optimisation of partner relationships, especially with partners from the retail and distribution network.

The strategic use of new ICTs is depicted by various Efficient Customer Response (ECR) initiatives that have gradually spread since the 1990s throughout North American and EU member states. The objectives of ECR initiatives include reducing operating costs and optimising the principal processes of the food chain, i.e. efficient replenishment of products and efficient store assortment, and developing more efficient promotion and efficient new product introduction.

These projects involve the larger distribution companies and a variety of manufacturing companies, most of which operate in the food service sector. For instance, the Efficient Foodservice Response (EFR) initiative aims at saving billions of Euros in the food supply chain through five distinct strategies: (a) equitable alliances, (b) supply chain demand forecasting, (c) electronic commerce, (d) logistics optimisation, and (e) foodservice category management.

Integration of tiers of suppliers to manufacturers and to the retail and distribution network could drive down costs, improve logistics and ultimately improve customer satisfaction. The actual extent of collaboration and integration by means of B2B e-commerce is dependent on many factors. Although

collaboration and integration between producers and suppliers of raw materials must be improved, it is evident that the diffusion of network technologies can only build on an average penetration rate of EDI solutions.

Integration of upstream suppliers is inhibited by the dominance of traditional transaction and communication channels, where the "social factor" (personal contact with business partners, "handshake agreements", long-term partnerships) plays a very important role. Even so, there are efforts to achieve better integration by implementing Supply Chain Management (SCM) applications.

The "push" for integration between production, packaging and modern distribution is bilateral, in the sense that the initiatives for e-business are promoted by both parties, and are now supported by greater interaction from the so-called "parallel" sectors, for example, packaging manufacturers and food production process companies.

E-commerce adoption

Despite the fact that e-business in the sector mainly involves processes and internal procedures, companies (above all food companies, particularly the larger ones) have shown continuously growing interest in web applications, and in recent years, they have implemented numerous projects aimed towards creating portals for online selling and applying e-procurement solutions. Online initiatives are predominantly B2B solutions. Most of them are composed of “showcase” portals, but several significant marketplaces have also been observed.

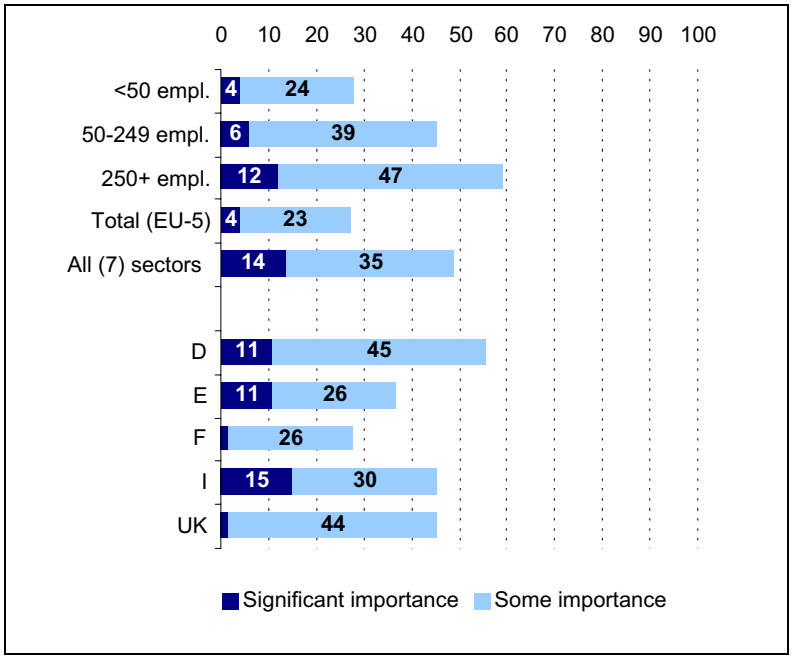
Although B2C activities are not yet maturely developed in the sector, the strong performance of many food and beverage sites underscores the importance of offering products online that might not otherwise be accessible to consumers, for instance local products (for example, specialities, wine, olive oil). Culinary and gastronomic culture has fostered excellent B2C interaction, building virtual communities for food and wine articles. However, many sites closed between 1999 and 2002 or decided to eliminate e-commerce from their offer. Most of the failures involved companies that were only present as virtual shops. Companies with a brick-and-mortar outlet to support their web activities were generally more successful, thriving on their existing infrastructure and brands. Pure Internet players failed to convince enough consumers to purchase products on-line from virtual brands with no visible "brick-and-mortar" foundations.

Importance of e-business for the sector in 2003

Exhibit 1-1: Food, beverages and tobacco: Importance of e-business in 2003 as perceived by companies

Base: EU-5 (D, S, F, I, UK), all enterprises (N= 3515 for all sectors, N=502 for the food & beverages sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



The role of ICT in the sector is still rather controversial. Despite the fact that, based on the results of the survey, 71% of the interviewed enterprises feel that e-business does not play a significant role yet for the company, it must be noted that for approximately 50% of larger enterprises and over 20% of small enterprises, e-business already represents a rather significant part.

1.2.2 E-readiness: ICT infrastructure and skills development in the sector

ICT infrastructure

The diffusion and use of ICT infrastructures in enterprises mirrors the structure of the sector. While the big multinationals (most of which lead in their markets) are also the companies with the most highly evolved infrastructures, smaller businesses normally “lag behind” when it comes to ICT.

Computers are used by 82% of companies comprising more than 90% of employment. All enterprises with more than 50 employees interviewed in the 2003 survey reported the use of computers. The most widely used network applications are the Internet (70%) and e-mail (55%). LAN networks (25%), Intranets (13%), EDI systems (8%), WAN networks (6%) and Extranets (3%) are used less often. On the whole, the usage of ICT is less widespread in the food and beverage sector than in the other sectors analysed.

Exhibit 1-2: Food, beverages and tobacco: Availability of IT infrastructure (2003)

Available IT infrastructure	All (7) sectors	Food			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Computer usage	93	92	81	100	100
Internet access	87	82	69	96	94
E-mail usage	83	75	53	93	94
WWW usage	77	69	46	85	87
Intranet usage	49	41	12	37	73
Extranet usage	17	14	2	15	26
LAN usage	61	57	23	70	88
WAN usage	34	32	6	23	64
EDI usage	25	39	7	37	73

Base: EU-5 (D, S, F, I, UK), all enterprises (N= 3515 for all sector, N=502 for the food sector). Note: figures for "all sectors" / "all enterprises" weighted by employment ("enterprises comprising …% of employment"), figures for size-classes in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

To access the Internet, enterprises mainly use ISDN lines (40% of the total number of companies with Internet access) and / or an analogue modem (35%). ISDN is used above all in Germany (65%), whereas the analogue modem is used most in France (65%) and the United Kingdom (53%). In Italy and Spain, ISDN and the analogue modem are used to more or less the same extent.

Exhibit 1-3: Food, beverages and tobacco: Type of Internet connection (2003)

Type of Internet connection	D	E	F	I	UK	EU-5
Analogue dial up modem usage	9	26	65	42	53	35
ISDN usage	65	27	16	44	25	40
DSL usage	26	38	2	12	5	18
Other fixed connection usage	3	2	23	2	13	6
Other connection usage	0	4	5	0	0	1

Base: EU-5 (D, E, F, I, UK), enterprises with internet access N=350. In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Exhibit 1-4: Food, beverages & tobacco: Remote access to the company's computer system

Remote access	All (7) sectors	Food and beverages			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Remote access to the company's computer system	43	44	12	33	78
Wireless access to the business computer system	14	14	5	8	25

Base: EU-5 (D, E, F, I, UK), enterprises with computers (N= 3272 for all sectors, N=459 for the food sector). Note: figures for all sectors/enterprises weighted by employment ("enterprises comprising…% of employees"), figures for size-classes in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

IT skills development

67% of the companies in the food and beverages sector back their employees in acquiring specialised skills in using a personal computer and network-related information technology. Companies with more than 250 employees are the most training-oriented (92% of them support their personnel), whereas small companies with less than 50 employees are the ones that feel the problem of ICT training the least. With regard to the training instruments offered by companies, 52% of enterprises stated that their employees can use some of their work hours for learning, 48% of them use specific training courses offered by outside consultants, and 32% of them rely on computer or IT training courses conducted in-house. Only about 3% of small companies from the food and beverages sector stated that over the past 12 months period they recruited (or at least tried to recruit) personnel with specialised skills in information technology, one in seven medium-sized companies and every second large enterprise. About 5% of medium-sized enterprises in the food and beverages industry and 15% of large companies had great or some difficulties in finding personnel.

1.2.3 Internal business processes and processes of the extended enterprise

Diffusion of e-business software solutions for integration

In 2003, 12% of the companies from the food, beverages and tobacco industry use **Enterprise Resource Planning** (ERP) systems in order to integrate their information system with their customers. Adoption of integrated management systems will emerge as a trend in the coming years as the major ERP suppliers create solutions for small and medium-sized businesses, opening up new prospects for those companies with the available capital to invest. Up to now, this sector has not shown a particular interest in ERP, opting rather for traditional business models better adapted to their size and characteristics. The functionalities of ERP systems are integrated by means of specific sector utilities, for example management of returns, handling recyclable packaging, HACCP quality control, handling with double independent units of measurement or recipe management.

Supply Chain Management (SCM) is in an embryonic phase, but presents significant opportunities. After reengineering internal processes to increase efficiency, large companies (especially in the food and beverage sector) have attempted to increase their competitive advantage by achieving inter-organisational goals, such as decreasing time-to-market and distribution costs.

An emerging customer-centred approach and the spread of concepts such as "segment by one" and "mass customisation" have encouraged the implementation of **Customer Relationship Management** (CRM) by some of the larger companies. CRM system implementations mostly involve customer contact points with the company in sales, marketing, trade assistance services, order management, distribution and delivery. Typically, the first areas tackled in implementing CRM are automation of the sales force and call centre management. CRM systems offer new specialised applications, but also use or reuse of investments already made in structures such as Helpdesks and websites, redirecting them to meet CRM needs (for instance at Coca Cola). Thus the service component is still more important than the software application component.

Exhibit 1-5: Food, beverages and tobacco: Usage of special e-business solutions (2003)

Usage of special e-business solutions	All (7) sectors	Food and beverages			
		All enterpr.	0-49 empl.	50-249	250+ empl.
SCM usage	4	3	3	5	8
CRM usage	6	4	3	7	20
Usage of a Knowledge Management Solution	5	4	4	5	5
Usage of an ERP system	9	12	11	25	30
Use of online technologies for e-learning	7	2	2	4	9

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 3515 for all sector, N= 502 for Food sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Exhibit 1-6: Food, beverages and tobacco: Use of online technologies (2003)

Use of online technologies	D	E	F	I	UK	EU-5
Use of online technologies to share documents/ to perform collaborative work	7	24	4	12	11	10
Use of online technologies to automate travel reimbursement of employees	2	0	2	0	7	1
Use of online technologies to track working hours and production time	13	8	2	7	5	7
Use of online technologies to support the human resources management	3	7	2	5	9	4

Base: EU-5 (D, E, F, I, UK), all enterprises N=502 . In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Processes of the extended enterprises

Enterprises do not use online technologies solely for e-business purposes. The use of online technologies for the electronic exchange of documents with suppliers or with customers is becoming quite important in the sector. There is less latitude for the use of these technologies for collaborating with commercial partners to design new products or forecast product demand. Moreover, only a low percentage of enterprises from the sector stated that they use online technologies to negotiate contracts or to manage production capacity and inventory.

Exhibit 1-7: Food, beverages and tobacco: Usage of online technology within the value chain (2003)

Usage of online technology within the value chain	All (7) sectors	Food and beverages			
		All enterpr.	0-49 empl.	50-249	250+ empl.
Online collaboration with business partners for designing products	12	7	6	9	14
Online collaborating with business partners to forecast product demands	10	7	6	8	19
Online management of capacity / inventory	10	10	10	10	15
Electronic exchange of documents with suppliers	37	29	28	40	57
Electronic exchange of documents with customers	28	25	25	34	58
Online negotiation of contracts	12	7	7	10	12

Base: EU-5 (D, E, F, I, UK), enterprises with internet access (N= 2677 for all sector, N= 350 for Food sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

1.2.4 Purchasing online

In contrast to online selling which is used by 5% of the interviewed companies, online procuring (as in other sectors) has been developed more rapidly, playing a more important role in the sector. In 2003, 19% of the sample companies representing 36% of employment make online purchases. This is significantly below the average of the seven sectors surveyed (47%, employment-weighted).

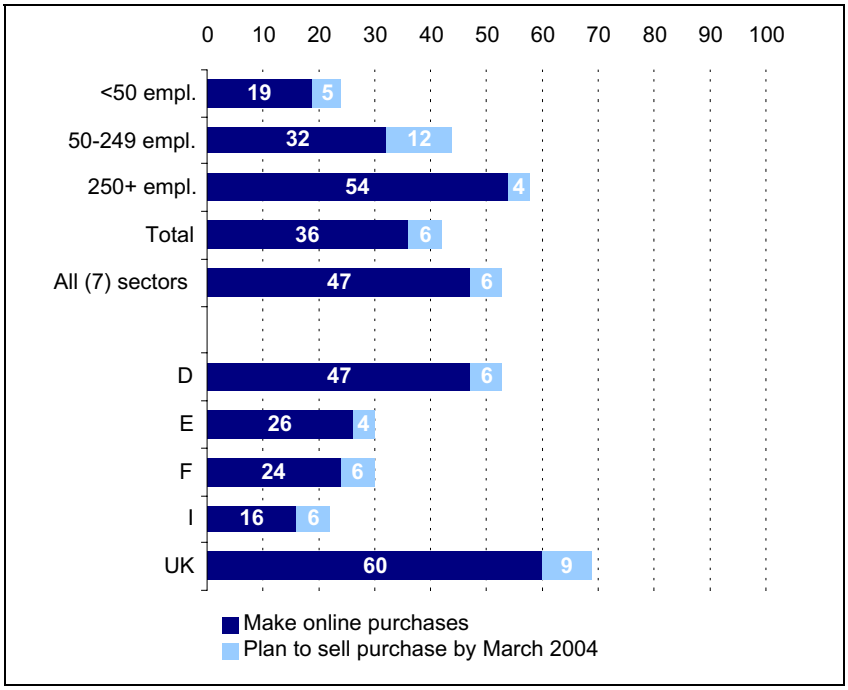
Large companies are the ones that mainly adopt online procuring (54% of the sample), but there is also a rather significant percentage of small companies that handle their purchasing online (19%). On a geographic level, online procuring is more widespread on the average in countries such as Germany (40% of enterprises) and the United Kingdom (30%).

Exhibit 1-8: Food, beverages and tobacco: Companies making online purchases (2003)

Base: all enterprises. Note: Figures for "total" and "all sectors" are weighted by employment ("enterprises comprising…% of employees"), while figures for size-classes are to be read as "% of enterprises".

Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



For 70% of the companies (out of the total number of companies that use e-procurement), online purchases represent less than 5% of total purchases. This leaves a wide window for future online purchases. For 20% of these companies, online procuring represents a share ranging from 5% to 10%, and for 9% of the companies online procuring represents a share of 11% to 25%.

Most companies use the website of other companies to place their orders (an instrument used by 76% of companies). EDI is also used quite extensively (21%), particularly in Italy. Instead, only a few companies place their orders through a marketplace or through access to a supplier's Extranet. Only a very small percentage of enterprises (8%) indicate that they have a system integrated with those of their suppliers for placing their orders. This percentage rises in the case of larger companies (21%).

1.2.5 Marketing and sales

Approximately three out of ten companies in the EU Member States examined and nearly eight out of ten large companies from the food and beverages sector have a website in 2003. 16% of all companies say they plan to create a website over the 12 months period ahead.

Exhibit 1-9: Food, beverages and tobacco: Enterprises with a website (2003)

Percentage of companies having a website on the Internet	D	E	F	I	UK	EU-5
Website	23	46	13	54	47	34
Plans to have a website	27	20	10	10	16	16
Usage of Content Management Systems	0	36	1	9	4	12

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 502). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Only about 5% of companies report in 2003 to make online sales. This percentage is only slightly higher in the case of medium-sized enterprises (9%) and large enterprises (8%). This is a lower adoption rate than in other sectors. On average, 16% of companies from the seven sector surveyed make online sales.

Even if making online sales, the relative importance of e-commerce is very limited in most of the cases. More than 60% of the companies from the food and beverages sector that reported to sell online said that online sales represent less than 5% of their total sales in 2003.

Exhibit 1-10: Food, beverages and tobacco: Companies selling online (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 502). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

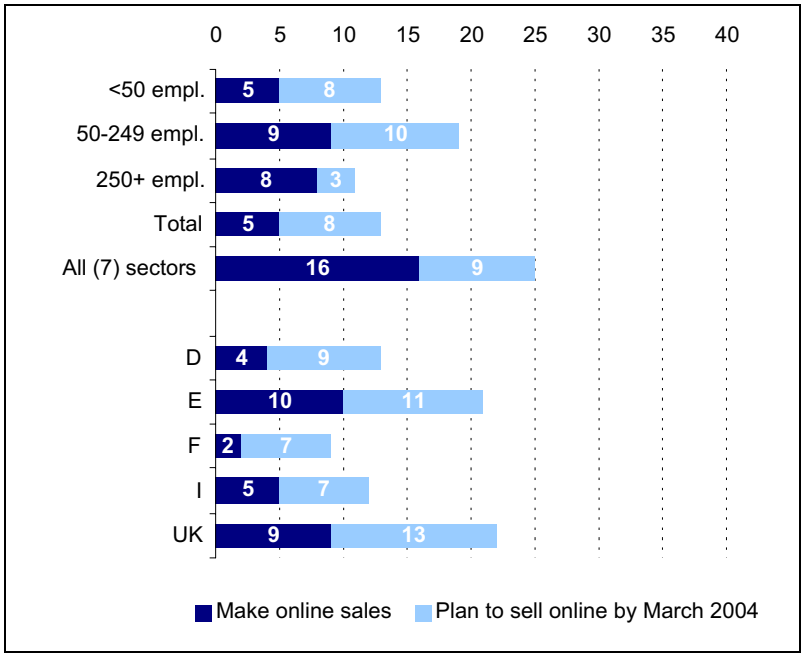
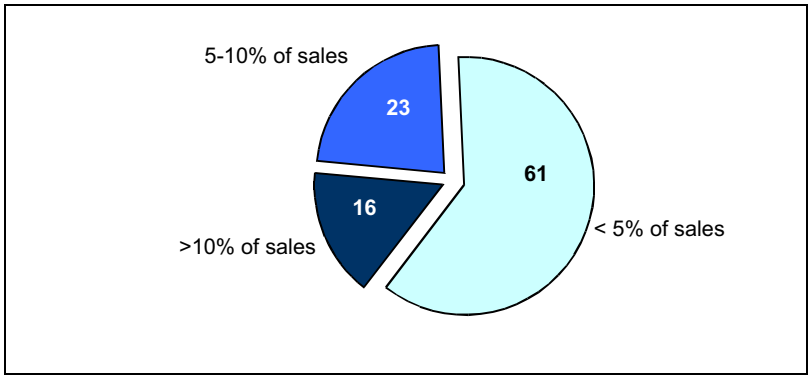


Exhibit 1-11: Food, beverages and tobacco: Share of online sales on total sales (2003)

Base: EU-5 (D, E, F, I, UK), enterprises selling online, excl. "don't know" / "no answer" (N=542 for all sectors, N=31 for Food & beverages). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



1.2.6 E-business development 2002 – 2003: main trends

In the past two years, the development of e-business in the food and beverage sector has followed the trend of the entire ICT sector, which is experiencing a phase of reflection. Although the number of companies present online has increased slightly through the creation of websites, e-commerce has not shown enormous development. The further growth of online procuring, which has now become rather widespread in the sector, has recently shown a slowdown. Inversely, online selling – which is yet less widespread – has gained some momentum.

The growth of online selling has been favoured, on the one hand, by the market entry of websites belonging to companies that were already operating on the traditional market (favoured over dot-coms in that they already have infrastructures and an established brand), and on the other hand, by the creation and success of several sites offering typical food products.

With regard to the use of specific e-business solutions, there is a growth trend in terms of ERP. This growth has been driven by requests from larger companies (due to increasingly customised software to meet the specific needs of food businesses), as well as the tendency among ERP suppliers to broaden their target to include SMEs. EDI systems and corporate banking have essentially remained stable, and they have reached a mature phase in terms of life cycle.

Among the more "evolved" systems, there has been a slight growth trend in Supply Chain Management applications, which have also been introduced at several small and medium-sized businesses. There has instead been stronger growth in CRM, above all in larger companies.

Exhibit 1-12: Food, beverages and tobacco: main trends in the spread of ICT applications in 2002 and 2003

Type of technology	Adoption status in leading firms	Adoption status in SMEs
ERP	Growth	Growth
EDI	Stability	Stability
Corporate banking	Stability	Stability
Website	Stability	Slight growth
SCM	Slight growth	Introduction
CRM	Growth	Introduction
KM	Introduction	Insignificant

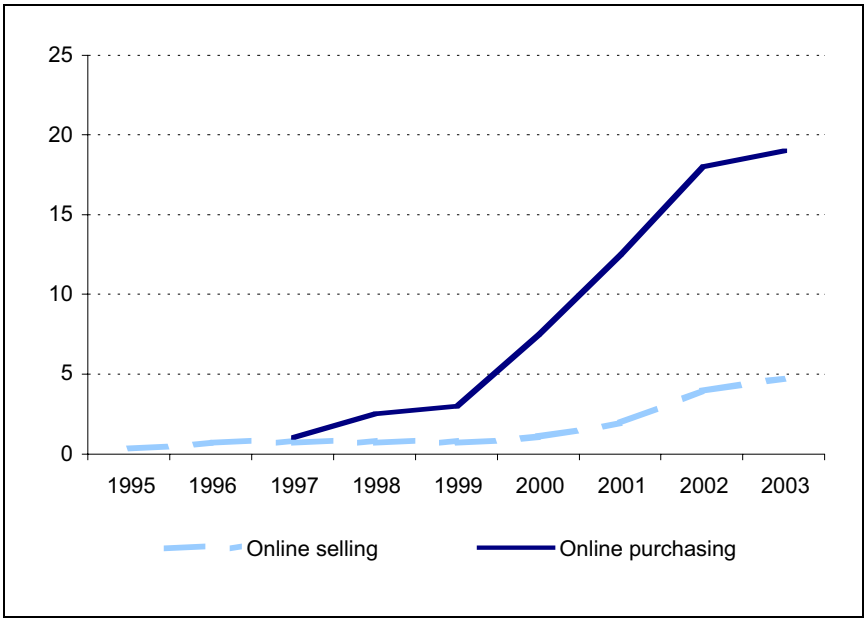
Source: Databank Consulting developed from e- businesses survey 2002/2003

Exhibit 1-13: Food, beverages and tobacco: Adoption process of selling and procuring online

% of firms selling online / making online purchases.

Based on question "When did your company start selling / purchasing online?" (year, month).

Source: *e-Business W@tch (2003)*



Investment climate for e-business technologies

70% of the interviewed enterprises stated that they would maintain the same level of investments, whereas 26% of the enterprises plan to increase their investments in e-business technologies over the next 12 months. Only 2% of the enterprises say that they intend to cut down on ICT expenditures. Not only large enterprises, but also a high percentage of SMEs is planning to increase these expenditures.

Exhibit 1-14: Food, beverages and tobacco: Planned expenditure on e-business and overall satisfaction (2003)

Plans for expenditure on e-business technologies for 12 months period ahead	All (7) sectors	Food and beverages			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Increase expenditure	29	26	26	29	36
Decrease expenditure	2	2	2	1	8
Maintain current level	64	70	71	65	56
Very satisfied with e-business	19	11	12	10	8
Fairly satisfied with e-business	70	79	79	87	88
Fairly disappointed with e-business	9	9	10	3	4
Very disappointed with e-business	1	0	0	0	0

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 3515 for all sector, N= 502 for Food sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

1.3 Conclusions

1.3.1 Economic implications

Exhibit 1-15: Strengths and weaknesses of e-business in the food, beverages and tobacco sector

Points of strength	Points of weakness
• Presence of multinationals leading in the introduction of ICT and development of e-business • Presence of many companies capable of offering local speciality products which are also popular abroad • Good level of availability of "basic" ICT infrastructures (PC, website, e-mail) • ICT training and education is quite widespread in larger enterprises • Good prospects for growth for selling online • In a number of countries (including France, Italy, Spain) enterprises have large shares of online sales for export thanks to their offer of local speciality products • Birth of a number of marketplaces and portals specialising in specific food sectors • Significantly widespread use of banking online. Growing offer of specialised ERP services for food enterprises • About 25% of enterprises plan to increase ICT expenditures in the next 12 months	• Presence of a large number of SMEs which lag behind when it comes to ICT "awareness" • SMEs often cannot budget for ICT expenses • Lack of availability of certain "advanced" ICT structures (such as LAN, Intranet, WAN, Extranet), especially in SMEs • Little education and training in SMEs • Little use of e-commerce throughout the sector • Online sales/purchases represent a small percentage of the total • Enterprises rarely participate in B2B initiatives and marketplaces in the sector • Certain specific e-business solutions (SCM, CRM) are rare, practically non-existent in SMEs • Presence of high barriers (mostly "psychological") to growth in e-commerce

Source: Databank Consulting

From a structural perspective and also in terms of ICT availability and awareness, the food, beverage and tobacco sector is strongly polarised between many small and a few very large companies. A relatively limited group of large multinational firms have acted as pioneers, introducing within their

corporate structures the various technologies present on the market. On the other hand, there is a large group of SMEs operating in this sector which tend to be relatively "behind" from an ICT standpoint. This distinction is important for understanding the economic implications of e-business on companies in this sector. Against this background, e-business has had "partial" economic implications specifically because it has significantly involved only a relatively small number of companies, namely the larger ones.

Food and beverages: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **"Typical" products**: there are numerous SMEs in this sector – above all in countries like France, Italy and Spain – that have gained important shares of online sales on foreign markets with typical products. The trade sectors that are most involved are those of wine, charcuterie products and baked goods. As far as Italy, Greece and Spain are concerned, olive oil may also play an important role. • **Training**: a significant opportunity for sector companies is tied to bolstering ICT training and education for their employees. Large companies seem more evolved from this standpoint. Here again, more widespread training among SME's would be positive. Web-based Vocational training although in its first steps, provides a promising alternative for remote SMEs. • **Online selling**: although the percentage of companies that continue to sell online is still limited, based on the results of the survey there are good growth prospects in both B2B and B2C.	• The main threat for the sector is represented by general backwardness with regard to **ICT awareness**, and this is widespread throughout the production chain and above all among SMEs. This is due in part to the relatively low level of training and education conducted inside these companies. • Another threat is tied to the ongoing difficulty of companies in evaluating and appreciating the **economic returns of e-business**, often accompanied in the past principally by the steep purchase costs of software and hardware, and by a technological offer that is often not very efficient and that does not always target the specific needs of the sector.
Enablers	**Barriers**
• **"Leading" companies**: in this sector companies like Barilla (I), Danone (F) and Unilever (NL) are playing a "pioneering" role in the introduction of ICT and the development of e-business. The satisfactory results achieved by these companies could generate an "imitative" process by smaller companies operating in the respective trade sectors. • **ICT expenditure**: More than 25% of the companies indicate that they will increase ICT expenditures over the short / medium term.	• The barriers that prevent the development of e-business in the sector are high and, above all, they are **cultural barriers**. • For e-procuring, the main barrier is seen in the need for personal interaction with suppliers and by the still limited number of suppliers who sell online. • In the case of online selling, the main barriers are linked to the fact that many of the products offered by companies do not lend themselves to being sold online. • The sector is also affected by the current **negative economic trend** and by the stagnation phase being experienced by e-business in general.

Economic implications for the industry

From the standpoint of the industry structure, the implications of e-business have not been highly significant to date. E-business has not led to structural changes, but it has nevertheless facilitated certain processes. For example, the creation of industrial groups (tied to recent acquisitions) has been facilitated from an operative standpoint by the installation of interconnected local networks. Likewise, the need to achieve greater collaboration and integration between industry and trade has discovered an important tool in network technologies. However, it would be difficult to sustain that – at least so far – e-business has triggered significant structural changes in the sector.

The most significant economic implications that are likely to arise over the next few years are:

- the growing collaboration among companies, tied to common online initiatives, could lead to the creation of new agreements or strategic alliances, as well as acquisitions and mergers, with an ensuing increase in the level of concentration of the sector;
- increasing competition in terms of costs, accelerated by the introduction of certain labour-saving technologies, could cause companies (particularly SMEs) to leave the sector, as they are no longer able to be competitive on the market;
- the spread of ICT infrastructures and new applications could lead to a more forceful integration within the various production chains, particularly between industry and distribution;
- the optimisation of certain processes/areas/corporate activities could promote the recovery of operating margins and free up financial resources to be allocated to other areas/activities (for example, trade marketing, customer service); nevertheless, the structure of the chain of value will probably not undergo major changes;
- the development of online selling could promote the establishment of new specialised enterprises in the channel (and the growth of existent enterprises), the development of new online operators (online supermarkets, virtual consortia), and the creation of new strategic groups of enterprises.

1.3.2 Policy issues

Quality assurance, including food safety

A key issue that most companies in the food industry are facing today is "safety from gate to plate". EU regulation concerning safety is of utmost importance in this sector, and in the Food sub-sector in particular. Issues involved are quality and safety of materials and the regulation of food typical products (regulated by the EU laws n. 2081/92 and 2082/92, concerning the DOP and IGP productions.

Verifying the quality of raw materials and finished products is becoming increasingly important. ICT is important in this respect as it plays a key role in facilitating vertical integration and control between production processes and suppliers. An e-business solution capable of guaranteeing food safety to consumers and vertically integrating business operations across the supply chain would have a good chance of becoming the “killer application” for e-business in the food industry.

Promotion of ICT education, training and “cultural” change

The implementation of e-business requires qualified and continuously vocationally trained personnel. Companies, therefore, have to ensure the necessary tools for improving competences and ICT skills. So far only leading companies have progressed from use of ICTs as a mere tool for reducing production costs to a tool supporting strategic decisions and e-business interaction models. The dominant culture, especially among SMEs, is still conservative. They lack confidence in the potential and benefits of new technologies for their business, and instead underline the common concerns about security and the cultural reluctance to any change in established procedure. Successful initiatives which have developed forms of collaborative product design, joint marketing and integrated logistics among the various players in the value chain should be promoted and become common knowledge in the sector.

Fostering competitiveness in industrial districts through ICT support

In the food and beverages sector, and particularly in Italy and France, there are several important industrial districts (for example, the charcuterie districts of Parma and San Daniele in Italy, and the champagne district in France) and they are mainly composed of SMEs. The industrial districts of the food and beverage sector enjoy the competitive advantages typical of all industrial districts (such as exclusive skills, or a dense network of relations) and, as such, they are experiencing a transitional situation, tied not only to the globalisation process underway but also to the impact of new technologies. The ability to face these challenges in a positive way depends on numerous factors, including the application of new IC technologies by enterprises in order to enhance their efficiency and collaboration within the production chain, as well as relations with companies working outside the district.

Fostering and encouraging SMEs to use ICT

The food & beverage industry has been a *follower* of e-commerce and e-business development rather than an early adopter. Encouraging the further up-take of e-business by this sector, and especially among SMEs, will therefore be a key issue for policy actions.

This aim can be achieved facilitating and promoting:

- creation of marketplaces and B2B portals capable of drawing SMEs closer to larger enterprises and large-scale distribution. Special initiatives could be implemented in sectors characterised by an important offering of "typical" national speciality products (such as wine, cheese, ham). Initiatives of this kind would offer countless benefits for SMEs, but also for larger enterprises and distributors. The benefits for SMEs would include increased visibility (for both the enterprise and its products), improved communication with prospective customers, reduction of the time and expense involved in negotiation (telephone contact, sending of documentation sending of information and clarification on products, productive processes). Large multinationals and distributors wanting to expand their range by offering speciality products would benefit from the presence of small local suppliers capable of guaranteeing know-how, procurement of quality raw materials locally, the image and guarantee of the genuine speciality product, and flexibility in production.
- facilitating and promoting creation of B2C portals and sites capable of bringing SMEs closer to final consumers Implementation of B2C initiatives capable of enhancing the final consumer's impression of national speciality products and promoting sales on foreign markets. Almost half of online sales in the sector are destined for export. Countries like Italy, France and Spain with a vast offering of world-renowned speciality products are most export-oriented. Promotion and facilitation of support might take such forms as promotion of the creation of carrier networks for rapid delivery or opening "virtual" shops for online sales of speciality products.
- facilitating the purchase and usage of ICTs and e-business applications specifically aimed at improving SME's competitiveness. Specialized software solutions tailored for food companies are already available and could be adapted to the specific needs of SMEs. This initiative can be coupled with good-practice examples in order for SMEs to reduce the concept complexity of e-business applications and make more visible how those applications can practically help their business.

Promotion of implementation of projects and initiatives involving both industry and modern distribution

Following the example of the ECR (Efficient Customer Response) initiative which spread throughout all EU nations from the mid-nineties on, other similar initiatives could be implemented with the aim of improving integration between industry and modern distribution and making it more efficient. The goals of initiatives of this kind should be reduction of operating costs and optimisation of the principal processes in the food chain (product supplies, restocking of individual points of sale, administration of transport, inventory management). Projects of this kind should involve both the major distribution groups and the largest possible number of producers in the food industry.

Those initiatives can also offer value-added in terms of traceability of products. It is evident that, one way or another, food safely and food quality depends upon the efficient traceability of products and raw materials throughout the food chain. The implementation of effective traceability projects relies upon the usage of modern e-business applications that permit the efficient communication of information, co-ordination of activities, and integration of processes.

References

Afuah C. Tucci L., Virili F. (2002): Modelli di e-business, McGraw-Hill
Allen T.J., Scott Morton M.S. (1994): Information Technology and the Corporation of 1990s, Oxford University Press, New York.
Amor D. (2000), E-business (R) evolution, Tecniche Nuove
Angell D., Heslop B. (1995): The Internet Business Companion. Growing your Business in the Electronic Age, Addison-Wesley Publishing Company, USA.
Antognazza E., Moeder P. (1999): Web marketing per le piccole e medie imprese, Hops
Annual Report CIAA (2001): The Voice of the European Food and Drink Industry, Brussels
ANEE (2000): Osservatorio sul commercio elettronico, Milano
Assinform (2001), Rapporto 2001 sull'Informatica e le Telecomunicazioni.
Boston Consulting Group (2001): The multi-channel consumer
Brynjolfsson E. (2001), Understanding the Digital Economy, MIT Press
P.F. Camussone, A.Biffi, (1999): Il commercio diventa elettronico, Milano, Edipi,
Camussone P.F., Ciuccarelli F. (2000): Crescere in Rete, Edipi, Milano
Campo dall'Orto S., Ghiglione B. (2000): L'azienda on line verso il commercio elettronico, Franco Angeli
Casaleggio D. (2002), I modelli dell'e-business, Hops
Chester M., Kaura R. (1998): Electronic commerce and business communications, Springer, Berlin.
Ciuccarelli F., (2001): "Il commercio elettronico nelle piccole e medie imprese italiane", Etas
Demattè C. (2001): E-Business, Etas libri
ERNST & Young (2001): Global on-line retailing, Special Report
European Commission: (2002): The development of e-commerce in the European Union – A general assessment, Quarterly Report No. 1/2002
European Commission (2001): Impact des NTIC sur la logistique des enterprises commerciales
European Commission (2001) : The impact of the e-economy on European Enterprises: economic analysis and policy implications
European Information Technology Observatory – EITO (2001): The impact of E-commerce on five vertical sectors
Gartner Group (1997): EDI and Electronic Commerce in Europe
Giamminola G. (2001), E-Marketplace: Guida operativa ai nuovi modelli di mercato elettronico, ISEDI
Grasselli, P. Mevio (Aprile 1999): "Shareholder-value: leve per la creazione del valore", Il Sole 24 Ore
Greenberg P. (2002): CRM-Customer Relationship Management, Apogeo
Guidotti E. (2002): Dove ci porta Internet, Franco Angeli
Hewson Group (2000): "Making a compelling case for CRM"
ISTAT, National Statistical Institute of Italy (2002): ICT and Business Performance in Italy
Ita.sas.com, Rivista periodica di SAS, Gennaio 2000, "Speciale CRM"
Keen P. - McDonald M. (2001): Il vantaggio competitivo nell'era di Internet, Apogeo
Komenar M. (1997): Electronic marketing, John Wiley and Sons, New York.
Korper S., Ellis J. (2000): Il libro del commercio elettronico, Apogeo
Lucchini A. (2002): Content Management, Apogeo
Malhotra, Y. (2000): Knowledge Management for E-Business Performance, The Executive's Journal" vol. 16(4)
Marcandalli R., Pacchiardo E. (1998): Il Commercio elettronico, Masson, Milano
Pannella L. (2002): Sviluppo dell'ECR nelle Macro Organizzazione Commerciali, in : www.ismea.it
Mandelli A. (1999): "Internet, Intranet e Extranet nelle medio-grandi imprese italiane", relazione in occasione dell'Osservatorio Internet Italia, SDA Bocconi.
Microstrategy White Paper (1999): The five Engine of eCRM, Vienna, Virginia, USA, Microstrategy Inc.
Miranda L., Giulidori F. (2001): Siti di successo, Hoepli Informatica
Oracle White Paper (2000): Gestire le relazioni con i clienti per avere successo e generare profitti nella internet economy
Palmer J. (1999): "Business-to-Business Connectivity on the Internet: EDI, Intermediaries, and Interorganisational Dimensions", in Electronic Markets, University of St. Gallen, vol. 6, n° 2.
Peppers D., Rogers M., Dorf B. (2000): Marketing one to one, Il Sole 24 Ore
Peterson R.A., S. Balasubramanian, B.J.Bronnenberg (1997): "Exploring the implications of the internet for Consumer Marketing", Journal of the Academy of Marketing Science, Vol 25, N.4
Ravi Kalakota, Marcia Robinson (2000): e-Business: Come avviare una impresa di successo in Internet, Apogeo, Milano
Rifkin J. (2000): L'era dell'accesso, Mondadori
Rose G., Khoo H., Straub D. W. (1999): "Current technological impediments to business-to-consumer electronic commerce", in Communications of the Association for Information Systems, Vol. 1, Art. 16.
Rullani E., Romano L. (1999): Il postfordismo: idee per il capitalismo prossimo venturo, Etas Libri, Milano.
SAP White Paper, (2000): Porre i clienti al centro delle proprie attività aziendali, SAP AG
Scott W.G., Murtula M., Stecco M. (2000): Il Commercio Elettronico, Isedi, Torino
Sudsweek F., Romm C. T. (1998): Doing business on the Internet: opportunities and pitfalls, Springen, London.
Santoro F. (2000): Il Commercio Elettronico, Edizioni FAG
Turconi F., (Febbraio 2001): "Integrazione CRM e Supply Chain, i motori della nuova impresa", dossier di ZeroUno n.229
Watson R.T., Berthon P., Pitt L.F., Zinkhan G.M. (2000): E-commerce & Impresa, McGraw-Hill
Vaccà C. (1999): Il commercio elettronico: il documento digitale, Internet, la pubblicità on-line, Giuffré, Milano.
Vlachos, I. P. (2003): Adoption of Electronic Data Interchange by Agribusiness Organisations, Journal of International Food and Agribusiness Marketing, Vol. 15. No. 3.
Whinston A. B., D. Stahl, S. Choi (1998): The economics of electronic commerce, Macmillan Technical Publishing, Indianapolis

B.2 The chemical industries

2.1 Economic profile and trends

The chemical industries are defined in this study as business activities specified by NACE Rev. 1 divisions 24 ("Manufacture of chemicals, chemical products and man-made fibres") and 25 ("Manufacture of rubber and plastic products"). We use the terms “the combined chemical industries” or in short “the chemical industries” for the combination of these sectors.

NACE Rev.1		Activity
Division	Group	
24		Manufacture of chemicals, chemical products and man-made fibres
	24.1	Manufacture of basic chemicals
	24.2	Manufacture of pesticides and other agro-chemical products
	24.3	Manufacture of paints, varnishes and similar coatings, printing inks and mastics
	24.4	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
	24.5	Manufacture of soap, detergents, cleaning, polishing
	24.6	Manufacture of other chemical products
	24.7	Manufacture of chemical fibres
25		Manufacture of rubber and plastic products
	25.1	Manufacture of rubber products
	25.2	Manufacture of plastic products

Together, the combined chemical industries produced output worth 675 billion Euro in 2001, that is approximately 14% of the production value of EU manufacturing. Together, the combined chemical industries account for 14% of the production value of EU manufacturing. The four main areas of this industry are:

Basic chemicals Basic chemicals form the foundation of the chemical industry. Its manufacturers produce inputs for the remainder of the chemical industry from raw minerals, crude oil, gas and energy, typically in large-scale plants. Much of the produced output remains in the chemical industry itself, where it is refined to downstream products. The production is characterised by large output volumes as well as by high capital and energy intensity. R&D intensity is comparatively low.

Fine and speciality chemicals Fine and speciality chemicals are the next element in the chemical industry’s value chain. The companies in this segment use basic chemicals as a major input to produce a large variety of special substances, often in relatively small volumes. R&D intensity is comparatively high in this sector. It also implies high switching-costs for the customer. Overall, the manufacture of fine and speciality chemicals is an industry with comparatively high profit margins, where price is not the determining factor for establishing a business relationship.

Formulated chemicals Formulated chemicals are another step further along the value chain. This sub-sector typically uses basic chemicals as well as speciality chemicals as inputs. It differs from the other two chemical industries in that its products are mostly produced for end use by individuals, government institutions or other companies and not as inputs for other parts of the chemical industry. The most important part of formulated chemicals is the production of pharmaceuticals, medical chemicals and botanical products. The products are typically only partially substitutable, either due to patent protection or due to brand name. Therefore brand or monopoly premiums are possible.

Rubber and plastic products The manufacture of rubber and plastic products is similar to the formulated chemicals sector in that it uses considerable amounts of speciality chemicals as inputs. While synthetic rubbers and rubber chemicals are important inputs for the rubber products industry, the plastic product industry’s major input are resins. The plastics industry is characterised by a high number of SMEs. Its most important customer is the automotive industry, for example for tyres.

Exhibit 2-1: Structure of the Chemical industries in the EU-13 (2001) by kind of activity

NACE Rev. 1		Production value		Value added at factor cost (est.)	
		Euro (m)*	%	Euro (m)*	%
24.1	Manufacture of basic chemicals[1)]	192,312.7	39.6	49,309.7	34.0
24.2	Manufacture of pesticides and other agro-chemical products[2)]	8,302.5	1.7	2,306.5	1.6
24.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics[1)]	34,584.6	7.1	10,614.3	7.3
24.4	Manufacture of pharmaceuticals, medicinal chemicals and botanical products[1)]	139,077.8	28.6	50,710.1	35.0
24.5	Manufacture of soap, detergents, cleaning, polishing[3)]	55,755.1	11.5	15,687.6	10.8
24.6	Manufacture of other chemical products[4)]	40,188.1	8.3	12,399.8	8.6
24.7	Manufacture of man-made fibres[5)]	9,886.2	2.0	2,831.6	2.0
	unassigned (see footnotes 1 to 5)	5,748.8	1.2	1,033.2	0.7
24	**Manufacture of chemicals and chemical products**	**485,855.8**	**100.0**	**144,892.8**	**100.0**
25.1	Manufacture of rubber products	39,428.5	20.8	15,281.3	22.9
25.2	Manufacture of plastic products	150,097.5	79.2	51,514.3	77.1
25	**Manufacture of rubber and plastic products**	**189,525.9**	**100.0**	**66,795.6**	**100.0**

* EU-13 = EU-15 excluding Greece and Ireland.

1) EU-12 = EU-13 excluding Luxembourg. 2) EU-10 = EU-13 excluding Belgium, Denmark, and Austria. 3) EU-11 = EU-13 excluding Luxembourg and Finland. 4) EU-11 = EU-13 excluding Belgium and Sweden. 5) EU-8 = EU-13 excluding Denmark, Luxembourg, Austria, Finland, and Sweden.

Source: Eurostat New Cronos (2003), estimates and calculations by DIW Berlin (2003).

Growth in the chemical industry was comparatively strong since the mid 1990s. Compared to the manufacturing sector as a total (1.4% per year during 1991-2002), production in the chemical industries grew significantly stronger (3.3%). Growth in the manufacturing of rubber and plastics was very much in line with total manufacturing growth (1.8%). However, not all parts of the chemical industry grew equally strongly: The most powerful driver during the 1990s was the pharmaceutical industry. Its European production value grew on average by 5.2% each year in the period 1990-2001 (CEFIC 2002b). Basic chemicals (3.9%) grew also faster than industry average (3.2%).

Employment in the chemical industries

Overall, the European enterprises in the combined chemical industries employed more than 3 million people in 2001. This constitutes a share of 11% in total manufacturing employment. The employment contribution to manufacturing has increased over the last decade.

According to Eurostat (2001), the share of highly educated employees in the EU chemical industry is quite high at 27% on average. Highly educated employees are here defined as those with more than second-level education. In comparison, only 12% of the employees in rubber and plastic product manufacturing were highly educated. On average over the combined chemical industries, the high share of well-qualified workers shows in above-average labour costs which are about 17% higher than in overall manufacturing.

Industry structure by size-class distribution

The size class distribution shows a comparatively high percentage of small enterprises (97% are SMEs) for the chemical industries. These, however, have a comparatively small importance for employment and turnover in this sector. More than half of all employees are working in large companies, which sell output worth about two thirds of the sector's turnover.

Exhibit 2-2: Size class distribution in the chemical industries in EU-15

Variable	Enterprises with ... persons employed (share in % of total)			
	1 to 9	10 to 49	50 to 249	250 and more
Persons employed	4.6%	14.7%	25.7%	54.9%
Total turnover	2.7%	9.8%	21.7%	65.7%
Number of enterprises	58.0%	28.5%	10.4%	3.0%

Source: Eurostat New Cronos (2003), estimates and calculations by DIW Berlin (2003).

Effects of the current state of the world economy

As the chemical industries are dependent on raw materials as inputs (for instance, oil and energy), fluctuations in the prices of these goods heavily influence the profitability of its enterprises. Therefore, the fluctuations in oil and energy prices in the wake of the Iraq conflict also affected this sector, especially the producers of basic chemicals.

Closely related to this issue are exchange rate fluctuations. The recent weakening of the dollar and strengthening of the Euro had two contrary effects on chemical companies in Europe: On the one hand, oil and other raw materials, which are largely billed in dollars, became cheaper. This helped to offset price increases. But on the other hand, the weak dollar put pressure on profitability. Many chemical companies bill a considerable fraction of their output in dollars. Those companies that have to pay a large part of costs in Euros and cannot raise dollar prices for their output in the short run – due to contractual obligations or competitive pressure – experience a fall in profits. The actual effect, thus, depends very much on the product and currency mix of each individual company.

Planned regulatory changes

In Europe the planned new regulatory environment for the chemical industry is intensely debated (European Commission, 2001). A major aim of these changes is to harmonize different treatment of so-called existing chemicals (introduced into the market before September 1981) and new substances. Existing substances represent by far the largest share of output and it is felt by policy-makers that not enough information about the properties of these substances is available. The most important substances are planned to be registered in a central database together with their basic properties. Suspected dangerous substances shall be tested for their physical, chemical, toxicological and ecotoxicological properties and the results be made public.

A key feature of the new regulatory system proposed by the European Commission is that the industry should become more pro-active in providing information and assuming responsibility for their products. Apart from this shift in responsibility, an important topic in the ongoing discussion concerns the costs of this new regulatory environment for the chemical industry and its effect on innovation and competitiveness. While the European Commission regards costs and benefits as balanced, the chemical industry itself fears detrimental effects for jobs, output and international competitiveness.

Structural changes and regional shifts

During the last several years, exports and imports of chemical and plastic products have increased, making the industry more global. The Internet and other ICTs have helped in realising a global market for these products by increasing transparency. This, however, reinforces the pressure on output prices. It puts mergers and consolidation on the agenda also for those parts of the industry that could formerly live comfortably within their special niche, for example in speciality chemicals. Companies in Asia in particular are increasingly competing with European chemical enterprises.

Another factor for an increasing globalisation has been the economic development of emerging markets. The proceeding industrialisation in both Asia and Latin America combined with a higher standard of living led to a demand for sophisticated chemical and pharmaceutical products. For European companies this development is a threat in form of increasingly sophisticated competitors in these countries on the one hand, and an opportunity to enter new markets on the other hand.

2.2 Usage of ICT & e-business in 2003

2.2.1 The role of ICT and e-business

The main driving forces for using e-business in the combined chemical industries differ quite substantially from sub-sector to sub-sector. Commodity-producing companies in the basic chemicals industry, for example, place different hopes in e-business than R&D-intensive pharmaceutical companies do. Overall, four major drivers for e-business in the chemical industries can be identified:

- Decreasing processing costs
- Speeding up information flows
- Improving information about the market
- Extending the market

Importance of e-business

The chemical industry is often perceived as one of the forerunners in e-business. Preconditions in the chemical industries for B2B e-commerce are often considered as exceptionally good – this was the case particularly in the early days of the e-business boom. For example, in a study published in 2000, Forrester Research identified the chemical industry as one of the biggest factors in the B2B e-commerce development, and expected it to be the third largest Internet market behind electronics / high tech and the automotive industry in 2003 (Forrester 2000). They estimated that 35% of sales by chemical firms would be conducted online by 2002. Other studies and the media paint a similar picture of an industry that quickly adopts e-business.[1]

Results of the *e-Business W@tch* survey, however, paint a different picture at first sight: survey results, for example, show that only 8% of the enterprises in the combined chemical industries of the EU-5 say that e-business constitutes a significant part of the way their company operates today. This is clearly below the average of 14% over all 7 sectors surveyed. Even more surprising is that almost half of the chemical enterprises do not ascribe *any* role to e-business. Data presented in the following chapters of this report, e.g. on the use of e-marketplaces or online purchasing and online selling also show that the level of e-business activities in the combined chemical industries is more or less in line with other sectors rather than being exceptionally high.

Two explanations for these different views on the importance of e-business for the chemical industries exist: Firstly, "the chemical industries" is not always defined in the same way. Often, the pharmaceutical industry (NACE 24.4) is not included in market surveys and analyses but discussed as a different industry. In addition, the plastic and rubber product industry (NACE 25) is frequently not explicitly included, as it is in this survey. Secondly, many studies, press articles and best practice examples focus very much on e-business activities by large, globally active chemical companies. These constitute the major customer group of e-business software providers as well as consultants and are therefore primarily addressed in the respective reports and studies. However, while global giants account for a large share in turnover and employment in this sector, they only make up a fraction of the number of enterprises.

In the pharmaceutical industry four areas of e-business are of special importance:

- **Knowledge management solutions** that can help researchers and product developers to find the information they need more quickly, be it scientific information, patent information or information about specific regulations. As R&D depends very much on information flow and information sharing, an improvement of these activities can have a major impact on the bottom line.

[1] E.g.: Julia King: "Chemical sector leads e-business", Computerworld, October 2000. Rob Spiegel: "B2B E-Commerce Transforms Chemical Industry", E-Commerce Times, January 2000. See also: studies presented in the first *e-Business W@tch* sector report on the chemical industries.

- **The use of Internet and mobile devices in the clinical trial phase** can help to speed up the information gathering process. At the same time information transfer errors can be avoided and the trial results can be stored in a way that corresponds to compliance regulation.
- **Electronic collaboration** is another important area of e-business in the R&D-intensive chemical industries. Using appropriate e-business tools, the process of designing drugs or specific chemicals can be speeded up, leading to corresponding cost savings. This driver is not only important in the pharmaceutical industry but also in the speciality chemical industry. Often the chemicals are developed by the speciality chemical company in tight collaboration with its customer.
- **Remote access to the company's IT systems** is of particular importance for pharmaceutical companies, which have large numbers of sales and customer care people, who are typically spending most of their time with customers. Connecting these field workers to the information in the company's ERP and CRM systems can improve their ability to sell the right products considerably. Wireless devices and connections using mobile phones and PDAs provide means to realise these improvements.

2.2.2 E-readiness: ICT infrastructure and skills development

General ICT infrastructure

On the ICT infrastructure side, the prerequisites for using e-business can be considered as rather well in the combined chemical industries. Due to the comparatively high importance of large companies – particularly in NACE 24 – a large number of employees in the sector work in companies that are equipped with an above average IT infrastructure. This assessment holds true for all 5 surveyed countries. 97% of all employees in the sector work in companies that have Internet access, compared to an average of 87% in all sectors. An above average share of employees also works in companies that use e-mail, the World Wide Web, and have an intra- or extranet implemented.

Significant differences can be observed between company size classes, however. Large enterprises are clearly better equipped than small ones. For instance, only 69% of small companies use the WWW while 94% of the medium-sized and 97% of the large companies do. Large gaps can also be observed in the use of intra- and extranets.

Remote access solutions are significantly more prevalent in the chemical industries than in other sectors: almost 60% of the employees in this sector work in enterprises that offer their staff remote access to the company's computer system; an additional 9% plans to enable remote access within the next year. This outcome is, however, again strongly influenced by the dominance of large enterprises in the chemical industries. The percentage of enterprises with remote access solutions is at only 27%.

Exhibit 2-3: Chemical industries: Availability of IT infrastructure

Available ICT infrastructure	All (7) sectors	Chemical industries			
		Total	<50 empl.	50-249 empl.	250+ empl.
Computer usage	93	99	96	100	100
Internet access	87	97	87	99	99
E-Mail usage	83	94	81	99	97
WWW usage	77	91	69	94	97
Intranet	49	62	19	59	77
Extranet	17	27	4	18	38
LAN	61	81	37	89	94
WAN	34	49	6	32	69
Remote access *	43	59	22	51	73
Wireless access *	14	13	6	11	16

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total), except*: enterprises using computers (N=489 for sector total). Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

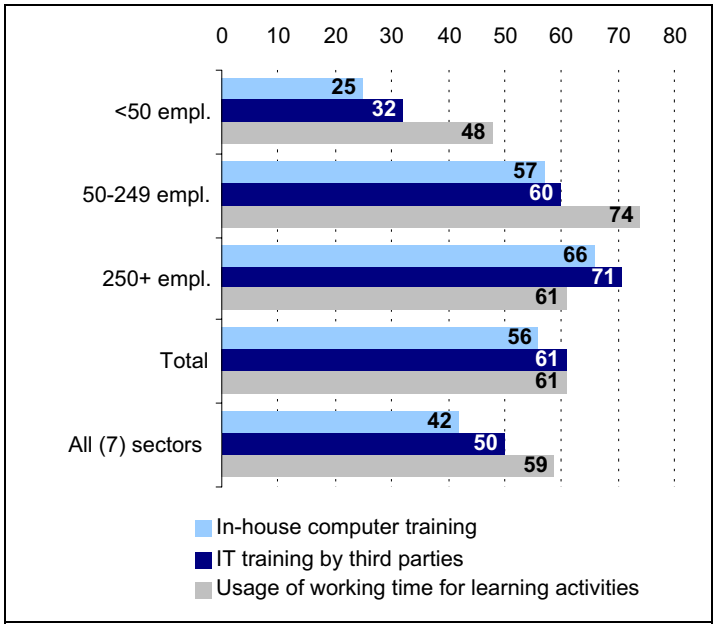
IT skills development

Almost 90% of the employees in the sector work in companies that offer at least some support of IT and networking skills development. This is above the average in other sectors, which underlines the importance of general IT in the chemical industries. However, the high level of IT support in the chemical industries is again determined by the strong dominance of large companies, which offer a considerably better support of IT skills development than small companies.[2] This difference between large and small companies is further aggravated if the form of IT skills development support is considered. In small and medium-sized companies, the usage of working time for learning activities is by far the most important form of support. More effective formal training schemes, either in-house or by third parties, are offered only to a relatively small percentage of employees in the small company segment.

Exhibit 2-4: Chemical industries: IT training offered to employees

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total). Figures weighted by employment ("enterprises comprising …% of employment offer …"). Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



2.2.3 Adoption of online technologies for internal business processes

While e-business is often related to the exchange of information or goods and services with external business partners, the use of e-business solutions and ICTs can, first of all, significantly enhance the efficiencies of the internal processes of an enterprise. Companies in the chemical industries are comparatively advanced in the use of online technologies to support internal processes. This can partly be explained by the high share of large companies in the sector.

Exhibit 2-5: Chemical industries: Usage of online technologies

Online technologies used	All (7) sectors	Chemical industries			
		Total	0-49 empl.	50-249	250+ empl.
To share documents / to perform collaborative work	19	26	22	53	67
To automate travel reimbursement of employees	3	5	4	8	26
To track working hours and production time	6	12	9	26	45
To support the human resources management	6	8	5	22	40

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total). Figures in % of companies. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Human resource management systems in particular can improve the efficiencies in companies with many employees. As a result large companies apply them significantly more often than small ones.

[2] On an enterprise weighted basis "only" 64% of the enterprises in the chemical industries offer IT skills support, compared to 54% on average over the 7 surveyed sectors.

For example, 45% of the large but only 9% of the small companies track their employees' working hours and production time with the help of online technologies.

Diffusion of specific software solutions for integrating e-business

Customer relationship management (CRM) systems are used by 7% of the enterprises in the combined chemical industries, which is largely in line with the average over all 7 sectors surveyed. Again, such systems can particularly improve the efficiency of customer related processes in companies with a large customer base and large sales forces. Accordingly, medium-sized and large companies use CRM systems three times as often as small companies. The difference in usage of CRM systems between company size classes is likely to widen further in the future, as a large share of medium and large enterprises plan to implement those systems within the next 12 months.

Enterprise resource planning (ERP) systems: Overall, companies in the combined chemical industries make above average use of ERP systems. In general, production processes in the chemical industries are very well suited for ERP: a large number of inputs is used to produce a wide variety of outputs. In particular companies with many employees use ERP systems to optimise their production processes: More than 60% of all large but only 43% of the medium-sized and 9% of the small enterprises do so. In addition, a higher share of large enterprises plans to further implement ERP systems within the next 12 months, which will lead to a widening gap between company size classes if those plans materialise. ERP systems are often not only too complex and expensive for small companies but usually also require a far-reaching restructuring of organisational processes as well as complete integration of data into a central database. The fixed cost are accordingly high, while the resulting marginal savings are comparatively low and therefore often profitable mainly for large enterprises.

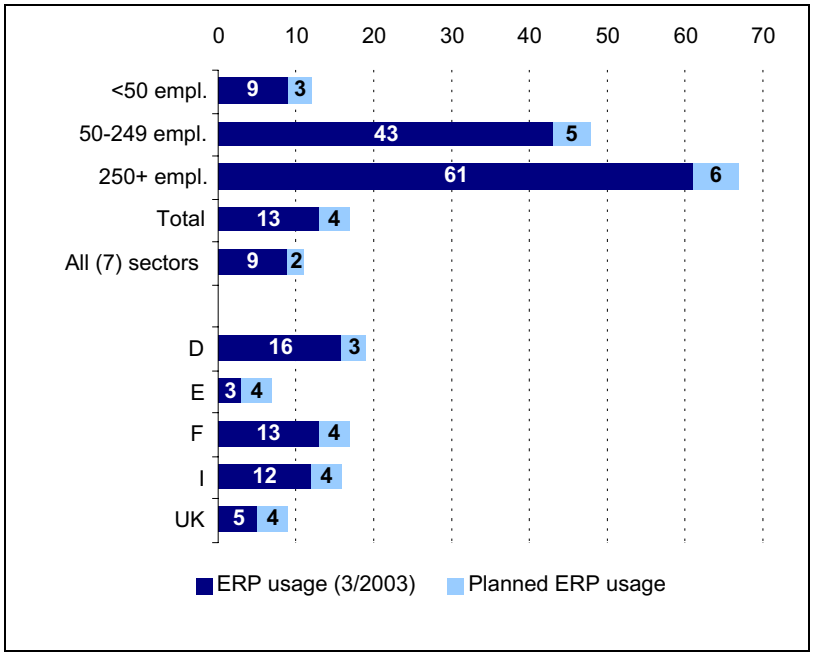
While the low usage of ERP systems in the small company segment often makes economical sense from a single company perspective, it might put small chemical enterprises in a backward position for acquiring new customers that expect their suppliers to implement e.g. ERP-to-ERP connectivity. This could pose a barrier to small enterprises for participating in and profiting from B2B e-commerce in the chemical industries.

Exhibit 2-6: Chemical industries: Current and planned usage of ERP systems

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



2.2.4 Processes of the extended enterprises

Standards for the extended enterprise

The main idea behind the concept of an "extended enterprise" is that a company not only consists of its employees – from assembly hall to management board – but also of a network of business partners, including its suppliers and customers. Enterprises that want to be successful must not only look at their internal processes but also need to manage this network efficiently and provide all members of the network with exactly the information they need. Several rather sophisticated e-business solutions and concepts like EDI networks, supply chain management (SCM), and many e-marketplaces address these issues of an extended enterprise.

A prerequisite for online collaboration with external business partners, and specifically for e-commerce, is the digitisation of information to be exchanged between trading partners. To allow for automatic processing, the information has to be digitised in structured, consistent form rather than being unstructured digital information. Standards help in organising and exchanging information in a way that is consistent across enterprises and IT systems. The chemical industry has, for example, a widely used identification scheme for chemical substances, the CAS registry numbers.

A major industry effort in the chemical industry to standardise electronic documents for e-business are the Chem eStandards developed by the Chemical Industry Data Exchange CIDX a non-profit industry-backed organisation. Currently more than 50 companies are member of CIDX, among them chemical companies as well as software companies, trading platforms and systems integrators. Chem eStandards are supposed to become the uniform standards of data exchange developed specifically for the buying, selling and delivery of chemicals. They are based on XML, the extended Markup Language. To help companies use the standards, CIDX also has been developing business process guidelines. These define frequently used e-business scenarios, such as order-to-cash transactions and collaborative planning, forecasting and replenishment (www.cidx.org).

Online collaboration

Companies from the chemical industries cooperate online with external business partners to a comparably large extent. This is first of all an indication of the strong interconnection in the chemical supply chain. But it also points to a reasonable use of information technology to support cooperation. Online technologies are used more often than on average for collaboration in the product design phase. Recalling the different sub-sectors of the chemical industries, these numbers are most likely driven by the formulated and speciality chemicals, where the design process is of larger importance.

Exhibit 2-7: Chemical industries: Usage of online technologies within the value chain

Value chain activities	All (7) sectors	Chemical industries			
		Total	0-49 empl.	50-249	250+ empl.
Online collaboration with business partners for designing products	12	16	15	21	16
Online collaborating with business partners to fore-cast product demands	10	9	8	14	17
Online management of capacity / inventory	10	10	9	15	27
Electronic exchange of documents with suppliers	37	41	40	46	45
Electronic exchange of documents with customers	28	40	40	44	47
Online negotiation of contracts	12	13	13	12	14

Base: EU-5 (D, E, F, I, UK), enterprises with internet access (N=456 for sector total). Figures in % of companies.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Interestingly, there are only comparatively small differences between small and large companies in online collaboration. However, small and large companies will most likely follow different procedures and use different technologies for exchanging documents. While small companies often exchange unstructured documents (for instance PDF or text files) via e-mail, large companies are more often integrated with suppliers and customers and automatically exchange EDI documents.

EDI usage

While more than half of the large companies employ EDI solutions, only one tenth of the small companies do so. Reasons for this strong difference are first of all that large companies started e-business some time ago, when EDI was the prevalent technology. Secondly, traditional EDI systems based on proprietary value added networks (VANs) are relatively expensive to install and use. Thus, investment in this technology was most useful for large companies, which handled a considerable number of transactions and could achieve significant savings in processing costs from installing such systems. Large and small companies also use EDI for different purposes: while small companies seem to use EDI primarily for procurement purposes, large companies use EDI mostly for selling.

Of those companies using EDI, almost two thirds use standard EDI solutions, while 44% use Internet-based EDI. New, Internet-based EDI solutions that require less investment than the traditional systems are more prevalent in small companies.

Exhibit 2-8: The chemical industries: EDI usage

EDI usage	All (7) sectors	Chemical industries			
		Total	0-49 empl.	50-249 empl.	250+ empl.
Use EDI	25	12	9	27	55
Plan to use EDI	3	2	2	8	4
Standard EDI usage	71	63	60	68	73
Internet-based EDI usage	41	44	46	40	37

Base: EU-5 (D, E, F, I, UK), all enterprises for lines 1 and 2 (N=502 for sector total), enterprises using EDI for lines 3 and 4 (N=104). Figures in % of companies. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Supply chain management

Despite the often cited integrated supply chain in the chemical industry, supply chain management (SCM) systems are used by only 4% of the companies in the combined chemical industries. Large companies currently use such systems much more often than small and medium-sized companies. A considerable share also plans to increase SCM use within the next 12 months. This is partly due to SCM networks being very beneficial to those at the top of the value chain that can use them to manage several layers of suppliers. They can typically also handle the complexity of such systems better as well as the problems involved with installing them.

B2B e-marketplaces

The chemical industry used to be a prime example for the usefulness of electronic marketplaces. Because a significant part of chemical companies' output is sold to companies within the chemical industry itself, the industry is rather fragmented and the products can be well-described, it was considered a good example of an industry well-suited for B2B marketplaces. However, the overall share of companies in the combined chemical industries that use e-marketplaces is at only 2%, which is in line with the average in other sectors. This low number, however, might partly be due to different definitions of "participation in e-marketplaces", as results also show that 23% of the companies that purchase online do so via e-marketplaces. This equals 8.5% of all companies in the combined chemical industries.

2.2.5 Purchasing online

Online procurement is closely related to the concept of the extended enterprise, as the relationship to suppliers forms one element of the extended enterprise. However, companies can also engage in online procurement without the additional step of really collaborating with their suppliers. Therefore, online procurement is generally more often observed than SCM or other forms of supply chain collaboration. 36% of all companies in the combined chemical industries already purchase online and an additional 6% plans to do so over the next 12 months. This is only slightly above the cross-industry average. At 57% the share of large companies procuring online is highest.

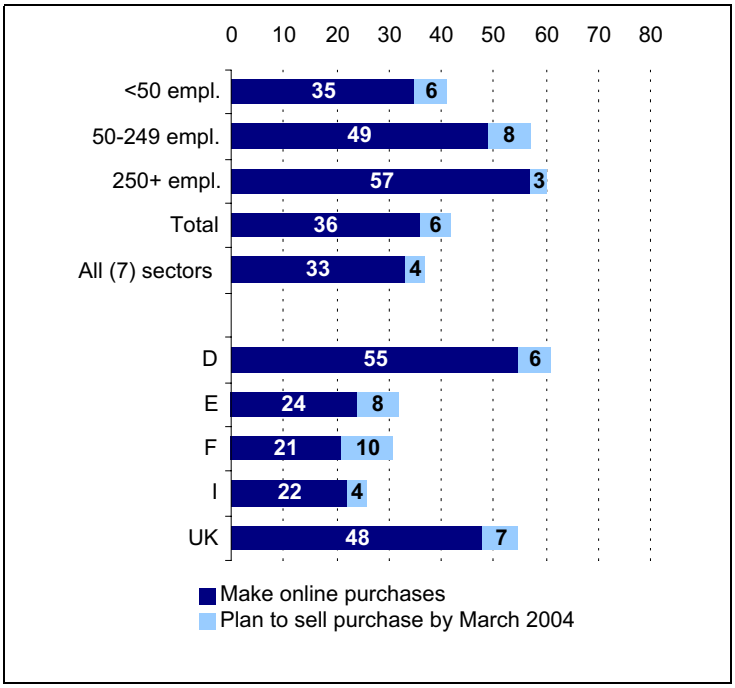
If the share of online purchases in total purchases is considered, the importance of online transactions in the overall procurement process of the chemical industries is further diminished. The fraction of companies, for which the share of online purchases in total procurement is below 10%, is considerably higher (80%) than on average (63%).

Exhibit 2-9: Chemical industries: Companies making online purchases

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



Online purchasing channels

The largest share of online purchasing (83%) in the chemical industries is still conducted via a supplier's website. E-marketplaces are the second most important purchasing channel. Only 13% of the companies surveyed in this sector have integrated their IT system with that of their suppliers for placing orders. This is significantly below the average share of integrated enterprises in other sectors and holds true even for large companies. Also surprising is that only 21% of the companies in this sector that purchase online, use EDI systems – half as many as on cross-industry average. These findings underline that despite the often cited need for IT integration as a prerequisite for reaping all the benefits from B2B e-business in the chemical industries, the largest share of companies in this sector is still well behind in this respect.

Exhibit 2-10: Chemical industries: Channels used for purchasing online

Channel used for selling online	All (7) sectors	Chemical industries			
		Total	0-49 empl.	50-249 empl.	250+ empl.
Supplier's website	83	83	83	86	80
E-Marketplace	28	23	23	23	24
Extranet of a supplier	27	15	14	21	19
EDI	42	21	23	14	12
IT system integrated with that of a supplier for placing orders	24	13	13	12	12

Base: EU-5 (D, E, F, I, UK), enterprises purchasing online (N=193 for sector total). Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

2.2.6 Marketing and sales

ICTs and the Internet can be used in various ways to support marketing and sales activities of chemical and plastics companies. A simple but very effective way for companies to address current and potential clients is to provide information on products and services on a website on the Internet. For SMEs in particular, the Internet is a comparatively inexpensive way to reach a large audience of potential clients. Chemical and plastics companies are more often present on the Internet than companies from other sectors. Currently, almost all of the large, about 80% of the medium-sized and about half of the small enterprises in the combined chemical industries have their own website on the Internet. However, the share of enterprises with a website in different size classes will probably equal out over the next year, since 16% of the small and 10% of the medium-sized companies in the sector plan to implement a website within the next 12 months.

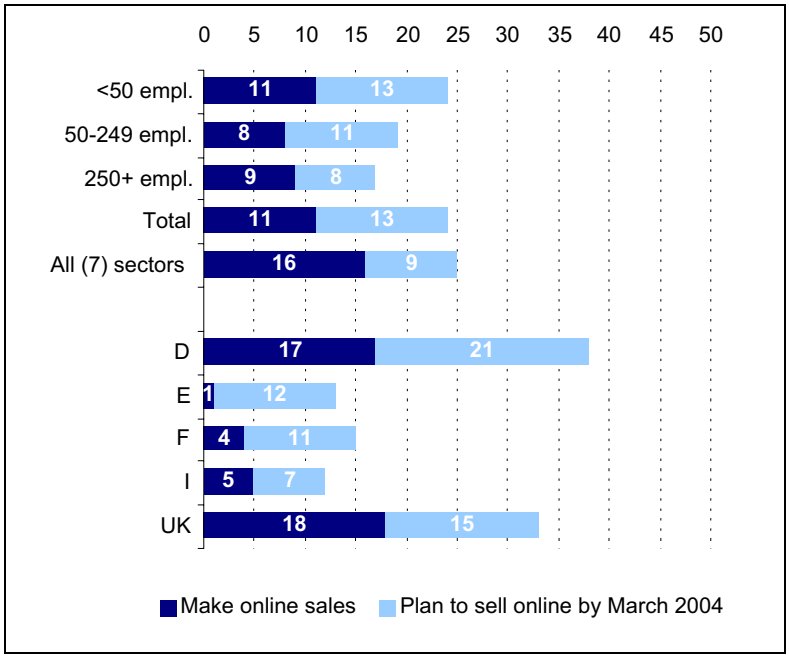
Only 11% of all companies in the combined chemical industries currently sell their products online. This is below the current cross-industry average of 16%. Surprisingly, the differences in online selling between company size classes are not significant, nor are the differences in online selling plans. Small companies seem to have realised that they can particularly profit from selling online.

Exhibit 2-11: Chemical industries: Companies selling online

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



Similarly to the online purchasing activities, companies in Germany and the UK are the most active online sellers in the combined chemical industries. Italy, France and Spain on the other hand clearly fall back behind their competitors from Germany and the UK, regarding current online sales as well as their plans to make online sales within the next 12 months.

The most common channel for selling online in the chemical industries is still the company website. 81% of the companies that actually sell online, use this as the primary channel. 30% sell their products on e-marketplaces, which is below cross-industry average. A comparatively high share of companies (30%), however, has its IT systems integrated with that of a customer for receiving orders. This is not only above cross-industry average, but also considerably higher than the share of companies with integrated IT systems for purchasing online (13%). This result could be due to the fact that a number of chemical companies might be forced by their customers to participate in some forms of supply chain integration.

Even though the results for different company size classes have to be interpreted with care due to the low number of observations, they give an indication about the different online sales channels used by small and large companies: While the company website is the most commonly used channel for small enterprises, EDI systems are most important for large companies. Thus, large companies make strong use of EDI for selling online, while small companies predominantly use EDI for purchasing purposes.

2.2.7 E-business development 2002 – 2003: main trends

The data presented in the previous sections of this report was based on the *e-Business W@tch* survey conducted in March 2003. The aim of the following section is to identify, if significant changes from the first survey, carried out in June/July 2002 have occurred, which allow an assessment of some major trends in e-business developments in the combined chemical industries.[3]

A comparison of the main e-business indicators of the 2002 and the 2003 survey results reveals that statistically significant changes can mainly be identified in indicators concerning the attitude towards e-business, which are based on the personal judgement of the respondents, rather than in objective usage indicators. For example, no significant changes in the use of e-business applications such as ERP, CRM, SCM or knowledge management could be observed.

One explanation for this result is that changes in the usage of main e-business technologies are dependent on long-term investment decisions and within the time span of one year changes probably range between only a few percentage points. Such changes are too small to be identified at a statistically valid level. Expectations and attitudes towards e-business, on the contrary, change much faster and more strongly and can therefore be better identified in shorter observation periods.

Attitude towards e-business

One major trend that can be identified when comparing survey results from 2002 and 2003 is that the importance of e-business in the combined chemical industries has increased from a comparatively low level. While in 2002 only 40% of all enterprises in the sector stated that e-business constitutes a significant or some part of the way their company operates, this share has increased to 50% in 2003 ***.[4] Even though the share of e-business sceptics[5] in the combined chemical industries is still high, it has at least decreased from 57% to 49%** during the course of last year.

This positive change in the attitude towards e-business is particularly driven by medium-sized and small companies. The share of medium-sized companies that ascribes some or a significant role to e-business has risen from 40% to over 60%*** in 2003, while the share of small companies has increased from 40% to almost 50%**. A significant drop of e-business sceptics from 58% in 2002 to 49%* in 2003 has also occurred in the small company segment.

Obviously, the common perception that large companies are the main beneficiaries of e-business has also somewhat changed over the past year. While 36% of all respondents still believe that large enterprises are most likely to benefit from e-business, the share of those that see SME's as the main beneficiaries has increased from 11% to 17%**.

Investment climate for e-business

The overall investment climate for e-business has also improved in the combined chemical industries over the past year. In 2003, 33% of all enterprises in the EU-4 plan to increase their e-business budgets within the next 12 months, compared to only 27%* in 2002. However, this change is mainly due to higher e-business investment plans of large chemical companies: In this segment, the share of companies that plan to increase the expenditures for e-business technologies has risen from 30% in 2002 to 55%** 2003.

Even though small and medium-sized companies plan to increase their e-business expenditures as well, their investment plans are more moderate and the increase from 2002 is statistically not significant. The more positive attitude of small and medium-sized companies towards e-business has accordingly not yet translated into an equally large increase of e-business budgets.

---

[3] For comparability of the 2002 and 2003 data, the analysis of e-business developments in this section is based on enterprise-weighted data in the EU-4 (Germany, France, Italy, UK).

[4] In the following analysis, *** will indicate a confidence level of 99% for the statistical validity of a difference between both samples, ** indicates a confidence level of 95%, and * indicates a confidence level of 90%.

[5] Defined as those companies that do not ascribe a significant role of e-business today nor in the future.

E-commerce

Some significant changes between 2002 and 2003 can also be observed in the area of e-commerce in the combined chemical industries. In particular, the share of companies in the EU-4 that are purchasing online has increased from 30% to 38%**. This result shows that the companies' plans to increasingly purchase online, stated by 9% of all enterprises in 2002, have indeed materialised. Large and medium-sized companies in particular have significantly increased their e-purchasing activities: In 2002, 40% of the large and 34% of the medium-sized enterprises were purchasing online. In 2003, the shares have risen to 59%* and 51%** respectively. As a result, the potential for online purchasing in large companies seems to be widely exhausted by now: while in 2002 19% of the large companies were planning to increasingly purchase online, this share has reduced drastically to 3% in 2003**.

Online selling activities, on the contrary, have not significantly increased between 2002 and 2003. However, what has changed at a statistically valid level are the companies' plans to engage in online selling activities within the next 12 months: the share of companies in the combined chemical industries that plan to sell online has risen from 8% to 13%**. This change is mainly due to the future plans of small companies, where online selling plans have increased from 8% to 14%*.

2.3 Conclusions

The state of e-business in the combined chemical industries is still below expectations and also below its potential. At the beginning of the e-business boom the chemical industry (not so much the manufacture of rubber and plastics) was perceived as having ideal conditions for e-business, specifically B2B e-commerce: Many chemical products are easy to classify, many are commodities rather than manufactured to spec, large amounts of chemicals are traded within the chemical industry, and with the envisaged reductions in processing costs there seems to be a good business case for conducting business transactions electronically. In addition, the technical preconditions are comparatively good, as basic ICT indicators show.

Despite these good prerequisites, survey results not paint a very impressive picture of e-business use. For example, the usage of supply chain management or e-marketplaces is only in line with the average in other sectors. And only a small and below average share of companies in this sector has integrated their IT systems with customers or suppliers for placing or receiving orders.[6] Nevertheless, several companies in the chemical industries use e-business extensively. These companies – large and established household names – make up the largest share of media coverage about e-business in the chemical industries. As they do not constitute the majority of enterprises in the sector, though, their dominance in the media might bias perception of the state of e-business in the chemical industries.

But the overall trend indicates that the importance of e-business will further increase in the future. In 2003, more companies – and in particular small and medium-sized companies – consider e-business a part of the way their company operates. This is also reflected in the e-business investment climate, which seems to have improved during the last year. About one third of companies surveyed plan to increase their e-business expenditures within the next 12 months, whereas this number was only slightly more than one quarter in 2002. Finally, the share of companies that are purchasing online also increased. Thus, the importance of e-business in the chemical industries is slowly rising.

However, compared to the initial expectations, the pace of change is comparatively slow. This might be due to the changed nature of e-business activities. The initial "B2B e-commerce" focus was to a large extent on finding new business partners, saving product costs and buying and selling products on the Internet. The focus of many current e-business projects in the chemical industry, though, is on improving the efficiency of business processes.

[6] Work by others confirms this assessment. Cf. Thayer (2003)

2.3.1 Economic implications

The chemical industries: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **Decreasing processing costs**: Using e-business to decrease the costs related to commercial transactions, for instance processing and changing orders, and at the same time reducing error rates is a major driver of e-business in this sector. Due to the usually large number of transactions, even small fractional improvements in these processes can aggregate to quite substantial savings. In particular the basic chemicals industry, which relies heavily on commodity inputs and is active on rather competitive output markets, has an incentive to advance e-business for this purpose. This setting explains the focus on ERP-to-ERP connectivity as one of the aims of e-business activities in the chemical industries. • **Speeding up information flows**: Speeding up information flows and thereby accelerating processes is the primary driver in other sub-sectors, particularly the formulated chemicals industry, among them the pharmaceutical industry. In the pharmaceutical industry, R&D as well as clinical trials constitute a major part of business activity. • **Improving information about the market**: Besides improving the access to scientific, product-related information, the Internet considerably enhances the ability to gather information about the market. There are a number of industry-wide portals and related websites. Particularly in basic chemicals, which are well suited for being traded on exchanges, Internet platforms provide up-to date information about the current prices of these commodities. Buyers can use the information from the platforms to renegotiate their current contracts or let the prices be connected in some way to the spot prices on exchanges. The increased market transparency benefits mostly the buyer of products. • **Extending the market**: Being able to extend one's market is one of the hopes placed in e-business. There are direct and indirect effects. Indirect effects are market gains based on the cost savings and process improvements a company can achieve by conducting e-business (for example, through improved competitiveness, better contracts). The direct effects are based on the idea that on the Internet and on electronic marketplaces the company can be found better and thereby conduct business with new partners, which previously were unaware of its existence.	• **Increasing market transparency and competition**: The enhanced access to information on the market can pose an opportunity as well as a risk to companies in the combined chemical industries. On the one hand it can be an opportunity to those companies that can use increased market transparency to extend their markets or to attain better conditions from suppliers. On the other hand, it can pose a risk if competitive pressures threaten a company's market position – particularly if international competition increases through increased market transparency. Survey results on the impacts of online selling have shown, that some companies actually seem to have lost market shares through stronger competition resulting from enhanced information on prices, new products and patents over the Internet. • **Investment in complex e-business projects with insecure ROI**: Another risk that can accompany e-business is an insecure return on investment (ROI). The ROI of complex e-business projects is often difficult to measure and even harder to estimate in advance. During the Internet hype in particular many companies engaged in large and costly e-business projects to gain early competitive advantage that did not result in the expected efficiencies.

Enablers	Barriers
• **Comparatively good IT infrastructure**: The prerequisites for using e-business on the ICT infrastructure side can be considered as rather good in the combined chemical industries. While this is partly due to the high importance of large companies – particularly in the chemical sub-sectors –, smaller companies are also equipped with a comparatively good IT infrastructure. This assessment holds true for all 5 surveyed countries. • **Strong competition and supply chain integration force companies to adapt e-business**: Some sub-sectors of the combined chemical industries also provide good preconditions for the quick dissemination of e-business due to its strong supply chain integration. In particular those at the top of the supply chain can force their business partners to adapt e-business as a prerequisite for long-term contracts. In addition, especially in the basic chemicals industry, outputs are commodities traded under almost perfect competition, so that all companies have to follow with process improvements once one company has achieved savings from its e-commerce activities. • **Positive change in the attitude towards e-business and in the investment climate**: The positive change in the attitude towards e-business that could be observed when comparing the 2002 and 2003 surveys also builds a good prerequisite for e-business development in this sector. In addition, a larger share of companies now plans to increase e-business expenditure compared to last year. In the large company segment in particular e-business budgets have been increased.	• **Internal readiness of chemical companies and their partners**: The most important barrier for e-business is that many companies in this sector do not yet fulfil the necessary internal technical and organisational preconditions for applying e-business. They often have various disparate systems implemented that first have to be integrated internally before they can be integrated with external business partners. This not only requirer technical integration but often also a redesign of internal business processes. • **Lack of IT integration**: Survey results have shown, that only one tenth of the companies in this sector have integrated their IT system with that of their suppliers for placing orders – and this holds true even for large companies. This underlines that despite the often cited need for IT integration as a prerequisite for reaping all the benefits from B2B e-business in the chemical industries, the largest share of companies in this sector is still well behind in this respect.

Implications for the industry structure

Increasing market transparency implies stronger competition

A major impact of the Internet is the increasing international transparency for products and conditions of chemicals. While e-marketplaces are the most obvious platforms aiming at increasing transparency, individual websites, portals and catalogues are probably even more important. In particular some companies – for example, so-called "bulk speciality chemicals", which are produced by a large number of manufacturers and sold to a variety of buyers – are increasingly facing international competition, whereas they had previously occupied a niche and been the most obvious suppliers, due to their local proximity and the high search costs for finding other suppliers. Obviously this increasing transparency is a two-edged sword. It not only increases competitive pressure on former niche players but also offers new opportunities for active enterprises.

Closer integration of companies increases mutual dependencies

The increasing use of e-business for procurement in the chemical industries often not only aims at reducing processing costs for each individual transaction. A second aim is to obtain better and more accurate information about internal buying behaviour within the company. Buying outside of framework contracts, so-called "maverick buying" frequently occurs in large companies and is often seen as cost-increasing. By using

information about who buys what within the company under which conditions, companies can apply a greater degree of centralisation to procurement, which enables them to achieve savings by concentrating on fewer suppliers and obtaining better terms from these suppliers. Together with the costs involved in integrating the IT systems of several companies, this factor works towards a reduction of the number of suppliers.

E-business accelerates globalisation of chemical industries

The chemical industries are a global industry. With new markets such as Asia developing further, globalisation of the chemical industries will increase further. This development is accelerated by e-business. As the Internet increases transparency and the awareness of potential competitors, customers or suppliers, the probability that a company in a different country is the optimal party with which to conduct business, rises. E-business standards that are international right from the start, like the Chem eStandards, facilitate international electronic data exchange. Since enterprises can exchange data internationally without the need to adapt their IT systems to foreign conventions, the barriers to international trade are lower than they would otherwise be. International Internet trading platforms add to this effect.

2.3.2 Policy issues

Acknowledge changing role of e-business

A few years ago, the assessment of the implications of ICT usage for enterprises was focused on e-commerce, i.e. on buying and selling over the Internet. Companies were said to be able to decrease their costs for inputs by finding cheaper suppliers and to extend their markets by finding new customers in previously uncovered markets. As the *e-Business W@tch* survey results have shown, however, companies in the chemical industries see the most positive impact of buying online in improved internal processes. This applies especially to small companies. These results are in accordance with anecdotal evidence about the early e-business motivations of many large companies that aimed to streamline processes and decrease process costs..

This shift in enterprises' motivation for e-business is due to considerable experience gained from early Internet and e-business projects. It thus reflects a better understanding of the potential benefits of e-business than enterprises had a few years ago.

Educate SMEs about necessary preconditions for realising the full e-business potential

Reaping the full benefits of e-business is not something that can be done by simply setting up a website or by browsing the Internet for new business occasions. The full potential of e-business comes from improving internal as well as B2B processes. This, however, requires that some technical and organisational preconditions are met and normally takes time. Many smaller companies do not meet these preconditions yet. They lack behind in basic IT infrastructure and in the IT skills development of their employees.

While the decision of SMEs, not to invest large amounts in such technologies, might be justified by short-term business calculations, there is the danger that such a decision will have serious long-term consequences. Thus, there is a role for policy to educate SMEs about the future potential of e-business and to make clear to those companies that foundations for successful e-business in the future have to be laid now. Especially as the current economic climate favours short-term business decisions delivering an immediate return on investment, such long-run considerations might be undervalued.

Educate about the changing role of e-marketplaces

B2B trading platforms have become a fixed element in the combined chemical industries. However, the *e-Business W@tch* survey for the combined chemical industries reveals some conflicting numbers on the usage of e-markets, depending on the context of the question. This can be interpreted as a sign that it is very much unclear to many enterprises, what exactly can be considered an e-marketplace today.

Indeed, e-marketplaces have changed considerably since their invention in the late 1990s. Then they were basically Internet platforms, where several buyers and sellers came together to conduct business transactions. Now there exists a variety of different platforms. Some provide support for negotiations, others are aggregated catalogues, while other groups provide integration support. Some of these are independent and others belong to single companies or to consortia of companies. This state of e-markets is rather confusing.

It is therefore important that all market players are provided with an ongoing and neutral assessment of the current state of Internet trading platforms and the issues involved. It is also important that these assessments are up-to-date and do not reflect ideas that are by now defunct. There could be a role for policy in providing this information, first of all because it should be neutral and unbiased and secondly because smaller companies in particular suffer from information gaps.

References

CEFIC (2002): Economic Bulletin June 2002.

CEFIC (2002a): EU Chemical Industry: Modest Growth in 2002 with some Improvement for 2003, News Release, 28.11.2002

CEFIC (2002b): Facts and Figures – The European Chemical Industry in a Worldwide Perspective, June.

Chung, Christina, McLellan, Loraine (2003): B2B Insights for the Chemical Industry, www.e-chemmerce.com

European Commission (2001): White Paper: Strategy for a Future Chemicals Policy, COM (2001) 88 final

Eurostat (2001): Panorama of European Enterprises 2000.

Eurostat New Cronos (2003):

Forrester (2000): eMarketplaces Boost B2B Trade, February 2000

Federchimica (2001): Indagine dull'e-commerce nell'industria chimica.

Forrester (2001): Custom Chemicals Materialize, January 2001

Keppler, David E. (2002): e-Business: Redefining Business Process in the Chemical Industry, www.dow.com

Thayer, Ann M. (2003): Chemical E-Business: Are We There Yet? In: CENEAR 81, 6.

B.3 Transport equipment manufacturing

3.1 Economic profile and trends

The transport equipment manufacturing industries are composed of business activities specified by the NACE Rev.1 divisions 34 and 35. Whereas the activities in the sub-sectors of NACE 34 – which we will call the "automotive" or "car industry" in the following – form a cluster of closely interrelated firms, the shipyards, the railway equipment industry, and the aircraft and spacecraft industries (NACE 35) operate in markets with rather different profiles.

NACE Rev.1		Activity
Division	Group	
34		Manufacture of motor vehicles, trailers and semi-trailers
	34.1	Manufacture of motor vehicles
	34.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
	34.3	Manufacture of parts, accessories for motor vehicles
35		Manufacture of other transport equipment
	35.1	Building and repairing of ships and boats
	35.2	Manufacture of railway, tramway locomotives, rolling stock
	35.3	Manufacture of aircraft and spacecraft
	35.4	Manufacture of motorcycles and bicycles
	35.5	Manufacture of other transport equipment

Transport equipment manufacturing contributed a value of 673 billion Euro[7] to manufacturing production in Europe in 2001. About 81% of the production value can be attributed to the automotive industry (NACE 34) and 19% to other transport equipment (NACE 35). Within the automotive industry, the manufacture of motor vehicles, comprising the very large producers of final products, is by far the biggest industry. Nearly two-thirds of the production value in the "other transport equipment" sector was produced in the aircraft and spacecraft industry.

Value added is proportionally higher in the sub-sector "other transport equipment" (31%), which points to a higher degree of vertical integration compared to the automotive industry. The proportion of value added to production value in the overall transport equipment sector is approximately 23%.

Exhibit 3-1: Structure of the transport equipment sector (DM) in the EU 2001

NACE Rev. 1		Production value		Value added at factor cost (est.)	
		Euro (m)*	%	Euro (m)*	%
34.1	Manufacture of motor vehicles	402,719.5	74.1	69,640.1	61.8
34.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	23,928.8	4.4	6,784.4	6.0
34.3	Manufacture of parts, accessories for motor vehicles	117,085.3	21.5	36,278.1	32.2
34	Manufacture of motor vehicles, trailers and semi-trailers	543,733.6	100.0	112,702.6	100.0
35.1	Building and repairing of ships and boats	28,783.2	22.3	8,424.2	21.1
35.2	Manufacture of railway, tramway locomotives, rolling stock 1)	13,447.2	10.4	3,725.6	9.3
35.3	Manufacture of aircraft and spacecraft	75,903.6	58.9	24,910.7	62.5
35.4	Manufacture of motorcycles and bicycles 2)	9,217.9	7.2	2,306.9	5.8
35.5	Manufacture of other transport equipment n.e.c. 3)	875.1	0.7	325.4	0.8
	Unassigned (see footnotes 1 to 3)	663.7	0.5	172.6	0.4
35	Manufacture of other transport equipment	128,890.7	100.0	39,865.4	100.0
DM	Manufacture of transport equipment	672,624.3	-	152,568.0	-

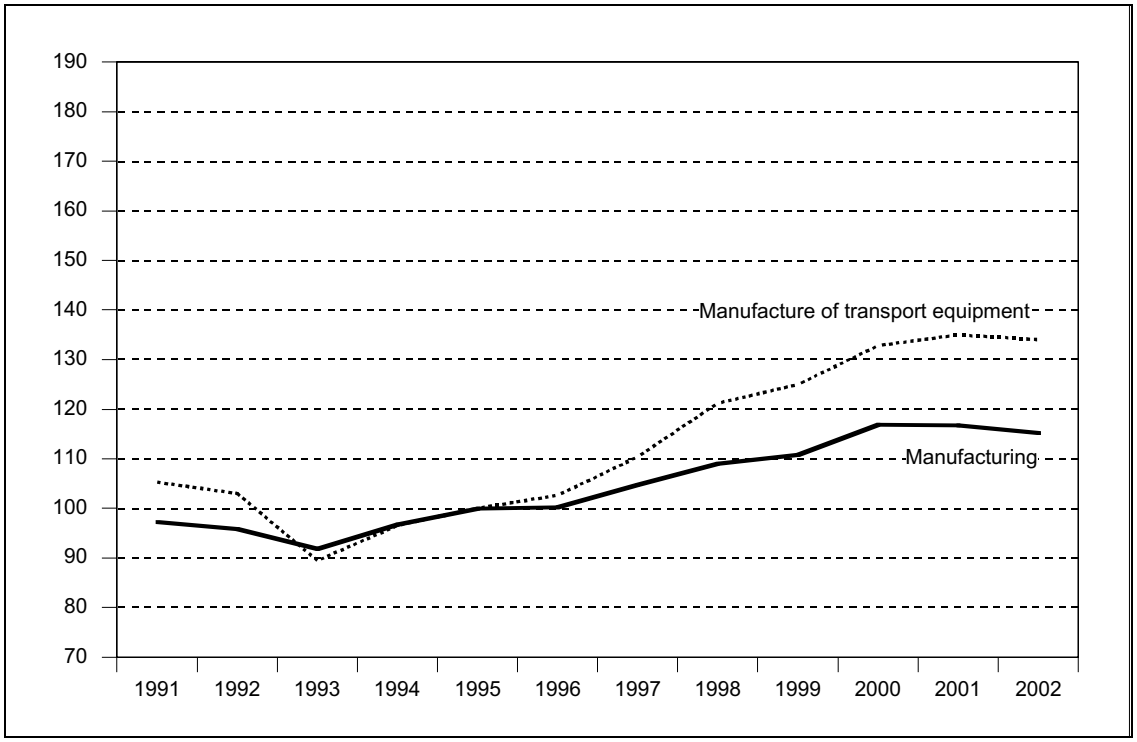
* EU-12 = EU-15 excluding Greece, Ireland, and Luxembourg.
1) EU-10 = EU-12 excluding Belgium and Denmark. 2) EU-11 = EU-12 excluding Belgium. 3) EU-11 = EU-12 excluding Denmark.

Source: Eurostat New Cronos (2003), estimates by DIW Berlin (2003).

[7] EU except Greece, Ireland and Luxembourg

The chart below shows the development of production value of the transport equipment industry relative to the manufacturing sector as a whole (yearly changes on the basis 1995=100). After the difficult period in the early 1990's, the transport equipment sector exhibited a steady increase of production value that outperforms growth in overall manufacturing by almost 20% from 1995 to 2002. However, the sector could not escape the sluggish economic development since 2001 and is currently experiencing a small recession.

Exhibit 3-2: Development of production value at constant prices in the transport equipment industries and in total manufacturing in the European Union 1991-2002 – Index (1995=100) in %



Source: Eurostat New Cronos (2003), calculations and estimates by DIW Berlin (2003).

Employment and productivity

The transport equipment sector has outperformed the manufacturing average in terms of persons employed since 1995. Quite remarkably, although the manufacturing sectors have on average lost jobs since 1995, the transport equipment sector was able to create new jobs in the same period. From 2001 to 2002, however, employment decreased again for the first time since 1996. Overall, the transport equipment sector accounted for approximately 2.62 million people employed in the EU. 74% of these jobs are provided by the automotive industry. Within the automotive industry, almost every second job (44.8%) is located in Germany. Productivity, measured as value added per employee, varies considerably within the EU. Portugal, Italy, and Finland show the lowest productivity figures. Sweden exhibits the highest productivity per employee, followed by Austria and France. The leading role of Germany in the EU automotive industry is not reflected in productivity figures.

Industry structure by size-class distribution

The transport equipment sector exhibits a very high degree of industry concentration. In fact, the top 6 car manufacturers (General Motors, DaimlerChrysler, Ford, Toyota and VW) already control over 80% of global vehicle production. If Honda, PSA, Daewoo and BMW are included, this figure increases to 90%. Large companies, which only account for 3.7% of all companies in the sector, contribute more than 90% to the sector's turnover and 81% to employment. The large enterprises in the sector are usually manufacturers of final products (cars, ships) or first level suppliers (system integrators) who increasingly act as global players. The consolidation and concentration of the entire transport equipment sector is being driven by high sunk costs for production facilities, high fixed costs for engineering, and highly competitive, increasingly global markets.

Exhibit 3-3: Size class distribution in the transport equipment industries (EU-15, 2001)

		Enterprises with ... persons employed			
	Total	1 to 9	10 to 49	50 to 249	250 and more
NACE	Number of enterprises	Structure in % of total			
34 + 35	32,876	68.1	20.4	7.9	3.7
	Turnover in million Euro	Structure in % of total			
34 + 35	744,267.2	0.9	2.4	6.0	90.7
	Number of persons employed	Structure in % of total			
34 + 35	2,634,900	2.3	5.7	10.9	81.0

Source: Eurostat New Cronos (2003), calculations and estimates by DIW Berlin (2003).

General economic trend

The automotive industry is highly dependent on business cycles. The currently weak economic situation, marked by slow growth in most EU countries, has already affected sales in this area and has led to a difficult business environment for many producers. Domestic European automotive markets are almost saturated; demand is typically replacement demand. International crises have negatively affected the business of major airlines and resulted in decreasing orders for new aircrafts (except for discount airlines that seem to continue their upswing against the overall trend). Shrinking consumer confidence, high unemployment, possible tax rises (AutoFuture 2002), and a continuing uncertain global environment do not provide a promising outlook for markets in Europe and North America.

On the positive side, the Chinese market is currently entering a period of high growth in demand for cars. It is expected to become a larger market than Germany and perhaps even Japan within the next three to five years. For Volkswagen, the market leader in China with currently 41% market share, China is already the biggest market outside Germany, its home county. All major companies are currently building up production capacities in China.[8] Current risks in the Chinese market involve the spread of SARS and its economic consequences, as well as the risk of building up over-capacities that can lead to ruinous price competition.

Restructuring

The transport equipment sector was once a prime example of Old Economy vertical integration, but now faces the same pressures to reconfigure the value chain that have transformed the faster-paced high technology industries. OEMs increasingly depend upon and co-operate with large and sophisticated Tier-One-suppliers that take on design and logistics responsibilities and make investments in capital equipment and the development of advanced technology. Alliances among car manufacturers as well as with firms outside the industry are becoming increasingly common, not least because of the high costs of developing new technologies and serving global markets, which put strain on the resources of even the largest firms (IMVP Research 2002).

The role of suppliers to the automotive industry has undergone a process of change over the last few years, marked by their increasing share of responsibility for the end-product. This can be seen in the widening scope of their activities in terms of production and, most importantly, in product development. According to various analyses the proportion of development expenditure by supply companies relative to overall expenditure (which is estimated to be currently at about 25-30%) will increase to 50% or more within the next ten years (VDA 2001). Automotive OEMs were therefore able to shift some of the development costs for essential parts onto the supplier industries. In order to keep technological development under control, these R&D projects are entirely delegated to suppliers or OEMs instead of just closely co-operating with the developing supplier (cf. Preissl/Solimene 2003).

The trend towards the design of shared platforms in the car industry has lead to increased outsourcing by OEMs and concentration in the number of Tier-One-suppliers.

[8] The Economist, 01.02.2003, p. 55

3.2 Usage of ICT & e-business in 2003

3.2.1 The role of ICT and e-business

The sector's traditionally highly integrated supply chain relies on intensive flows of information between the different actors. During the 1990s, co-operation in engineering between OEMs, SIs and n-Tier suppliers became more common (see for example, Jürgens 2002), a trend which heavily relied on the use of communication technology for exchanging structured and unstructured data.

At the same time, Electronic Data Interchange (EDI) was implemented in almost all firms in the transport equipment industry. However, there was no standard solution or even a uniform data standard. This led to an extremely fragmented scene characterised by "island" solutions that were unable to communicate with each other. Despite high costs of implementation and operation, EDI communication is widely accepted in the industry. As a result, many firms today still have high levels of EDI use and a variety of proprietary legacy communication and information processing systems that are unable to exchange data across system boundaries.

The dominant use of EDI is one reason why until 2000, the sector was surprisingly slow in adopting e-business (KPMG 2001a). Another reason might be a generally conservative and traditional way of thinking about business in the industry. Hence, the adoption of e-business in the transport equipment sector lagged behind that of other sectors (KPMG 2001a).

Until recently, the sector seems to have been slow to grasp the concept of e-business and its opportunities for business up. However, some major initiatives have been successfully launched, and all major automotive OEMs are now engaged in some sort of e-business activities.

Another important trend is the e-business leadership of large firms and OEMs in the sector. All major surveys suggest that large firms and OEMs take on a pioneer role in the industry in adopting e-business. It can also be expected that the e-business initiatives of the sector's "giants" will have a knock-on effect on the smaller firms and lower level suppliers in the years to come.

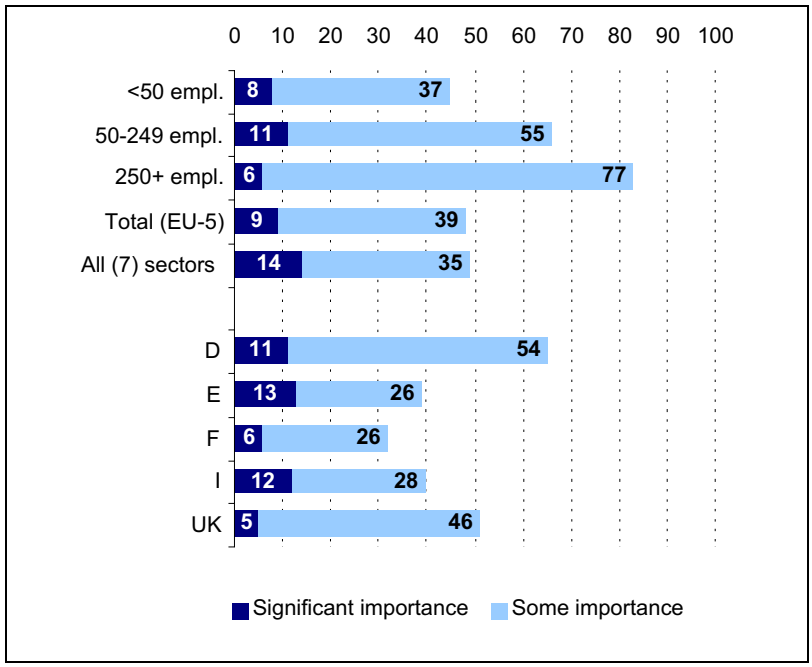
The fact that governments and especially the military, are important customers of the transport equipment sector, has shaped the use of e-business in the sector. The military relies on the efficient and timely supply of all its equipment and, thus, has established strict rules on terms of delivery which force suppliers to adopt the most advanced technologies.

Perceived importance of e-business

Exhibit 3-4: Transport Equipment: Importance of e-business in 2003 as perceived by companies

Base: EU-5, all enterprises (N=501). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



In spite of this dynamism in the sector, the Decision Maker Survey 2003 of the *e-Business W@tch* finds that only a small percentage of companies from the sector attribute "significant importance" to e-business in 2003. A larger share of firms hold that e-business had at least "some importance". The leading role of bigger firms becomes evident: more than 80% in the category over 250 employees find that e-business has at least some importance for the way they operate today.

3.2.2 E-readiness: ICT infrastructure and skills development

ICT infrastructure

An almost complete endowment with basic ICT infrastructure (computers, e-mail and Internet access) can be observed in the transport equipment sector as a whole. As expected, large and medium-sized firms are forerunners, whereas the diffusion is still somewhat behind in small firms. As to be expected, large firms have LANs and Intranets more often than others, and remote access as well as WANs confirm the picture, albeit at a lower level of diffusion. Wireless access can still be considered a marginal application. This puts the sector way ahead of the average of All (7) sectors covered in the survey. However, the difference with respect to other sectors of the economy is probably due to the higher share of large firms in this sector.

Exhibit 3-5: Transport Equipment: Availability of IT infrastructure

Available ICT infrastructure	All (7) sectors°	Transport Equipment			
		All enterprises°	<50 empl.	50-249 empl.	250+ empl.
Computer usage	93	99	89	100	100
Internet access	87	99	83	100	100
E-Mail usage	83	98	77	98	100
WWW usage	77	93	66	91	95
Intranet	49	81	27	54	89
Extranet	17	18	6	16	21
LAN	61	87	36	89	91
WAN	34	62	5	31	71
Remote access *	44	70	18	43	79
Wireless access *	14	9	4	6	9

Base: EU-5 (D, E, F, I, UK), all enterprises (N=3515), except*: enterprises using computers (N=3318 for all sectors; N=501 for transport equipment). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

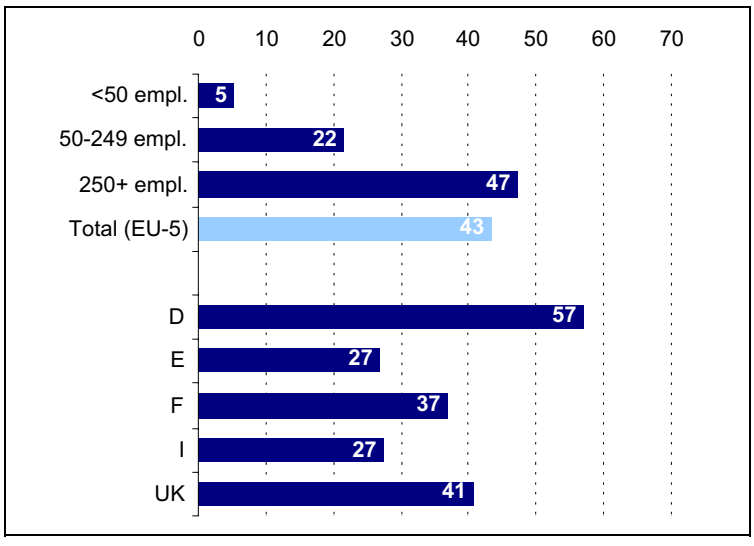
Source: *e-Business W@tch* (2003)

Exhibit 3-6: Transport Equipment: Companies having internet access with >2Mbit/s bandwidth

Base: EU-5 (D, E, F, I, UK), companies with Internet access (N=501).

Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



The quality of e-business solutions is highly dependent on the network capacity that firms can use. The more bandwidth their systems have, the more comfortable is the use of the network and the more features can be realised. Often frustration and a negative experience with e-business systems derive from attempts to operate complex systems in low-bandwidth networks. Therefore, bandwidth is an important indicator for the quality of infrastructure, especially for e-business adoptions. Again, the usual patterns of a size-dependent diffusion emerges. However, if small firms do not adopt high-speed connections, one reason might be that they are still not aware of the benefits of sophisticated e-business solutions. Another, currently more significant reason, might be that the volume of business to be handled through electronic channels is not yet big enough to justify the installation of expensive high network capacity.

IT skills development

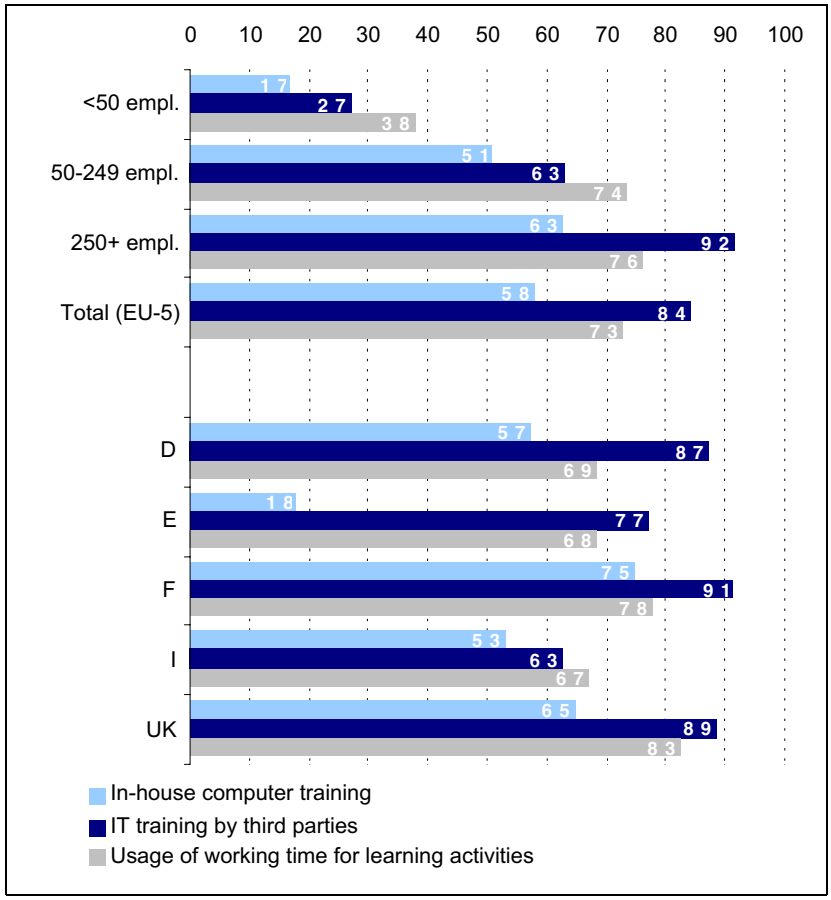
Given the rapid pace of technical progress it becomes more and more important for companies to keep their personnel up-to-date with respect to IT qualifications. However, not all companies support IT training. The smaller ones in particular seem to lack the necessary resources or ignore the eminent importance of qualifying measures in their firm. Obviously, there are size-dependent factors to be considered: small firms can hardly afford to give their employees time off for qualification, because certain tasks for which no substitute is available would be neglected. In larger firms colleagues can help each other out, and with a larger number of employees, organisational arrangements for times in which employees engage in qualification courses are easier.

IT training is offered in different forms. In-house computer training is one of them. Not surprisingly, it is found more often in large than in small firms, because it would be too expensive to organise individual formal training courses for just a few employees.

Exhibit 3-7: Transport Equipment: IT training offered to employees

Base: EU-5 (D, E, F, I, UK), all enterprises (N=498). Figures weighted by employment ("enterprises comprising …% of employment offer …"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



3.2.3 Adoption of online technologies for internal business processes

Internal collaboration

E-business can be used in a whole number of different applications. It can help to make internal flows of information and, therefore, co-ordination between departments more efficient. Companies in vehicle manufacturing industries in particular have put a lot of effort into streamlining their organisation in recent years. This is reflected in the fact that for all variables listed in the exhibit below, the transport equipment sector shows higher diffusion rates than the average of all sectors included in the survey. If enterprise-weighted data are used, adoption rates are only slightly higher than elsewhere. Hence, some of the difference has to be attributed to the more advanced diffusion in larger firms and the higher share of this group in the transport equipment sector.

The most widely used adoption is document sharing, followed by tracking of working hours and, at some distance, the support of human resource management. Less important seem to be the handling of travel expenses and e-learning. Compared with other industries, the sector seems to be particularly active in the use of e-business for tracking working and production times. This result is compatible with the specific emphasis in automotive industries to fully exploit the potential for more efficient production schemes.

Exhibit 3-8: Transport Equipment: Usage of online technologies

Online technologies used	All (7) sectors°	Transport Equipment			
		All enterpr.°	0-49 empl.	50-249 empl.	250+ empl.
To share documents/ to perform collaborative work	39	50	20	52	54
To automate travel reimbursement of employees	13	17	2	10	20
To track working hours and production time	21	41	7	38	45
To support the human resources management	21	34	5	26	36
For e-learning	14	18	6	9	20

Base: EU-5 (D, E, F, I, UK), all enterprises (N=3515 for all sectors, N=501 for Transport Equipment). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Diffusion of software solutions for integrating business processes

Compared with other e-business applications, Customer Relationship Management (CRM) and Supply Chain Management (SCM) systems are not widely diffused. Only about one quarter of firms in the sector use CRM, and only one fifth SCM. In a country perspective, Germany stands out for its a rather widespread adoption of CRM, while French firms show the highest diffusion rates for SCM.

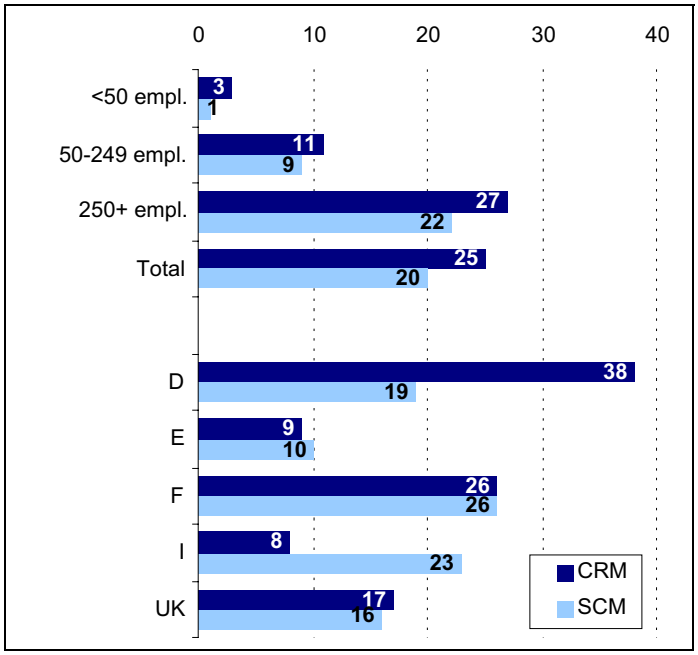
CRM systems are designed to automate customer contact in online settings. They are only useful if there is a very large customer base and if there is a lot of communication with (private) customers. Given the high importance that supply chain management had for the restructuring of manufacturer-supplier relations in the 1990s, where high efficiency gains were attributed to just-in-time logistics, at a first glance it is surprising that such a small share of companies actually use SCM systems today. However, it may well be that companies which have introduced their own logistic management systems, based on the previous generation of communication tools, are still happy with these systems and do not feel any need to change to new SCM systems. In addition, most SCM systems are extremely complex and difficult to implement and to handle. Thus, only firms that have a high level of specialised expertise will be able to use them efficiently.

Exhibit 3-9: Transport Equipment: Usage of CRM and SCM systems

Base: EU-5 (D, E, F, I, UK), all enterprises (N=501).

Figures for EU-5 total and for countries weighted by employment ("enterprises comprising …% of employment offer support"). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



3.2.4 Processes of the extended enterprises

The relatively advanced diffusion of e-business adoption in the transport equipment sector with respect to other industries is confirmed by the intensive use of online communication with external partners. More than half of the employees in the sector exchange documents electronically with their suppliers and/or customers. This holds for all applications except the negotiation of contracts.

Whereas in other industries the exchange of documents is more often handled electronically with suppliers than with customers, transport equipment manufacturers adopt e-business relatively more often with customer than with suppliers. Collaboration with business partners is ranking high in this as well as in all other industries. Relatively little importance is attached to online collaboration with the scope of forecasting demand and online management of inventories.

Exhibit 3-10: Transport Equipment: Usage of online technologies within the value chain

Value chain activities	All (7) sectors		Transport Equipment				
			All enterpr.		0-49 empl.	50-249 empl.	250+ empl.
	enter[1]	empl[2]	enter[1]	empl[2]			
Online collaboration with business partners for designing products	12	20	12	44	9	24	47
Online collaboration with business partners to forecast product demand	10	14	7	20	6	15	23
Online management of capacity / inventory	10	16	10	19	9	23	19
Electronic exchange of documents with suppliers	37	44	42	55	41	47	58
Electronic exchange of documents with customers	28	37	43	60	42	52	62
Online negotiation of contracts	12	13	16	12	16	19	13

[1] enterprise weighted ("% of enterprises"); [2] employment weighted ("enterprises comprising …% of employment"). Base: EU-5 (D, E, F, I, UK), enterprises with internet access (N=3128 for all sectors, N=453 for Transport Equipment). Figures in % of companies, except if stated otherwise. Reporting period: March 2003.

3.2.5 Purchasing

At first sight, online purchasing seems to be strongly developed in this sector. More than two thirds of all enterprises are engaged in buy-side e-commerce activities or will introduce them in the next twelve

months. These figures hide significant differences between companies of different size and in different countries. Whereas more than 70% of large enterprises procure online or plan to do so, this is the case for only 37% of the companies with less than 50 employees. In Germany about half of all enterprises in the sector purchase via electronic channels, and in the UK this is true for almost 40%, but France and Italy show considerably lower figures, and in Spain only every eighth company is an online buyer. The figures on plans for the next twelve months do not show any catching-up processes for late-comers, on the contrary, differences will increase, if plans are realised.

However, a slightly different picture emerges, if the share of goods purchased online in all acquired inputs is analysed. Almost 60% of the firms that purchase online buy less than 5% of goods and services via this channel, and only 5% buy more than 50% online. The impact of online procurement on the efficiency of procedures and the cost of procurement is therefore likely to be still rather marginal. Firms operate with different procurement channels in parallel; this involves additional costs and diminishes the savings that might be achieved by practising online procurement.

Exhibit 3-11: Transport Equipment: Companies making online purchases

Base: EU-5 (D, E, F, I, UK), all enterprises (N=501).

In % of all enterprises in the respective class. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

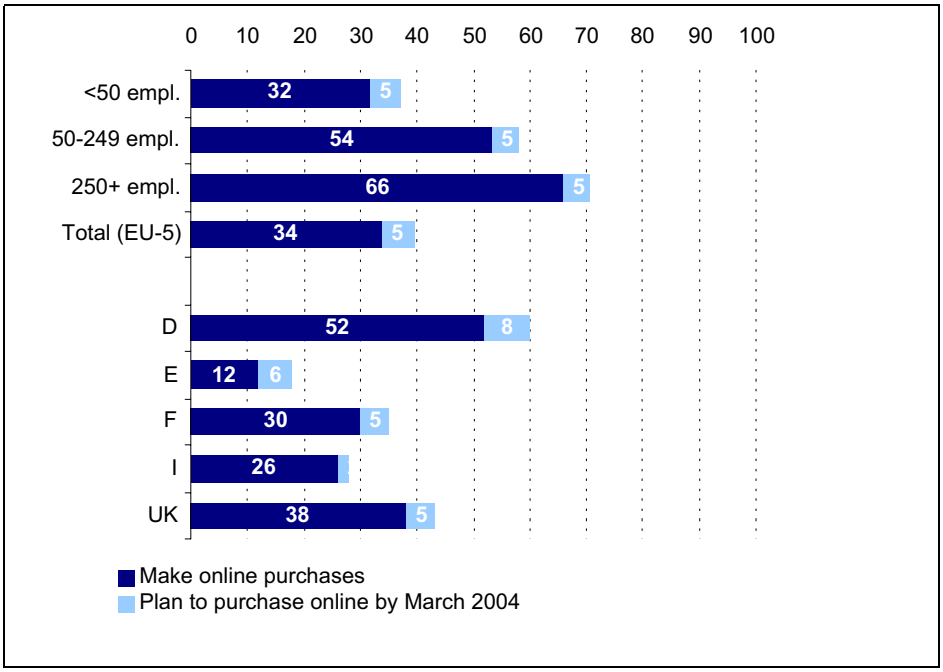
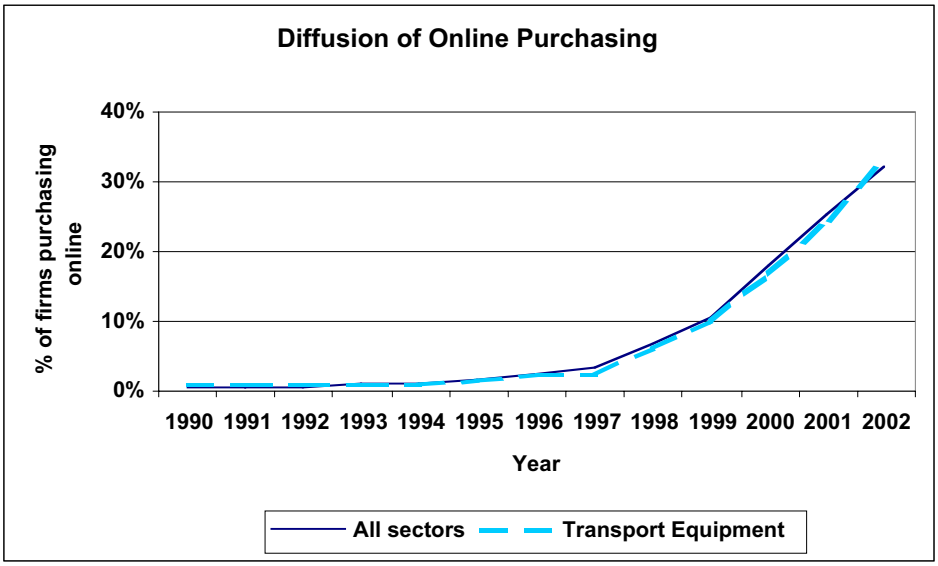


Exhibit 3-12: Transport Equipment: Diffusion of Online Purchasing

Base: EU-5 (D, E, F, I, UK), enterprises purchasing online and reporting date of first activity (N=1284 for all sectors, N=156 for transport equipment).

Figures in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



Most companies have started to use online channels to buy inputs in the last two years. Until 1999 only about 10% of all companies had started to purchase over the Internet, while by the year 2000 this figure had already doubled. The latest figures for March 2003 already show that almost 40% of companies purchase online. The diffusion path for the transport equipment sector is almost identical with that of all sectors comprised in the survey.

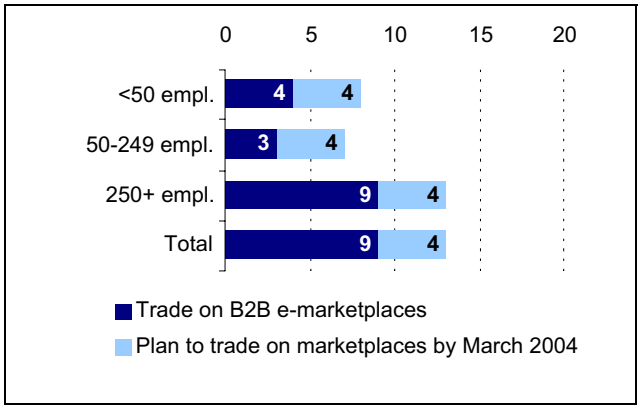
Electronic B2B marketplaces

In contrast with the enormous publicity given to online marketplaces that were specifically generated to serve the automotive sector, such as COVISINT, they only play a minor role in the transport equipment sector. Even among large firms with more than 250 employees, less than 10% use this facility, and even if plans for the next twelve months are considered, this figure does not even rise above a 15% margin. Since a much larger number of firms practises e-procurement, for most firms individual solutions seem to be a more convenient option than referring to electronic marketplaces.

Exhibit 3-13: Transport Equipment: Participation in B2B e-marketplaces

Base: EU-5 (D, E, F, I, UK), all enterprises (N=501). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



3.2.6 Marketing and sales

E-business is an excellent tool for marketing. Customers can be approached via the Internet, interactive features provide them with a broad range of product information and with individualised customer care services. A large majority of firms in the sector have launched their own website. This is significantly more than the average of other industries.

In fact, the automotive manufacturing sector has been regarded as a particularly suitable example for large scale online marketing. However, it turned out that customers frequently appreciated comprehensive product information and selected the desired vehicle using company websites, but then purchased their cars from a local supplier and not in an online transaction. Manufacturing companies, nevertheless, use the Internet to advertise their products and to induce customers to surf for information, play with configuration tools and select their desired models in a prosumer setting.

It is an important step for a firm to move from a mere presentation of the firm and its products to actually selling online. And indeed, although almost 90% of firms in the sector have a website, only 8% sell online. However, quite a large share of companies (10%) plan to sell online in the near future. Thus, a clear trend towards a more widespread diffusion of on online sales is visible. Small firms are catching up, and if all plans will be realised, they will have almost reached the adoption rate of the larger firms in 2004.

At first glance it may come as a surprise that online selling in the transport equipment sector has by far not reached the level of the average of other sectors in the survey, and that it has developed less dynamically here than in the average of all sectors over the last six years. However, this result is not implausible, since there are specific arrangements between vehicle manufacturers and their retailers. Often long-term contracts exist which guarantee merchants exclusive sales rights for new cars. These contracts would be violated if manufacturers opened up direct sales channels. Sales contractors would probably refuse to handle warranties and repairs, which would result in a severe deterioration of customer service.

However, car producing companies are only part of the transport equipment sector, thus, the other sub-sectors must be quite reluctant to engage in online sales. This may partly be explained by the nature of their products. Aeroplanes, ships and trains are often ordered individually and built to the specification of the client, so they are not off-the-shelves product that are traded in an electronic mass market. The relatively advanced diffusion of other e-business tools in the sector (with respect to all industries) does not result in online sales, but is still a necessary feature which helps firms to establish presence in the market, distribute information and manage customer services.

Exhibit 3-14: Transport Equipment: Companies selling online

Base: EU-5 (D, E, F, I, UK), all enterprises (N=501).

Figures in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

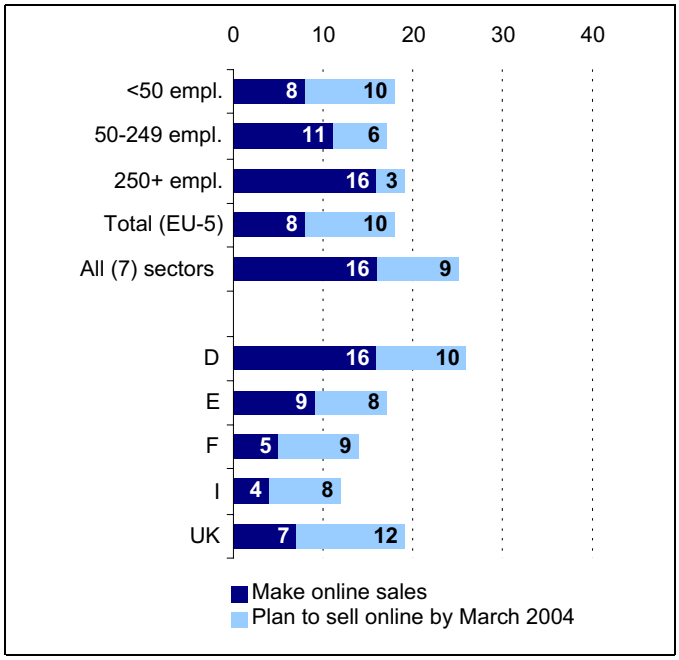
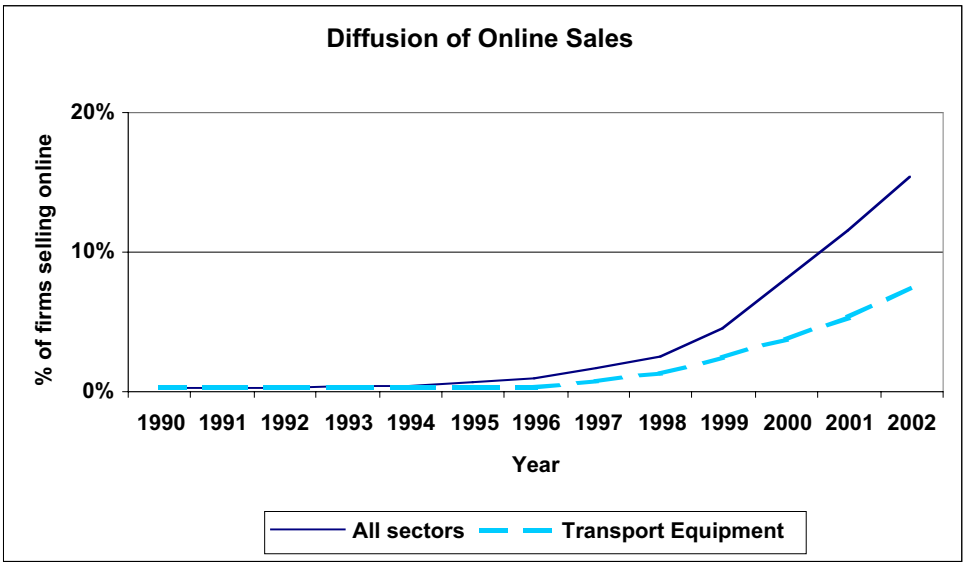


Exhibit 3-15: Transport Equipment: Selling Online Diffusion

Base: EU-5 (D, E, F, I, UK), enterprises selling online and reporting date of first activity (N=455 for all sectors, N=36 for transport equipment).

Figures in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



The potential of e-commerce to drastically change the way production and distribution of goods is organised can only be fully exploited, if the online sales activities are integrated with internal procedures and with all communication activities preceding and following a sale. Hence, the integration of a company's IT system with those of customers and the seamless connection of e-commerce systems with systems controlling inventories and production are indicators that hint at the level of usage of e-business potentials.

The integration of information depends on the techniques prevailing in communicating with customers. Mostly sales are handled over a company's website. Electronic marketplaces are used by about one third of the companies in the transport equipment sector that sell online. As expected, extranets and mobile devices are still hardly used, whereas some companies use EDI, probably on the basis of a tradition that has lasted longer than e-commerce experience.

Only about a quarter of companies that sell online report to have integrated their IT systems with those of customers, which allows to realise automated ordering systems in connection with integrated inventory systems and supply chains. Back-end systems that allow to automatically process orders that enter the company are still an exception, and faxes seem to loose in importance and might soon become 'yesterday's technology'.

3.2.7 E-business development 2002 – 2003: main trends

In the perspective of long-term technology trends and cycles, the use of e-business has just started in most industries. It is therefore difficult to say whether the diffusion of certain technologies and adoptions expresses a steady expansion trend, indicates limits of absorption capacity or unsteady trends.

E-business development has not slowed down in 2002/03. On the contrary, results from the 2003 survey suggest that e-business diffusion still continues at a rapid rate. First of all, time series diffusion figures for online sales and purchases show that the upward trends of these technologies are still intact. Plans of companies also indicate that selling and purchasing online, usage of B2B online marketplaces, and website usage will continue to gain acceptance in the next 12 months.

Generally the results lead to the conclusion that e-business will have the most dramatic effects in relationships along the supply and distribution chains and in internal work processes, whereas organisational structures and the mix of offered products and services will be less affected. The pace of expansion of activities may accelerate, if the business cycles in Europe are generally more favourable, and the consumer climate becomes more positive. Influences in world politics, in particular the Iraq war, and the resulting fluctuations of the oil price have had a slowing down effect on market dynamics. In addition, the economic crisis in Germany, one of the largest markets for passenger and commercial vehicles, and government budget deficits in some European countries that are likely to result in a reduction of purchasing power, which will affect demand for transport equipment in the private as well as in the public sector.

Survey data show that the share of firms that attribute "significant" or "some importance" to e-business has increased between 2002 and 2003. In July 2002, 56.3 % of firms in the four largest European vehicle manufacturing countries thought that e-business was not relevant for them, in March 2003 only 51.1 % agreed to this statement (*e-Business W@tch* 2002 and 2003). Obviously more firms are aware of the opportunities of doing business online, which corresponds with the trend in e-business related expenditure. After the enthusiastic phase of e-commerce promotion is over, and other topics, like persistently low growth rates in many European economies or a threat of higher petrol prices have been put on the agenda, it is not surprising that for some firms, e-business has shifted from a 'significant' element in management concerns (2002: 8.7%; 2003: 7.9%) to an element of 'some' importance (2002: 35%; 2003: 41%).

Furthermore, the climate for investments in e-business technologies could be better than the general economic situation would suggest. If plans reported by companies are realised, the trend to engage in e-business will continue. Most firms plan either to keep their current investment level or expand their e-business related expenditure.

3.3 Conclusions

The sector's e-business activities are largely shaped by the character of its processes of production. The manufacturing of sophisticated cars for a competitive mass market requires the exploitation of cost saving opportunities without threatening sensitive and complex relationships along the supply and distribution chains. Production in other transport equipment industries, on the other hand, is characterised by the domination of small production lots, often individually ordered products, such as railway equipment, aeroplanes or ships. Obviously, the use of a tool designed to address large customer groups, such as the Internet, does not play a significant role for these manufacturers on the sales side.

Given the excellent endowment with basic infrastructures and the often publicised opportunities of electronic markets for the sector, surprisingly few companies are actually engaging in e-business in its various features. Several factors could explain this phenomenon:

- The automotive industry in Europe has already begun to introduce new very efficient supply-chain management in the early nineties. These systems required substantial investment and resulted in a complex re-organisation of customer-supplier relationship. Thus, there is no urgent need to introduce new systems, and it might be economically unwise to throw out systems before they have amortised.
- Only part of the external and internal flows of information and communication lend themselves to be organised in "typical" Internet-based e-business systems. Inputs to vehicle manufacturing comprise standardised off-the-shelf products that might be purchased online or even on industry specific electronic marketplaces, as well as sophisticated parts that rely on joint development and long-term relations with specialised suppliers.

Firms are aware of the implications of a broad diffusion of e-commerce for the balance of market power and seem to be reluctant to run the risks involved.

3.3.1 Economic implications

Companies see the strongest impact of e-business in customer- and supplier relationships. This does not mean that long-lasting supplier relations will be given up for the sake of random Internet connections. However, co-operation with existing suppliers will become more intense, reaching as far as the complete integration of logistics and inventory systems or the establishment of completely simultaneous design tools. The customer interface will change, albeit in this sector direct online sales will remain of minor importance, but new forms of e-business-supported customer service might become a major differentiating feature for competitors in the sector.

Companies have been asked to give an assessment of the impact e-business is likely to have on their company. The resulting statements can be taken as an indicator for changes to be expected in the sector from a more widespread use of e-business adoptions.

Transport equipment: E-business opportunities, risks, enablers and barriers

Opportunities

- **Cost savings**: Efficient handling of procurement, internal information flows and customer relations, create a significant potential for cost savings through e-business. Almost half of the firms that procure online, and 30% of firms that sell online report positive impacts on the costs of inventory and logistics.
- **Efficiency gains**: E-technologies can lead to greater speed and efficiency of procedures. More than 50% of firms have already felt positive or very positive impacts of their e-procurement and e-sales activities.
- **Improved collaboration**: Advantages can be gained from a better collaboration between OEMs and suppliers. Outsourcing and specialisation are enhanced, and strong strategic partnerships can be built in an industry group.
- **Reduced overhead** results from the automation of routine tasks. This has positive effects on cost structures, and it unleashes internal resources for core business activities. Hence, overall procurement costs have been affected positively through e-business in half of the cases.
- **Facilitating strategic change**: E-solutions can enable strategic changes in a company or industry-group. For example, the car-industry may move from push-mass-production to customer-centred, demand-driven mobility solutions. First signs for such a trend can be seen in the increasing number of tools for customisation on companies' websites.

Risks

- **Complexity**: Implementation of e-business solutions is not straightforward. Sometimes, the system simply does not function as proposed, or the training of employees is insufficient to make it work effectively. The new system might also prove incompatible with other existing systems and processes.
- **Early adopters risk** serving as the beta tester for the industry, while competitors "wait-and-see". The end of the e-commerce hype seemed to suggest that this was the right strategy. However, the currently low business climate in Europe is likely to be a stronger retarding factor of e-business investment than strategic games.
- **Opportunity costs**: Investments in e-business solutions inevitably involve opportunity costs. Whether resources will be dedicated to e-business applications or to R&D or other strategic instruments, depends on market development. If diversification between car manufacturers depends on model policies, guarantee or financing schemes, e-business will only have a supportive role, as it helps to free resources to finance incentive schemes for marketing.
- **Risk of eroding profit margins**: Market transparency and access to a whole range of new suppliers involves the risk of eroding profit margins for suppliers. The poor performance of electronic marketplaces suggests that this is a relevant issue.

Enablers

- **Imitation behaviour**: Competition is intense among vehicle manufacturers as well as among their suppliers. This leads to a rapid imitation of innovations and, hence, to a continuous search for new diversifying features as well as cost-saving techniques and opportunities. E-business provides a set of powerful tools for these objectives and can, thus, become an important competitive variable.
- **Access to technology** does not appear to be a problem. Necessary communication infrastructures are widely implemented, ranging from high-quality telephone networks, computing hardware, and a large number of competing software and network access suppliers that court for business. Broadband technology as a prerequisite for sophisticated network applications is slowly spreading among firms in the sector.

Barriers

- **Implementation costs** are a major barrier for e-business initiatives, especially for firms with constrained budgets and for smaller firms which cannot amortise expenditure via large sales volumes.
- **Need to re-engineer business processes**: The requirement to change work routines can easily lead to conflicts. If these changes are implemented half-heartedly or in isolated batches, the expected positive results might not materialise.
- **Lack of e-business skills**: The implementation of new technologies and work processes requires extensive training and motivating measures. This is costly, time-consuming, and often seen as an opportunity cost to doing "productive work".
- **Security issues** still cause widespread concern. However, part of the problem seems to be based on misperceptions or misunderstandings.
- **Return on Investment issues**: Investments in e-business initiatives have to be justified by positive returns. However, cost savings often occur indirectly or are difficult to measure. Sometimes they might become visible only after some time. This holds, for example, for increased customer satisfaction or better motivation of employees.

Implications for the industry structure

Industry-wide implementation of e-solutions often leads to a battle over a shift of power

There is a possibility that e-business solutions such as e-procurement and SCM induce a battle over power within the industry groups and along supply chains. Smaller suppliers (especially those of commodity products) fear increased price competition and reduced margins. The early discussion about e-commerce impacts in fact suggested the customer-supplier-relationships would loosen and market relations would become much more volatile. Although companies clearly have achieved cost advantages, a dramatic reshuffling of component supplier markets has not occurred. Only the very large firms shift smaller parts of their procurement budgets towards electronic markets and actually change suppliers. If the share of online procurement in overall purchases rises, this might change and the market might go through major transformations and function according to new rules in competition. However, the same e-technologies that shift market power towards buyers can be used to intensify co-operation and communication between suppliers and lead to a shift of competencies to suppliers. If this is adequately compensated, suppliers can gain from the re-organisation.

E-business is slowly changing the way business is done

As the present analysis has shown, the transport equipment sector is clearly not among the early adopters of e-business solutions. However, particularly in the areas of procurement and product development, Internet-based solutions and process changes are beginning to have an impact on how business is done. E-business has not yet resulted in a dramatic reconfiguration of the supply chain or the products and services being offered by companies, but firms start to adopt e-business to automate existing supplier relations, to realise efficiency gains in internal processes, and to save costs in a variety of ways. Although the design and production of superior products is the number one prerequisite for success in this industry, e-business solutions add to the portfolio of possible strategies to gain comparative advantages. In times of economic crisis, the relevant competition variables might shift from quality, reputation and technical advancement to price, since people and governments cannot afford to buy expensive vehicles and other transport equipment. Companies that realise the cost saving potential of e-business first, might also gain in competition.

3.3.2 Policy issues

The availability of qualified personnel is a common challenge for all transport equipment industries

The eminent importance of being able to hire IT specialists and of continuously improving the skills of the present workforce for a successful implementation of e-business is beyond doubt. The qualification of young people, but also re-training and further qualification of older members of the labour force, is a topic which has become especially evident in the context of the realisation of a strongly technology-dependent knowledge economy. Hence, the problem affects all industries. The education systems should respond by implementing adequate curricula, and in particular by introducing effective schemes for further education. As has been shown above, most firms acknowledge their responsibility to some extent, but they will only invest in training if they can be sure of benefiting from the results. Therefore, claims to make labour markets more flexible, i.e., to introduce higher turnover rates in the workforce can have negative consequences for companies' willingness to invest in skill development. New forms of private-public partnership in organising and financing IT-related qualification measures are therefore required to solve this dilemma.

SMEs can benefit from support, but not all e-business applications are useful for them

At first glance, the substantial economies of scale that exist in the implementation and operation of e-business schemes seem to suggest policies in favour of small companies. However, research results have also shown that often SMEs' reluctance to engage in e-business had solid economic reasons, and it would be unwise to induce SMEs to ignore these facts and become e-business players in fields where they can gain little or nothing. Therefore, general information programmes that make companies aware of e-business opportunities, but also of the risks, and help them to find (and perhaps finance) support in the implementation process, seem to be adequate policy measures. Small firms are clearly neglecting skill development. Affordable public training schemes that actually respond to the needs of firms (and are not just measures to improve unemployment statistics) might help SMEs to organise training and to rise the qualification level of their work force.

Is there a case for market failure and policy action?

The discussion about economies of scale in IT solutions and cost advantages of large firms has two interesting implications for e-business policy makers. Firstly, it provides an economic explanation for non- or late adoption of IT systems in small firms. As mentioned above, at the level of the individual SME, non-adoption can be a perfectly rational and good decision. Secondly, it raises the question whether this individually rational behaviour could lead to inefficiencies at the aggregate level. At first glance, there are no major indicators for market failure visible as our discussion has shown. However, some questions still remain open and will need further evaluation in the future.

Infrastructure is still an issue

Despite largely deregulated telecommunication markets, there is still a role for public policies in guaranteeing communication infrastructures that are adequate for using the potential of e-business efficiently. For technical and economic reasons markets for broadband connection and for wireless networks and applications still require regulatory intervention. The aim of these interventions should be to secure supply of state-of-the-art technology at competitive prices. Hence, many innovations, but also the use of currently existing e-business features rely on effective telecommunication regulation. Hence, it should be one aim of e-business policies to establish and support regulatory schemes that serve this purpose in an optimal way.

References

AutoFuture (2002): "Automarkt Prognose Deutschland 2003, 2004", www.autofuture.de/publikationen/duden/presseberichte/artikel-automarkt-brd-nov.2002-2.pdf.

Elixmann, Dieter, Kulenkampff, Gabriele, Schimmel, Ulrike, Schwab, Rolf (2001): Internationaler Vergleich der TK-Märkte in ausgewählten Ländern – ein Liberalisierungs-, Wettbewerbs- und Wachstumsindex. Diskussionsbeiträge des Wissenschaftlichen Instituts für Kommunikationsdienste Nr. 216. Bad Honne

IMVP Research - The International Motor Vehicle Program at MIT (2002): "Research Framework 2001-2004", (http://web.mit.edu/ctpid/www/imvp/frame.html).

Jürgens, Ulrich (2002): Characteristics of the European Automotive System - Is there a Distinctive Approach? Co-ordinating Competencies and Knowledge in the Auto Industry (CoKEAS) Work Package 5 - Final Report, Berlin, November- Mimeo.

PWC - PricewaterhouseCoopers (2000): "A2C – The Second Automotive Century", http://www.pwcglobal.com.

PWC - PricewaterhouseCoopers (2001): "Economic Recession Impact on the Automotive Industry", in: AutoFacts 24-09-2001.

PWC - PricewaterhouseCoopers (2002): "Supplier Survival – Survival in the Modern Automotive Supply Chain", http://www.pwcglobal.com.

Preissl, Brigitte & Solimene, Laura (2003): The dynamics of Clusters and Innovation – Beyond Systems and Networks. Heidelberg, Springer/Physica, forthcoming.

Takeishi, A. & Fujimoto, T. (2001): "Modularisation in the Auto Industry: Interlinked Multiple Hierarchies of Product, Production and Supplier Systems", http://imvp.mit.edu/papers/0001/takeishi2.pdf, first draft 28.02.2001.

VDA - Verband der Automobilindustrie (2001): "Annual Report 2001", (http://www.vda.de/en/service/jahresbericht/auto2001/auto+maerkte/g_63.html).

B.4 ICT services

4.1 Economic profile and trends

The analysis of *e-Business W@tch* focuses on activities within the sectors telecommunications (NACE Rev. 1 64.2) as well as computer related activities (NACE Rev. 1 72). The latter can be subdivided on the 3-digit-level into six further groups. As all of these are concerned with service activities as well as the production of immaterial goods (software), we will also use the term "computer services" in this report to describe all activities within NACE 72. For the combined sectors NACE 64.2 and 72 we will use the term "ICT services" for better readability, where ICT stands for information and communication technology. In other contexts, ICT services are defined in a broader way, for example by also including wholesale of office machinery.

NACE Rev.1		Activity
Division	Group	
	64.2	Telecommunications
72		Computer related activities
	72.1	Hardware consultancy
	72.2	Software consultancy and supply
	72.3	Data processing
	72.4	Data base activities
	72.5	Maintenance and repair of office, accounting and computing machinery
	72.6	Other computer related activities

Both sub-sectors analysed in this report, telecommunications as well as computer services, have one thing in common: While they are potential users of e-business like every other industry – and only this aspect will be analysed in the *e-Business W@tch* – they also provide some of the most essential elements for conducting e-business. These are, firstly, the telecommunications infrastructure including the infrastructure for data traffic; secondly, software; and thirdly, consulting and outsourcing services.

Telecommunication services

Telecommunication services are much more than just telephone services. This sector embraces the distribution of data, sound, images, and other information via cable, broadcasting, relay or satellite. Included in this definition are the management and maintenance of networks as well as the provision of services using these networks. Excluded, however, is the provision of radio and television programs (NACE 92.2). Telecommunication services account for slightly more than half of the turnover in the ICT services sector, but only for about a third of the employees in the combined sector.

The telecommunication services sector has undergone dramatic changes in the last decade, mainly caused by deregulation and privatisation of formerly government-owned postal and telecommunication services conglomerates, but also by technological advances. Although this has led to a variety of new firm foundations, the sector is still characterized by a rather small number of large enterprises, many of them being parts of former state monopolies.

Computer services

Computer services produce value added of a similar size as telecommunication services, but in a totally different way: The average enterprise is considerably smaller than in telecommunication services and the production is significantly more labour-intensive. This explains why computer services companies employ about two thirds of all employees in the ICT services sector and make up for around 97% of all enterprises in this sector.

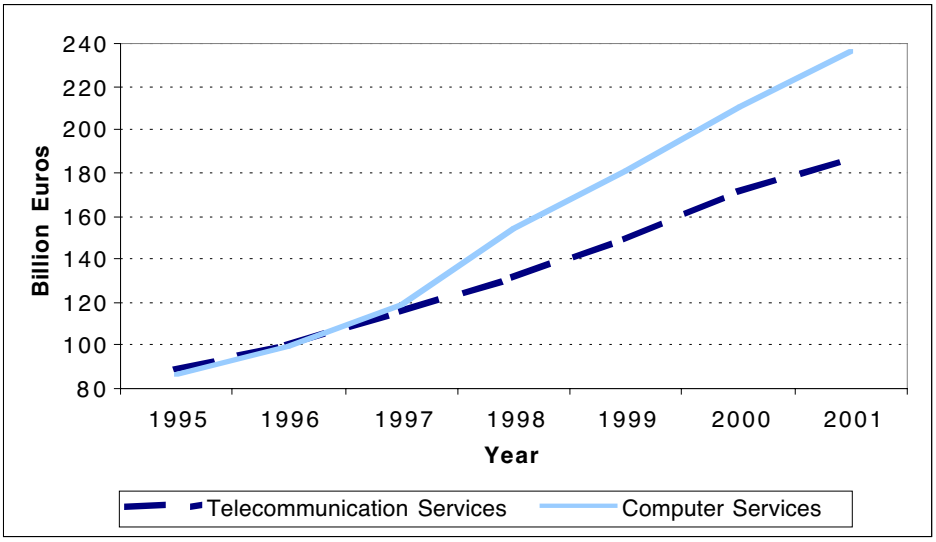
The most important sub-sectors in terms of value added and employment are the software consultancy and supply (NACE 72.2) and data processing activities (NACE 72.3). Typically, these account for more than 80% of the values for the whole computer services sector.

Enterprises and turnover

In the 15 EU Member States around 400,000 enterprises are active in ICT services.[9] By far the largest share of ICT service enterprises provides software services – only about 3% provide telecommunication services (Deiss 2002). Within the second half of the 1990s the number of enterprises increased continuously. It is most likely, that the bursting Internet bubble and the current economic climate has ended this trend. However, official data about the number of enterprises in the early twenty-first century is not yet available.

In 2001, the European telecommunications companies in those thirteen countries, for which data is available, sold services worth 287 billion Euro. The four largest EU member states (Germany, France, Italy and UK) in this group are responsible for 70% of the combined turnover in the EU-13. Within computer services, the same thirteen countries sold services worth 258 billion Euro, where Germany, France, Italy and UK accounted for 75%.

Exhibit 4-1: Growth in turnover in ICT services, EU-9/11, 1995-2001



Telecommunication services values are for EU-9: B, DK, D, I, L, A, P, FIN, UK
Computer services values are for EU-11: B, D, E, F, I, L, A, P, FIN, SE, UK

Source: Eurostat New Cronos, turnover, latest available data, estimates by Berlecon Research (2003).

Employment and productivity

In 2001, the thirteen EU member countries for which data is available employed more than 3.1 million persons in ICT services. Within these EU countries, roughly a quarter of ICT service jobs are located in the UK. Germany, France, Italy and UK together account for 71% of telecommunications employment and 73% of computer services employment.

While the ICT sector is the focus of many discussions and policy measures, its actual employment contribution for the economy as a whole is rather small. In 1999, the shares of computer services employment in total service sector employment were between 0.7% and 1.2% in the EU Member States. Finland, UK, Belgium and Denmark showed the highest importance of computer services with employment shares above 1%.

Main trends in the telecommunication services sector

Apart from the aftermath of the burst of the Internet bubble, other issues – often technical and legal ones – have influenced ICT services. Telecommunication services have changed considerably during

[9] These number include wholesale of office machinery (NACE 51.64).

the previous years, bringing new sector-specific issues and challenges to companies. The following issues have been and will be important for shaping the sector in the past, present and near future:[10]

- Liberalisation of telecommunication markets and the resulting increase in competition,
- Regulatory disputes involving former monopolies,
- Development of the demand for mobile communication,
- Expectations about the future demand for telecommunication services, particularly in the mobile area,
- Growth of data traffic on telecommunication networks, and
- New technologies for network access as well as network administration.

Computer services

Within the computer services sectors we consider the following issues as especially important for past, present and near future, of which some are of larger importance for the software business, others for the consulting or outsourcing business.

- New forms of software delivery and software services enabled by the Internet,
- Concepts related to Application Service Providing,
- The spread of Open Source software,
- Legal issues concerned with the protection of intellectual property rights of digital goods and software patents,
- New technologies for knowledge management and co-ordination as well as
- An increasing demand for outsourcing of ICT services.

4.2 Usage of ICT & e-business in 2003

4.2.1 The role of ICT and e-business

E-business drivers

The main drivers for e-business differ considerably within the ICT services sector. Although there are some common elements, the different outputs, processes, value chains, typical company sizes and numbers of customers in the different sub-sectors lead to various driving factors. As in other industries this implies that there cannot be a single “best practice” usage of e-business in the ICT services sector. For a small IT consulting company, for example, with half a dozen projects a year, selling its services via the Internet (in the sense of completing sales transactions) does not make sense, while it does for an equally small standard software company.

Enhancing customer relationships: Improving all processes related to customer care and management as well as enhancing the interaction with customers is one of the major driving forces for e-business in the telecommunication services sector. Telecommunication service providers have direct customer relationships with a very large number of customers, often running into millions. These customers typically have specific requests such as troubleshooting (for example, dead telephone lines), service changes (for example, upgrade to ISDN) or location changes (for example, due to relocation). Handling these requests can be a complex task with several internal processes to be started and followed through (for example, notifying service technicians, following status of service task, notifying customer about completion). These customer care tasks are therefore costly, which provides an incentive to invest in appropriate e-business tools to reduce these costs – internally as well as at the interface to the customer.

[10] The issues are briefly discussed in the complete sector report, available at the website of the *e-Business W@tch* (www.ebusiness-watch.org)

Improving billing and invoicing: Closely related to customer care are billing and invoicing, which are also of special importance to telecommunication service providers. Each customer expects regular bills for the services used, which are traditionally sent to the customer in paper form. Clearly, the telecommunication companies have an incentive to move to electronic bill presentment on the Internet to achieve cost savings as well as to shorten the accounts receivable cycle. According to Arias and Kinnaman (2000), cost savings can be in the range of 40-60%.

Supporting marketing and sales processes is another driver for e-business. The Internet is used as a major marketing tool by various players in this sector. Consulting firms, for example, go beyond the pure listing of activities and service offers on their websites. They often make considerable amounts of research available on their sites in the form of reports, extensive studies, white papers or newsletters. This way they transform their websites into knowledge portals for their areas of specialisation and at the same time present themselves as having major competencies in these areas. For software manufacturers, the possibility of creating different versions of the same software without high costs makes it feasible to use the websites for marketing purposes in a completely different way. They can, for example, offer trial versions of software with only limited functionality for download over the Internet.

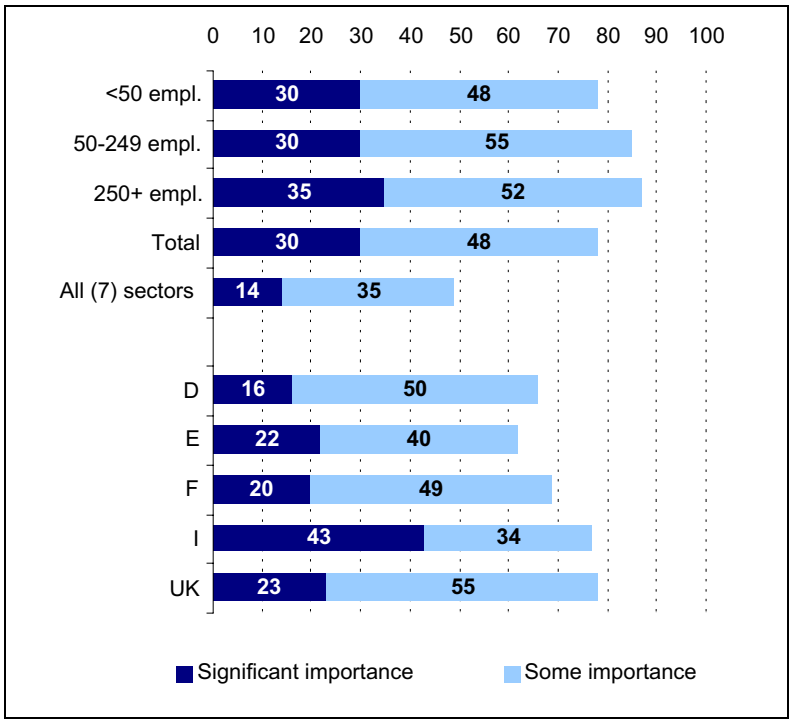
Increasing efficiency of internal processes and information flows: Processes related to project and human resource management play an important role in the ICT services sector and offer a promising application area for ICT based support tools. IT consulting and software programming, for example, are knowledge-based activities typically organised in projects. Therefore, the support of the associated knowledge discovery and co-ordination processes by suitable IT solutions is a major field for e-business. Since personnel is not only an important cost factor, but also the most important resource, optimal utilisation of the workforce determines profitability in many ICT services companies. In telecommunication services there is an additional interest in e-business technologies to facilitate operation and management of the network.

Importance of e-business

Exhibit 4-2: ICT services: Importance of e-business in 2003 as perceived by companies

Base: EU-5, all enterprises (N=502 for sector total). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



Electronic business plays an important – and by practically all measures – far above average role for the ICT services sector. Almost 80% of the respondents of the *e-Business W@tch* state that e-business constitutes a significant or some part of the way their company operates today. On average over all seven sectors surveyed, this share is below 50%. At 30% twice as many companies from the ICT services sector than on average ascribe a significant importance to e-business.

For only one fifth of all companies in the ICT services sector e-business does not play any role, compared to almost half of all companies on average. Nevertheless, even though significantly below average, still one third of all companies in the ICT services sector can be described as e-business sceptics, i.e. those companies for which e-business does not play a significant role today and is also not expected to do so in the future.

4.2.2 E-readiness: ICT infrastructure and skills development

ICT infrastructure

As one would expect in a sector that focuses on information and communication technologies, the survey results presented in the following section show that ICT services companies are indeed noticeably better equipped with IT infrastructure than on average in the seven sectors surveyed by the *e-Business W@tch*. Naturally, all companies in the sector use computers and the Internet. E-mail as well as the WWW are standard tools used in every ICT services firm, regardless of its size. The use of intranets and extranets is also clearly above average in this sector.

Companies in the ICT services sector also have a much better physical IT infrastructure than on average in other sectors. 89% of the employees in the ICT services sector work in companies that have a local area network (LAN) implemented, compared to only 61% on average.

Remote access to the company's computer systems is a very common element in the ICT services sector. Remote access solutions enable workers to have more flexible working schemes such as teleworking and can significantly improve work efficiencies of employees working from remote locations such as travelling managers, sales force or technical support staff. In ICT services working from home at unusual working times (for example, in software programming) and working from remote locations (for example, consultants at the client's site) are very common.

Exhibit 4-3: ICT services: Availability of IT infrastructure

Available ICT infrastructure	All (7) sectors	ICT services			
		Total	<50 empl.	50-249 empl.	250+ empl.
Computer usage	93	100	99	100	100
Internet access	87	98	98	99	98
E-Mail usage	83	98	97	99	98
WWW usage	77	96	92	96	97
Intranet	49	84	48	91	95
Extranet	17	50	21	43	61
LAN	61	89	75	93	94
WAN	34	69	19	57	87
Remote access *	43	74	57	80	80
Wireless access *	14	29	15	30	34

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total). Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

Accordingly, 74% of the employees in the ICT services sector work in enterprises that offer their staff remote access compared to only 43% on average. Even in the small company segment, 57% of the employees enjoy remote access to their companies' IT system. Furthermore, almost one third of all employees work in companies that offer wireless access solutions. However, this number is strongly influenced by the large company segment, where twice as many companies offer wireless access as in the small enterprise segment. Nevertheless, the gap in wireless access solutions between large and small companies is significantly smaller than on average over all sectors, where five times as many large companies than small offer wireless access.

Companies in the ICT services sector need very powerful Internet connections for conducting their business. As a result, almost twice as many employees in the sector than on average work in companies with broadband Internet connections with a bandwidth of over 2 Mbit/s. Even small ICT

services firms have very powerful Internet connections: 30% of the employees in this size class enjoy a bandwidth of 2 Mbit/s or more.

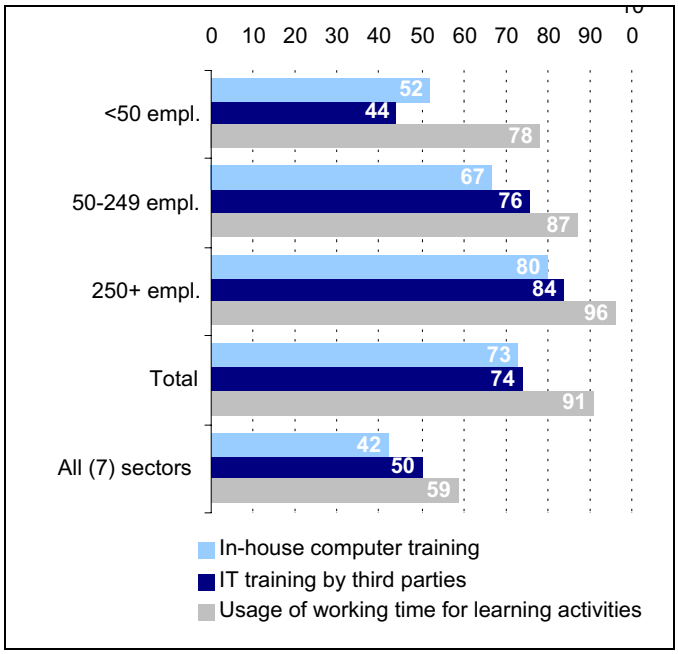
IT skills development

The efficient use of IT is one of the core competencies of ICT services firms and fast technological changes require considerable education efforts in this sector. Particularly the rising complexity of e-business solutions poses high demands on the IT capabilities of employees in this sector. It is therefore not surprising that the support of IT skills development in ICT services firms is above average in other sectors. Indeed, 94% of the employees in ICT services work in companies that offer support of IT and networking skills development. Usage of working time for learning activities is the most important form of IT training: 91% of the employees in the ICT services sector work in companies that let their employees use working time for IT skills development, compared to 59% on average. More effective (and more costly) formal training schemes either in-house or by third parties are offered to almost three quarters of the ICT services employees.

Exhibit 4-4: ICT services: IT training offered to employees

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total). Figures weighted by employment ("enterprises comprising …% of employment offer …"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



IT recruitment activities

Almost one third of the ICT services companies have recruited or tried to recruit staff with special IT skills during the last 12 months, which naturally is a higher share than on average in other sectors (9%). Medium-sized and large companies in particular were active recruiters of specialists: despite the difficult economic situation in the sector and the downsizing in many companies, still almost two thirds of the medium and large companies recruited IT specialists in 2002/2003. ICT services firms have more difficulties in recruiting IT specialists, though, than on average. This is probably due to the higher number of IT specialists needed and to the more specific skill requirements in the sector.

4.2.3 Adoption of online technologies for internal business processes

Internal collaboration

While e-business is often related to the exchange of information or goods and services with external business partners, the use of e-business solutions and ICT can, first of all, significantly enhance the efficiencies of internal processes within an enterprise. As ICT services firms are generally familiar with e-business concepts and technologies and competent in realising e-business projects, they naturally use such solutions significantly more often than companies from other sectors.

Exhibit 4-5: ICT services: Usage of online technologies

Online technologies used	All (7) sectors	ICT services			
		Total	0-49 empl.	50-249 empl.	250+ empl.
To share documents/ to perform collaborative work	19	52	51	68	79
To automate travel reimbursement of employees	13	14	14	32	46
To track working hours and production time	6	23	23	48	62
To support the human resources management	6	20	20	42	59

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total). Figures in % of companies. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

The usage of online technologies for several internal business processes is between two and four times higher in the ICT services sector than in other sectors. Online technologies that support human resources management, such as the tracking of working hours or automated travel reimbursements can particularly improve efficiencies in those parts of the ICT services sector that work project based, for example in project teams at different or remote locations. Obviously, in enterprises that employ a large staff, the use of such technologies is more frequent than in smaller enterprises.

E-Learning and knowledge management

Improving internal co-ordination as well as the flow and management of knowledge is vital in those sub-sectors of ICT services that produce their services mainly from skilled labour. IT consulting and software programming, for example, are knowledge-based activities in this sector where efficient knowledge management is business critical. The efficiency of, for example, accessing and sharing knowledge can be significantly enhanced by the use of suitable IT solutions. Knowledge management (KM) systems are therefore used by an above-average share (11%) of the ICT services companies. The efficient management of knowledge is important for companies of all sizes, but KM systems are most valuable for large enterprises with a complex and often dispersed knowledge base and files that have to be accessed by many different parties in the workflow. Particularly the sharing of tacit knowledge (the know-how contained in people's heads), which is done face-to-face in smaller companies, can pose a problem for large, dispersed companies.

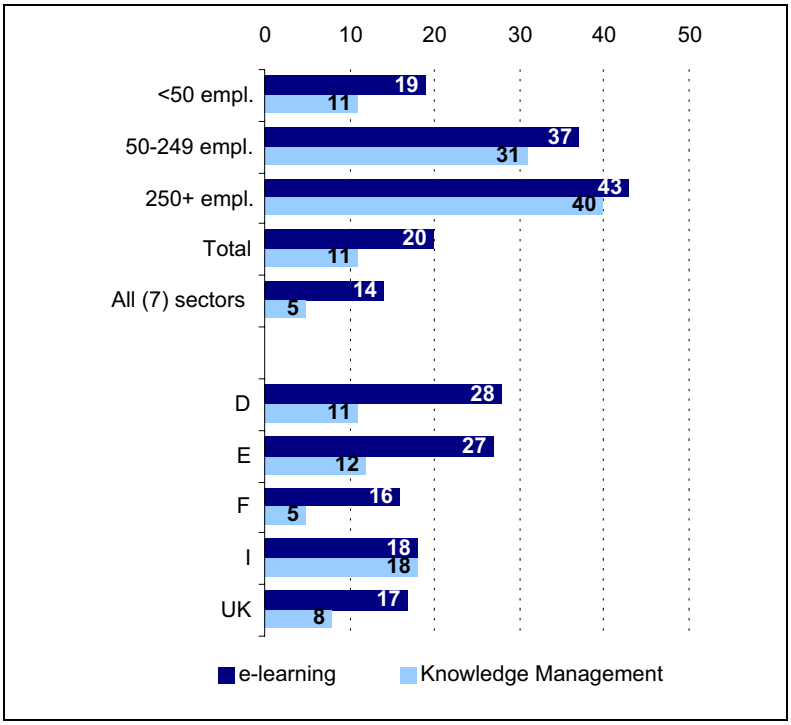
More frequently used than KM systems are e-learning tools. Keeping employees' knowledge up-to-date in a very dynamic environment with rapidly changing technologies and technical innovations is an important success factor in knowledge-intensive ICT services. E-learning tools that provide access to online courses can significantly improve efficiency and save cost by cutting back secondary education costs (such as travel and seminar room expenses). In addition, e-learning offers opportunities to speed up time-to-market of new products and services or speed up the implementation of new processes and/or new software. 43% of the large and 37% of the medium-sized enterprises in the ICT services sector but only 19% of the small firms use e-learning tools.

Exhibit 4-6: ICT services: Usage of e-learning and knowledge management systems

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



Customer relationship management (CRM)

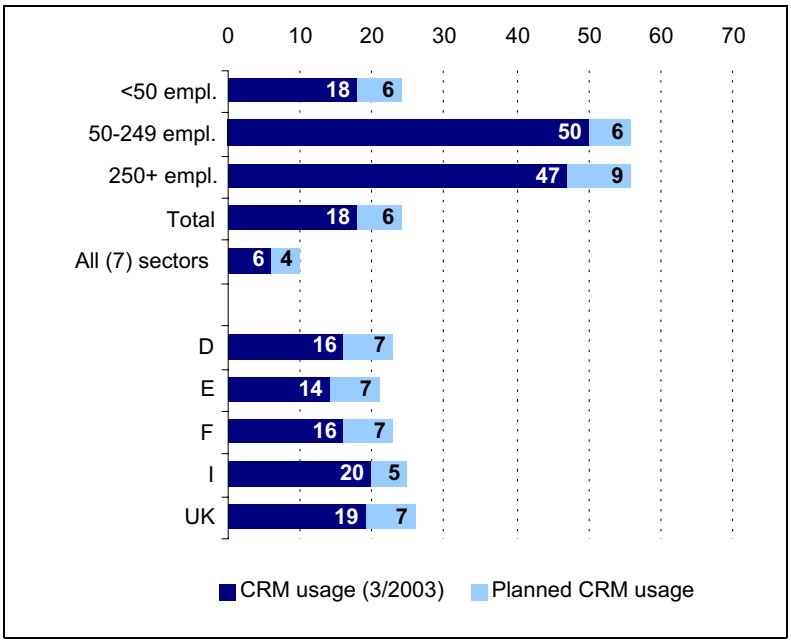
Employing e-business tools to improve customer-faced processes is a pressing issue in those areas of the ICT sector that deal with large numbers of customers. In telecommunication services in particular, where – after liberalisation of the market – customers can easily switch their provider when they are not satisfied, companies have a strong incentive to improve customer care and reduce error rates with the help of e-business tools.

Exhibit 4-7: ICT services: Current and planned usage of CRM systems

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



Overall, customer relationship management (CRM) systems are used by 18% of the enterprises in the ICT services sector, compared to only 6% on average over all sectors. CRM systems are used considerably more often by large and medium-sized enterprises than by small ones as they are of much higher value for firms with large numbers of customers, such as telcos. Smaller enterprises, for example IT consulting companies, can more easily handle their comparatively few customer relationships manually.

4.2.4 Processes of the extended enterprises

The main idea behind the concept of an "extended enterprise" is that a company not only consists of its employees – from assembly hall to management board – but also of a network of business partners, including its suppliers and even its customers. Enterprises that want to be successful must not only look at their internal processes but also need to manage this network efficiently and provide all members of the network with exactly the information they need.

Several rather sophisticated e-business solutions and concepts such as supply chain management (SCM), e-collaboration, vendor managed inventory (VMI), EDI networks and also electronic marketplaces address these issues of an extended enterprise. While SCM and VMI are mostly concepts with a history in the production of physical goods that have been used to optimize product flows and inventories, EDI networks have also been used for quite a long time in telecommunications.

Online collaboration

The ICT services sector is rather advanced in using online technologies to co-operate with external business partners. All indicators are considerably above average. The advance is strongest for online collaboration in the product design phase and for online negotiation of contracts. Online collaboration for product design is particularly favoured by the sort of products and services produced in computer services. Software, due to its digital nature, is ideally suited for a distributed development. Indeed the whole distributed programming model for the development of Open Source software is based on this possibility. The advanced state of online co-operation in the ICT services sector strongly facilitates the division of labour in this sector. The decrease in costs for co-operation allows even very small and specialised companies to work together with others on larger projects.

Exhibit 4-8: ICT services: Usage of online technologies within the value chain

Value chain activities	All (7) sectors	ICT services			
		Total	0-49 empl.	50-249 empl.	250+ empl.
Online collaboration with business partners for designing products	12	35	35	44	47
Online collaborating with business partners to fore-cast product demands	10	18	17	25	29
Online management of capacity / inventory	10	17	17	22	23
Electronic exchange of documents with suppliers	37	53	53	48	49
Electronic exchange of documents with customers	28	58	58	54	63
Online negotiation of contracts	12	30	30	23	32

Base: EU-5 (D, E, F, I, UK), enterprises with internet access (N=502 for sector total). Figures in % of companies.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

EDI usage

The use of EDI is more than twice as high in large than in small companies. EDI is used in the ICT services sector for the exchange of data related to buying and selling, payment processes and billing. For example, with ELFE there exists a special EDI subset for electronic telephone billing, which is used by telecommunication companies to bill their corporate customers. Overall, 18% of the ICT services companies use EDI solutions, compared to 25% on average over all sectors surveyed.

B2B e-marketplaces

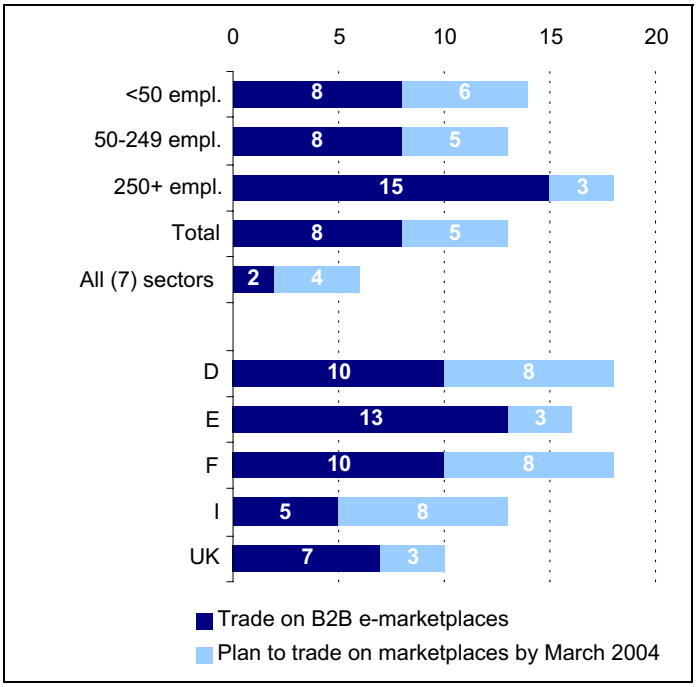
The use of online e-marketplaces is also above average in the ICT services industry. At 8%, four times as many companies as on average use e-marketplaces right now and an additional 5% plan to do so in the future. Currently large companies are somewhat more active on marketplaces than small and medium-sized companies. Nevertheless, the high expectations for e-marketplaces have been somewhat dampened over the past year, as a comparison between the 2002 and 2003 survey show.

Exhibit 4-9: ICT services: Participation in B2B e-marketplaces

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

In % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



There are three forms of intermediaries/e-marketplaces that specifically serve parts of the ICT services industry:

- Bandwidth marketplaces for telecommunications, where capacity on all sorts of tele-communication networks is traded.
- Software-related marketplaces for expert knowledge and software programming services that match potential buyers (organisations or individuals working on a software development project or looking for improvement of an existing solution) and sellers (the freelance developer community or companies offering programming services).
- Intermediaries for software and research

4.2.5 Purchasing online

Online purchasing is closely related to the concept of the extended enterprise, as the relationship to suppliers forms one element of the extended enterprise. The fraction of ICT services companies purchasing goods or services online is extraordinarily high (77%) compared to other sectors. Also there is no considerable difference between the share of large and small companies that purchase online, whereas in other sectors large companies are usually more active in online purchasing.

The significant importance of online purchasing in this sector, however, cannot necessarily be interpreted as the existence of large, sophisticated procurement systems. Since companies have been asked whether they are purchasing goods and services online, the answers comprise all sorts of online buying.

The preconditions for buying online are good in the ICT services sector: First of all, many inputs necessary for the provision of ICT services can easily be bought on the Internet. This applies, for example, to software, hosting services, Internet and telecommunication services, office supplies, books, database content and research. As many companies in this sector are small, buying manually via websites is often more appropriate than implementing large and complicated e-procurement solutions.

In contrast to other sectors, where the share of online purchases in total purchases is very low on average, online purchases form an important part of the overall procurement in the ICT services sector. For 28% of the ICT services companies, online purchases make up for more than 50% of total purchases, while the same is true for only 14% of the companies from all 7 sectors surveyed.

Purchasing online is of special importance for small companies in the ICT services sector. For 28% of the small companies that buy online, these online purchases constitute more than half of their total purchases. The same value for large companies is only at 15%.

Exhibit 4-10: ICT services: Companies making online purchases

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

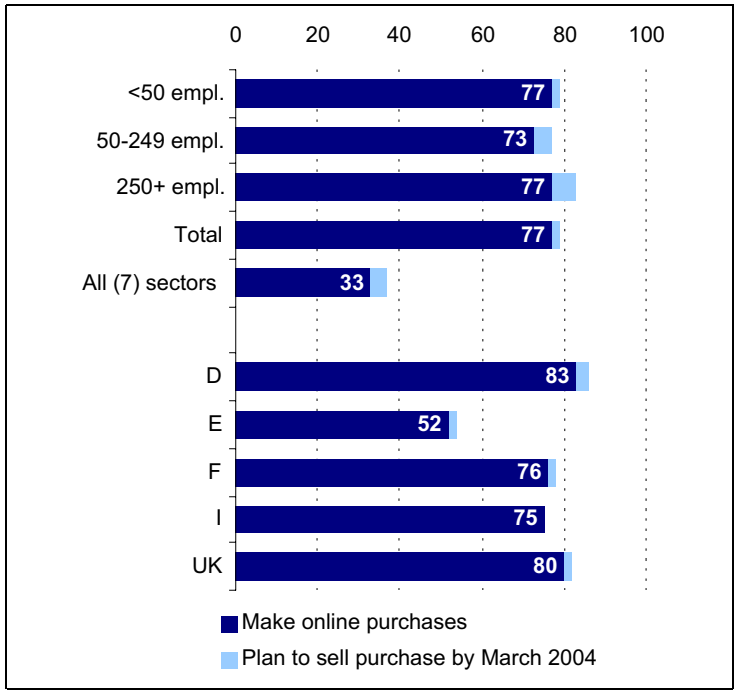
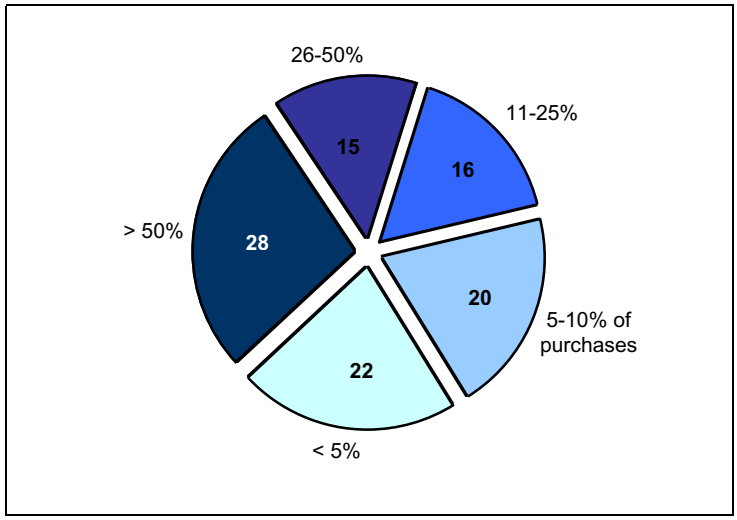


Exhibit 4-11: ICT services: Share of online purchases in total procurement (2003)

Base: EU-5 (D, E, F, I, UK), companies purchasing online, excl. DK's (N=337).

% of companies purchasing online reporting that they make x% of their total purchases online.
Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



4.2.6 Marketing and sales

72% of all companies in the ICT services sector have their own website compared to only 45% on average over all sectors. While there is still a certain gap between large and small companies, this gap will narrow over the next 12 months if the small companies' plans to implement their own website will materialise.

Selling products and services online has become increasingly important in both sub-sectors of the ICT services industry and has also affected related areas such as delivery channels, pricing strategies, and customer service. In computer services, standard software is a product, which is particularly suitable for being sold online. But also in telecommunication services, more and more companies now allow their customers to order services via the Internet. Usually online sales channels are combined with a large variety of additional customer (self-)services and online billing possibilities.

Results from the *e-Business W@tch* Survey show that 17% of all companies in the ICT services sector already sell products and/or services online and an additional 18% plans to do so over the next 12 months. Currently, a gap in online sales activities of large and small ICT services companies can be observed: only 17% of the small but 32% of the large companies in the sector sell online.

Purchasing online via a supplier's website is by far the most dominant form of online purchasing in the ICT services sector. Regardless of the size of the company, 94% of the ICT services firms that purchase online, do so on a supplier's website, compared to 83% over All (7) sectors. 31% of all companies use EDI for online purchases and 26% purchase online over e-marketplaces.[11]

Significant differences between size classes exist though when it comes to more integrated purchasing solutions. For example, only 24% of the small but 57% of the large companies purchase online via the extranet of a supplier. Similarly, only 12% of the small but 43% of the large companies have their IT system integrated with that of a supplier for placing orders.

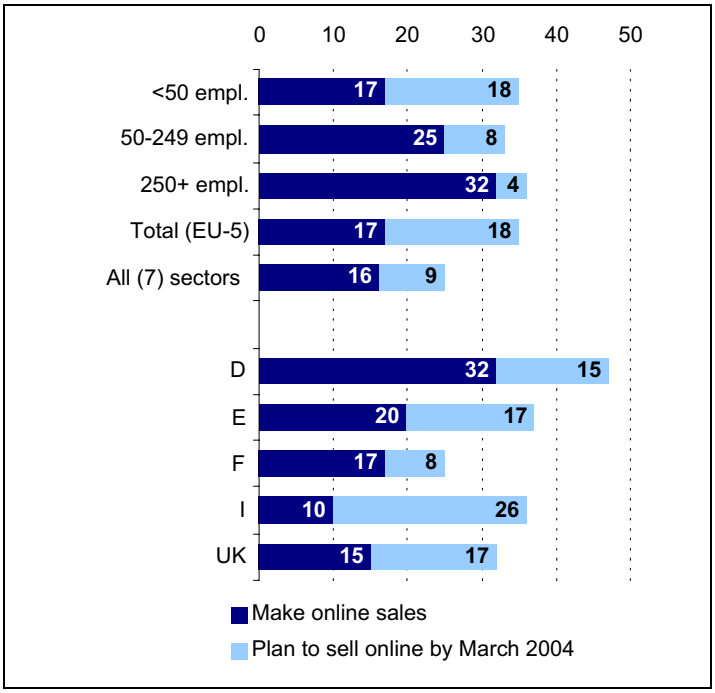
Despite the high share of companies purchasing online, the overall assessment of its impacts is largely in line with the assessment of other sectors. The two most important positive impacts of purchasing online on ICT services firms are lower procurement costs and an improvement in internal business processes. This shows again that an especially beneficial impact of e-business is the streamlining of processes and the cost savings associated with this.

Exhibit 4-12: ICT services: Companies selling online

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502 for sector total).

Figures in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



For 14% of those companies that actually sell online, online sales make up for more than 50% of total sales makes. The share of such "online specialists" is, therefore, clearly above the average in other sectors of 6%. However, for the largest part of the ICT services companies (56%), the Internet is still only a minor sales channel, accounting for less than 10% of total sales.

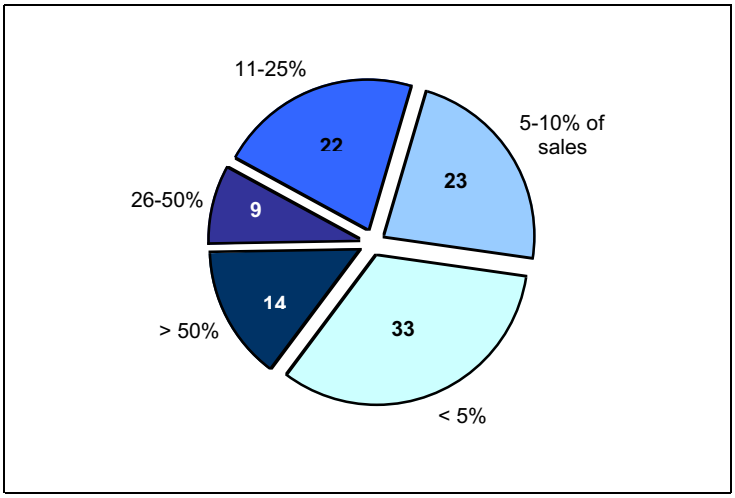
[11] The share of 26% of those companies that purchase online and use e-marketplaces equals 18% of all companies. This share is significantly above the share of 8% that state that they participate in e-marketplaces. This points to different definitions of what e-marketplaces actually are and different interpretations of what "participation in e-marketplaces" means.

Exhibit 4-13: ICT services: Share of online sales in total sales (2003)

Base: EU-5 (D, E, F, I, UK), companies selling online, excl. DK's (N=87).

% of companies selling online reporting that they make x% of their total sales online. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



The most important online sales channel in the ICT services sector is – as in other sectors – the company website. E-marketplaces are the second most important sales channel. However, they play a below average role compared to other sectors, particularly due to the relatively low usage by small and medium-sized ICT services companies. Similarly, the extranet is used only by a small share of small companies for selling online, while a higher share of medium-sized and large companies use this channel. EDI plays a noticeable role only in large companies.

In general, the impacts of selling online are considered more positively by ICT services firms than by companies from other sectors. In particular, 82% of the companies state that their volume of sales has been positively affected by selling online. Strong positive impacts were also felt on the sales area, the number of customers and the quality of customer service.

4.2.7 E-business development 2002 – 2003: main trends

The data presented in the previous sections of this report was based on the *e-Business W@tch* survey conducted in March 2003. The aim of the following section is to identify if significant changes from the first survey, carried out in June/July 2002 have occurred, which allow an assessment of some major trends in e-business developments in the ICT services sector.[12]

Importance of e-business and investment climate

The last 12 months have been dominated by a rather negative mood in the ICT services sector. After exceptional growth rates during the Internet hype, the bursting of the bubble and the general economic downturn have resulted in a negative assessment of the sector's current state. Some media and analysts even stated that 2002 was the worst year ever for the ICT services industry (Gartner 2003). In addition, the potential of e-business was often considered more critical than before – maybe also more realistic.

However, the negative mood and more critical assessment of e-business opportunities is not reflected in the *e-Business W@tch* data. The significant role that ICT services companies ascribe to e-business has not changed over the course of last year. Both survey waves 2002 and 2003 reveal that about 80% of the companies believe that e-business constitutes a significant or some part of the way their company operates today.

Likewise, the overall investment climate in the ICT services sector has not changed noticeably between 2002 and 2003: In both survey waves, about 44% of all ICT services firms planned to increase their expenditure for e-business technologies.

[12] For comparability of the 2002 and 2003 data, the analysis of e-business developments in this section is based on enterprise-weighted data in the EU-4 (Germany, France, Italy, UK).

Realisation of e-business plans

According to the 2002 survey wave, a considerable share of ICT services firms planned to implement various e-business solutions to support internal and external processes last year. For example, 6% planned to implement CRM systems, which would have equalled an increase by 30%. 5% planned to implement knowledge management systems (increase by 30%) and 5% planned to implement SCM systems (increase by 300%). However, results from the 2003 survey wave show that these plans have actually not been realised: No significant increases can be observed in the use of most e-business systems. On the contrary, for many solutions a slight negative (not yet statistically significant) trend can be perceived.

E-commerce trends

One area in which high expectations have not materialised at all is in the participation in e-marketplaces. In 2002, 12% of all ICT services firms reported an active usage of e-marketplaces and an additional 9% planned to participate in e-marketplaces within the next 12 months. In 2003, though, the participation in e-marketplaces has not increased but decreased to 7%** of all companies.[13] A significant drop could be observed particularly in the small company segment.

This result supports our hypothesis from the first *e-Business W@tch* report on the ICT services sector that the development of e-marketplaces for ICT services is suffering from the low dynamics of the ICT sector. Many ICT services companies currently have overcapacities, so that there are only few buyers for products and services offered on the marketplaces, leading to low usage rates.

For example, the level of online selling activities has been well below expectations in 2003: In 2002, 22% of the respondents from the ICT services sector were selling goods and services online and an additional 18% planned to do so within the coming year. However, in 2003 the share of companies selling online had dropped to only 17%* and not increased as the companies' plans would have suggested. At the same time, the share of companies planning to sell online within 12 months has remained constant at 18%, indicating that online selling plans have just been postponed rather than completely been abandoned.

Nevertheless, the assessment of the impacts of selling online has improved considerably, between 2002 and 2003. For example, while in 2002 only 53% of the ICT services companies that sell online felt positive impacts of selling online on their sales volume and the number of customers, this share has increased to 84%*** and 73%*** respectively. The same is true for an enlargement of the sales area that was reported by 54% of all companies in 2002 and by 76%*** in 2003.

The observed change in the assessment of impacts from selling online is mainly due to a significantly more positive assessment of small companies. While they had been rather sceptic towards the impacts of selling online in 2002 this has changed significantly in 2003. The more positive assessment of the impacts of selling online can also be explained by the higher share of companies that have gained considerable experiences with selling online. The share of companies selling online for more than two years has increased from 53% in 2002 to 76%*** in 2003.

[13] In the following analysis, *** will indicate a confidence level of 99% for the statistical validity of a difference between both samples, ** indicates a confidence level of 95%, and * indicates a confidence level of 90%.

4.3 Conclusions

4.3.1 Economic implications

ICT services: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **Improve internal processes and enhance information flows**: One of the most important opportunities of e-business is to improve the efficiency of internal work processes and achieve respective productivity gains. While this benefit of e-business is often related to manufacturing sectors, it is equally true for ICT services. In the latter this benefit of e-business is strongly related to an improved flow of information within the company and an optimal utilisation of the workforce as the most important resource and cost factor. In particular in those sub-sectors, where activities are typically knowledge-based and organised in projects, e-business solutions such as project and human resource management or knowledge management can significantly enhance the efficiencies of internal processes. • **Improve customer relationship management**: Particularly in large companies, where customer care tasks make up for a large part of overall business processes, increasing efficiencies and decreasing costs related to these processes can have a major impact on overall profitability. At the same time, a better quality of customer care is an important factor determining the competitiveness of ICT services firms. • **Extend market reach**: The Internet offers smaller companies the chance to make their services known to a global audience at low costs. As many products and services in the sector are experience goods, making trial products (for example, free market research, trial versions of software) available over the Internet reduces typical trust problems of such goods. In addition, the digital nature of many products and services allow companies to distribute them over the Internet in various forms and at various prices and also to sell them to a global market. • **Enhance procurement processes**: The significant importance of buy-side e-commerce activities in ICT services is reflected in the high share of companies purchasing online as well as in the high share of online purchases in total procurement. This indicates that the improvement of procurement processes is an important opportunity for e-business for this sector. Even simple forms, such as the substitution of traditional purchasing processes by Internet buying can already considerably increase efficiencies, also in smaller companies.	• **Weakening customer retention**: While e-business technologies can help to improve customer services on the one hand, they bear a certain risk of weakening customer retention on the other hand. This risk results from a replacement of personal services by more efficient online customer self-services. When buying standard software, for example, the entire process from making the purchasing decision, to actually buying, paying and downloading the software and even to using after-sales services such as updates or bug fixes can be conducted online by the customer without any personal contact with the selling company. • **Increased price competition**: The risk of weakening customer retention is further aggravated by higher market transparency through the Internet, which increases price competition and decreases switching costs for customers, for example in standard telecommunication services. Weakening customer retention is a risk that particularly applies to standardised services or products.

Enablers	Barriers
• **Strong e-business know-how**: One of the most important enablers of e-business in the ICT services sector is the strong know-how and familiarity with e-business concepts and technology and well-skilled employees in this sector. Contrary to other sectors, where the lack of knowledge about the benefits of e-business and the relevant technologies forms an important barrier to e-business development, this is not the case in ICT services. Rather ICT services firms apply e-business solutions internally to serve as role models for their own customers, • **Market pressures to increase internal efficiencies**: Another enabler of e-business expansion is market pressure to increase internal efficiencies. Strong competitive pressures, the present economic situation of the sector as well as pressure from capital owners currently force ICT services companies to achieve every possible efficiency gain. E-business technologies play a major role in achieving such efficiency gains for internal and external processes.	• **Weak demand for ICT services**: On the other hand, as long as the demand for ICT services from other sectors remains weak, budgets for internal e-business solutions of ICT services companies remain small as well. As stated above, over the past two years ICT services companies were more occupied with managing the impact of falling demand for their services than with formulating new e-business strategies. If this situation persists, it will pose a barrier for further e-business usage in the sector. However, if e-business demand from other sectors recovers, this could also turn into an important support factor for further e-business development in the ICT services sector.

It is probably fair to say that during the previous two years many ICT services companies were more occupied with managing the impact of falling demand on their companies than with formulating and implementing their e-business strategies – except in cases, where ICT and e-business investments promised to help cushion the impact of the demand downturn. These short-run business cycle effects were not the main focus of the *e-Business W@tch*, though. Nevertheless, the survey results do produce some insights into the long-term role of ICT and e-business for the ICT services industry:

Usage of ICT and e-business above average: Results from the *e-Business W@tch* survey confirm this picture of a sector for which e-business plays a comparatively important role. The fraction of ICT services companies stating that e-business constitutes a significant or some part for the way their company operates today is significantly higher than on cross-industry average.

Online purchasing well-developed in ICT services: The fraction of ICT services companies already purchasing goods or services online is extraordinarily high. The survey results show that about three out of four companies have already purchased products online. For the average of all industries this fraction is much lower at about one out of three companies. Also contrary to other sectors there is no significant difference in the online purchasing activities between small and large companies.

Impact of selling online strongest for small enterprises: The results of this second survey clearly show a more positive assessment of the impact of selling online by small companies than by large companies. Especially for the volume of sales, the number of customers and the sales area, up to two times as many small companies consider the impact of selling online on these variables fairly or very positive.

Implications for the industry structure

ICT and e-business in the ICT services industry can have a variety of different effects on an aggregated level. Some of these, for example the impact on the price level or on competition, are on a rather abstract level. Others, for example the impact on specialisation and cooperation within the industry or on the kinds of products and services offered, are more closely connected to the implications for individual enterprises.

Increasing use of e- The ICT services sector in its current form is still a relatively young

business and ICT may decrease ICT services prices

sector –as are many of its companies and production technologies. It is, therefore, safe to assume that there still exists significant potential for achieving productivity gains by standardising and improving processes in this sector. Due to the familiarity of this sector with the potential of ICT it is rather likely that ICT investments and e-business will play a major role in achieving these productivity gains.

As a result of more efficient production processes, ICT services should become cheaper in the long-term, at least if competitive pressure on prices persists. Such a price decrease can be expected to have quite positive effects on other sectors and eventually the economy as a whole. Due to the specific role of the ICT sector as provider of major building blocks of the information society all sectors should benefit from these improvements. As decreasing prices tend to increase demand for ICT services and rising ICT investments in other sectors should raise productivity there, the increase in ICT and e-business use in the ICT sector should eventually lead to an overall productivity increase in the economy.

ICT impacts competition and concentration in ICT services

The increasing use of ICT and e-business will have consequences for competition and concentration, as they can reinforce natural tendencies from the economics of production and distribution as well as from product and service characteristics. However, the respective effects differ for small and large companies. They can help both types of companies to strengthen their already existing advantages.

Many large companies, such as telecommunications, and some companies engaged in IT outsourcing, are infrastructure businesses with strong economies of scale. Economies of scale benefit concentration in such an industry as average costs are decreasing with the number of customers. In addition, in standard software production and in telecommunications the network effect (usage utility increases with the number of users of the product) aggravates the concentration forces. E-business in general and e-commerce conducted via the Internet in particular reinforce these effects. First, many e-business applications, such as e-procurement, knowledge management, CRM or ERP systems provide additional economies of scale for large companies. Second, the Internet facilitates worldwide distribution and thus increases the possibilities to distribute costs over an even larger number of customers. Thus, inherent concentration forces for this type of companies are actually strengthened.

ICT helps small companies to specialise on worldwide scale

For smaller companies, ICT and e-business have a different potential. These companies are often niche-players, which follow a strategy to become market leaders in their niche. They can benefit particularly by employing the potential offered by online sales technologies, and so stay in their niche while extending the region of their market. Such a strategy is particularly pronounced in software production, where many small but globally known software companies exist that have significant market share in their small market. Using the Internet as a marketing and distribution channel, they can pursue this strategy even further. Thus, while ICT and e-business increase the tendency for concentration in some market segments, they tend to increase the competition in other segments of the ICT services industry.

4.3.2 Policy issues

The economic implications for individual enterprises in ICT services as well as those for the entire sector lead to a number of policy issues. Three policy areas are listed below that require specific care and potentially appropriate policy measures.

Leveraging the potential of ICT services as a lead sector

The *e-Business W@tch* survey has shown that the ICT services sectors are the most advanced ones in the usage of ICT and e-business technologies. Due to their double role as users and providers of this technology, they tend to be early users. As far as these ICT investments increase productivity in ICT services, there are consequences for productivity and growth for the economy as a whole. Although ICT services are a comparatively small part of the economy as a whole, large productivity changes in this sector will also be seen in the aggregate.

Such an effect can be strengthened if other sectors that resemble the ICT services industry in one way or another use ICT services as a role model and learn quickly from this sector. Such sectors can be, for example, media and publishing with respect to experiences from distributing immaterial goods, business services with respect to experiences from co-operation in distributed networks of experts, or consumer-oriented sectors with respect to the telecommunication sectors' experiences from managing significant amounts of customer interactions and data. There exist several examples, such as the Open Source programming model or the possibility of downloading trial software, where the ICT services sector has been lead user of new forms of production and distribution.

For economic policy it is important to better understand why and in which areas of ICT and e-business application the ICT services industry is a lead sector. It is also important to understand which experiences can be transferred to which other sectors.

Monitoring concentration tendencies in parts of ICT services

Special characteristics of production in some ICT services tend to favour concentration, particularly in infrastructure-like sub-sectors such as telecommunications and – to some extent – outsourcing as well as in software production. While these tendencies are not caused by the emergence of e-business-technologies, they are reinforced by them. Online selling, for example, allows large companies to leverage their brand even further and technologies for managing large amounts of customer data efficiently help to overcome typical inefficiencies of large enterprises. Hence, they weaken counter-forces to the exploitation of economies of scale.

While concentration tendencies do not necessarily imply problems for competition, circumstances might evolve where this changes as, for example, the competition policy debate concerning certain large software companies or formerly state-owned telecommunication companies show. They therefore require continuous observation and monitoring as well as sophisticated anti-trust frameworks if the observed concentration is considered to be detrimental to competition.

Securing innovation-supportive business environment for ICT services

ICT services play a double role in the development of the information economy by supplying essential products and services for all sectors and by serving as a test bed and early adopter of many of its own technologies. This central role of a driving force for technical development requires that the business environment in which ICT services are operating should be as supportive to innovation as possible.

Unfavourable elements in the business environment can take on different forms: Financial systems may be inadequate for providing sufficient financial means for the inherently risky innovation process or legal restrictions might hinder the use of efficient means of financing, such as venture capital. Regulation in favour of incumbents may make it difficult for small innovative companies to enter a market and compete successfully with incumbents. Or general labour protection and business regulations may make it difficult to adjust the ICT services company to the business fluctuations associated with an innovative and risky environment. Such restrictions should be identified and, if possible, removed.

References

Arias, S.; J.C.Kinnaman (2000): E is for Earnings – The Economic Imperative for E-Business, in: PricewaterhouseCoopers InfoComm Review, 39-50

Berlecon Research (2001): ASP 2001 – Was wollen die Nutzer? Ergebnisse einer repräsentativen Befragung deutscher Unternehmen.

Deiss, R. (2002): Information Society Statistics, in: Statistics in Focus, Industry, Trade, and Services, Theme 4, 32/2002.

EITO (2003): EITO Report 2003.

Eurostat (2001): Panorama of European Enterprises 2000.

Gartner (2003): Gartner Says 2002 Was the Most Diffucult Year on Record for Worldwide ICT Services Industry, Press Release, May 13, 2003. www.gartner.com

OECD (2000): Measuring the ICT Sector.

Roberts (2001): Broadband markets find narrow trader interest, Financial Times, 19.08.2001.

Statistisches Bndesamt (2002): Statistisches Jahrbuch 2002 für die Bundesrepublick Deutschland

Statistics Denmark et al. (2001): The ICT Sector in the Nordic countries 1995-2000.

Wichmann, T. (2002): Billing Woes, Electronic Payment Systems Observatory Newsletter, 13/2002, www.epso.jrc.es.

B.5 The electrical machinery and electronics industry

5.1 Economic profile and trends

Enterprises manufacturing electrical machinery and electronics (NACE Rev. 1 divisions 30, 31, 32) accounted for approximately 10% of the total production of the EU manufacturing sectors in 2001 and provided jobs for about 2.3 million people in the EU. For the purpose of this study, NACE 31 is referred to as the "electrical engineering" or the "electrical machinery" industry. The remaining sectors can, to a large degree, be classified as the ICT-producing industry, loosely known as the "electronics sector".

NACE Rev.1		Activity
Division	Group	
30		Manufacture of office machinery and computers
	30.01	Manufacture of office machinery
	30.02	Manufacture of computers and other information processing equipment
31		Manufacture of electrical machinery and apparatus
	31.1	Manufacture of electric motors, generators and transformers
	31.2	Manufacture of electricity distribution and control apparatus
32		Manufacture of radio, television and communication equipment and apparatus
	32.1	Manufacture of electronic valves, tubes and other electronic components
	32.2	Manufacture of television and radio transmitters and apparatus for line telephony
	32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods

Exhibit 5-1: Structure of the electronics and electrical machinery sector (DL30, DL31, DL32) in the EU (2001)

NACE Rev. 1		Production value		Value added at factor cost (est.)	
		Euro (m)*	%	Euro (m)*	%
30	Manufacture of office machinery and computers	61,315.9	100.0	12,649.1	100.0
31.1	Manufacture of electric motors, generators and transformers	36,383.1	17.4	11,725.5	15.7
31.2	Manufacture of electricity distribution and control apparatus	85,866.6	41.2	33,912.5	45.5
31.3	Manufacture of insulated wire and cable	19,339.5	9.3	5,407.5	7.3
31.4	Manufacture of accumulators, primary cells and primary batteries	4,647.3	2.2	1,389.3	1.9
31.5	Manufacture of lighting equipment and electric lamps	14,857.6	7.1	5,772.6	7.7
31.6	Manufacture of electrical equipment n.e.c.	47,522.3	22.8	16,294.8	21.9
31	Manufacture of electrical machinery and apparatus n.e.c.	208,616.4	100.0	74,502.2	100.0
32.1	Manufacture of electronic valves and tubes and other electronic components 1)	49,872.3	24.7	17,287.5	29.9
32.2	Manufacture of television, radio transmitters and app. for line telephony or telegraphy 1)	118,330.7	58.6	31,388.3	54.3
32.3	Manufacture of television and radio receivers, sound or video rec. or repro. app. 1)	33,772.6	16.7	9,107.3	15.8
32	Manufacture of radio, television and communication equipment and apparatus 1)	201,975.6	100.0	57,783.1	100.0

* EU-12 = EU-15 excluding Greece, Ireland, and Luxembourg.

1) EU-11 = EU-12 excluding Netherlands.

Source: Eurostat New Cronos (2003), Estimations by DIW Berlin (2003).

All sub-sectors combined reached a production value of 472 billion Euro in 2001. The share of the sub-sectors in real production has slightly decreased compared to 1999 data, indicating that the electronics and electrical machinery industries have over-proportionally suffered from the sluggish

economic development of the last few years. The ratio of value added to production value is approximately 30.7%, the remaining share is accountable towards purchased semi-finished products not produced by the sector itself or outside of the Member States.

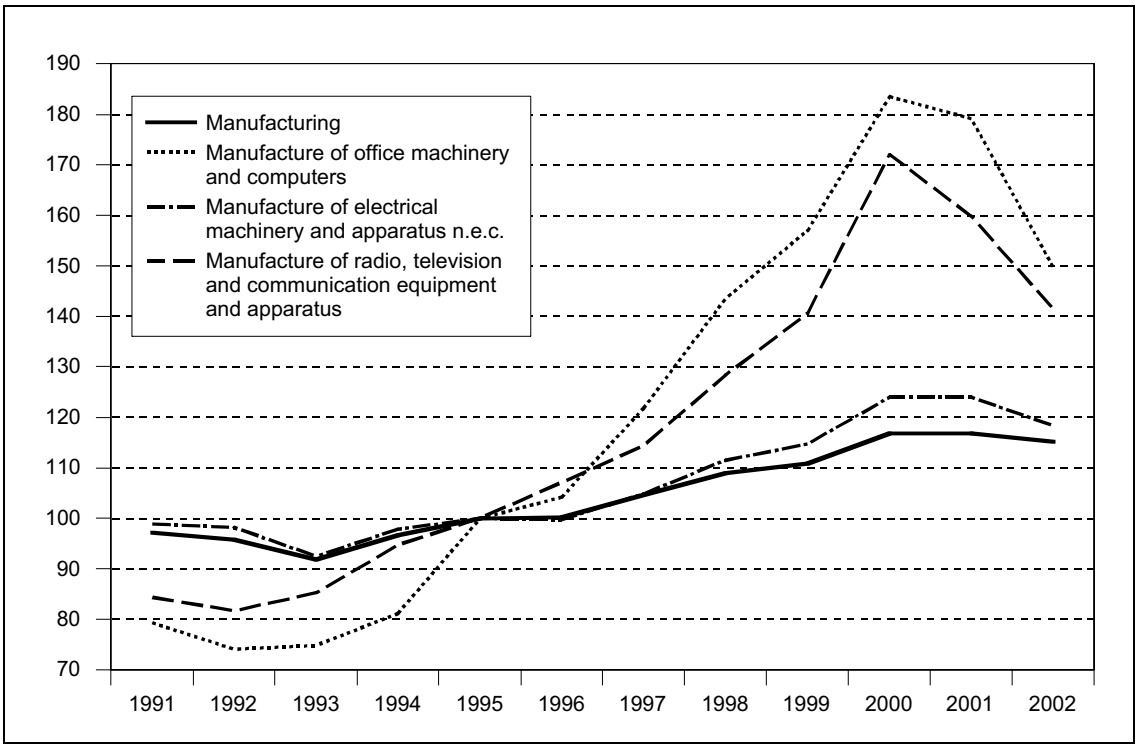
The traditional electrical machinery sub-sector (NACE 31) is still the largest of the three divisions included in this report. Within NACE 31, the manufacture of electricity distribution and control apparatus has the largest share in production value (41%).

Production value and value added

The chart below shows the development of production value in the three codes of this report relative to total manufacturing, with 1995 as the reference point (1995 = 100). The figure shows that the highly dynamic ICT-producing sectors have clearly outperformed the average of all manufacturing sectors from 1992-2000. During this "boom-period", production value in the ICT-producing sectors has more than doubled, compared to a 16% increase on average. However, the electronics industry has been in a deep recession since 2000, and production value fell back to the levels of 1998-1999 in 2002.

The more traditional electrical machinery industry was more in line with the average manufacturing development, still being able to outperform the average since 1995. Compared to the highly volatile ICT-producing sectors, the electrical machinery industry has proven much more resistant against the economic slowdown since 2000.

Exhibit 5-2: Production value in NACE 30, 31, 32, and total manufacturing in the European Union 1991-2002 – Index (1995=100) in %



Source: Eurostat New Cronos (2003), calculations and estimations by DIW Berlin (2003).

Employment, productivity and labour costs

The development of employment figures was much more volatile for the ICT-producing sectors than for the electrical machinery industry and manufacturing total. The computer industry in particular shows a dramatic cut-back in employment from 1991 to 2002. During this period, almost every second job in this sector has been lost. This development was only put on hold during the boom years of 1995-2000, after which employment began again rapidly to reduce in this sector. The cutback in jobs in this industry was most dramatic in Finland, Germany, Italy, and Spain, while Austria has been

increasing capacities and employment in NACE 30 against the trend. Combined with the rapidly increasing production index for the computer industry over the same time span, the reduction of persons employed leads to increases in the productivity statistics for the computer industry. Part of the explanation for this development is the outsourcing of labour-intensive, volume production activities to Contract Equipment Manufacturers (CEMs) in Asian countries, while the more knowledge-intensive production steps have remained in Europe.

Overall, the sectors covered in this report accounted for approximately 2.32 million persons employed in the EU. The sector with the highest absolute employment figure is the traditional electrical machinery industry, with approximately 1.4 million employees. Within NACE 31, the majority of jobs is located in Germany. Germany accounts for more than one in three jobs in these industries in Europe.

Productivity, measured as value added per employee, shows significant variance throughout Europe. Portugal, Sweden, and Italy report the lowest productivity figures, while Germany leads with 66,500 Euro value added per person employed. The productivity gap between Germany and Portugal is approximately 70%. This productivity gap is also reflected in labour cost figures: Employees in Portugal receive only 36% of the wages, salaries, and social benefits paid in Germany. The labour costs in this sector in Europe are highest in Belgium (45,700 Euro per employee) and the Netherlands (41,400 Euro), followed by Germany and Austria.

Industry structure by size-class distribution

The sector is characterised by a high degree of concentration. Large companies, which account for 2.0% of all companies in the sector, contribute 79.3% to the sector's turnover and 63.5% to employment. Industry concentration is particularly pronounced in the ICT equipment industries, where rapid technological progress and the production of electronic mass products enhanced economies of scale and hence the concentration process. Taking advantage of these economies of scale contributes positively to productivity levels in large firms in this sector. As a consequence, large firms contribute more to turnover than to employment shares within the three size classes. The enormous growth rates of the ICT-producing sectors in the second half of the nineties were mainly achieved by a few very large firms in some of the highly specialised smaller countries, such as Nokia in Finland, Ericsson in Sweden, and American firms active in the Irish computer industry.

Exhibit 5-3: Size class distribution in the electronics and electrical machinery industries (DL 30+31+32) in EU-15 countries in 2001

		Enterprises with ... persons employed			
NACE	**Total**	**1 to 9**	**10 to 49**	**50 to 249**	**250 and more**
	Number of enterprises		**Structure in % of total**		
30 + 31 + 32	73,746	73.7	18.6	5.6	2.0
	Turnover in million Euro		**Structure in % of total**		
30 + 31 + 32	566,099.2	2.6	6.3	11.8	79.3
	Number of persons employed		**Structure in % of total**		
30 + 31 + 32	2,434,600	6.2	11.9	18.4	63.5

Source: Eurostat New Cronos (2003), calculations and estimations by DIW Berlin (2003).

General economic trends and challenges

The sub-sectors exhibit significant differences in their production schemes and their degree of vertical integration. In electrical engineering, Original Equipment Manufacturers (OEM) are often highly vertically integrated, keeping large parts of the entire production and value-creation process in-house. In contrast, the electronics industry is characterised by high specialisation of firms along the value chain. The highly modular set-up of electronic products allows OEMs to outsource production steps and to purchase parts and modules from specialised manufacturers. As a consequence, the value chain in the electronics industry is more complex, involving more players and stages.

The production of electronics is nowadays an entirely global business. We observe a high frequency of international mergers and acquisitions, global price competition, and the forming of geographic production clusters that specialise in one particular kind of production activity (for example, hard-disks in Singapore, LCDs in Taiwan). Throughout the entire electronics value chain, some trends are

omnipresent: Labour-intensive, volume manufacturing has been shifted to Contract Equipment Manufacturers (CEMs) in Asia, while Europe and the US retain the high-end, knowledge-intensive stages of the value chain, such as product development and R&D.

On the other hand, the less standardised products of the electrical engineering sector (for instance, engineering-intensive motors, generators) are still manufactured mainly in the EU. The electrical machinery sectors have seen some relocation of production to low-wage countries, but mostly inside Europe. The majority of the manufacturing facilities nevertheless remain inside the EU member countries because they have the know-how necessary. The markets for some electrical engineering products, such as high-voltage generators, are strongly regulated for safety reasons, which makes outsourcing more difficult because of the necessary control and supervisory work. Germany dominates many electrical engineering sub-sectors. Most OEMs in this segment are big European or American enterprises, such as ABB, Siemens, Alcatel, or General Electric.

Recent trends

During the last months, a number of industry news pointed at recent trends and developments. The electronics and electrical machinery sectors are currently sceptic about business opportunities in 2003 and forecast that “in the best case” last year's revenues will be retained (VWD, 20.03.2003). German high-tech companies respond to this development by decreasing their R&D expenditures in 2003 for the first time in the last 8 years (Financial Times Deutschland, 26.02.03, p. 25).

The chip industry is still suffering from over-capacities and ruinous price-competition after the unrivalled boom period of the late 1990s. Most producers currently run a deficit, although chip prices have recently increased again. The sluggish demand for computers and telephone equipment is the main reason for this situation (Handelsblatt, 24.04.2003, p. 1).

On the other hand, there are also some positive developments. The proportion of electrical and electronic systems in a vehicle’s value is likely to increase in a few years from presently 20% up to 35% (VDA, 2003, p. 52-53), providing attractive business opportunities for manufacturers of such components.

The rapid growth of WLAN technology is an attractive market. In 2002, the number of WLAN locations rose by 327% (3G, 11.02.2003). According to BITKOM, the WLAN technology has the potential for a mass market (VWD, 11.03.2003).

Overall, the business climate remains volatile, especially for the ICT-producing industries, keeping up the pressures on firms to innovate and to become both more flexible and efficient.

5.2 Usage of ICT & e-business in 2003

5.2.1 The role of ICT and e-business

The sector is advanced in e-business usage. The *e-Business W@tch* survey 2002 already showed that large firms led in some e-business applications, but SMEs did not seem to fall behind as markedly as in other sectors. We attributed this specific characteristic of the sector to the high degree of IT knowledge and experience that naturally exists in this sector, even in smaller firms.

The electronics industry was found to be clearly more advanced than the electrical machinery sector. Specific e-business drivers in the electronics industry are short product life cycles, standardised components and products, a complex value chain that exhibits an extremely high degree of outsourcing, IT-competence of firms in the electronics sector, and a truly globalised industry.

At the sector level, the Internet is speeding up the process of globalisation and specialisation. The trend towards specialisation (both of firms and of regions) is being supported and enabled by the widespread implementation of e-business solutions. This should lead to an exploitation of comparative advantages and thus improve overall sector productivity and economic growth. Increasing sector productivity does not, however, automatically mean that all regions and all firms will benefit equally.

Exploitation of comparative advantages does involve re-allocation of production and development facilities to regions with especially profitable surroundings. The re-allocation of chip and component manufacturing facilities to Asia and the emergence of CEMs during the last decade is such a consequence. On the other hand, high value-added research, engineering, and development tasks often remain in the industrialised countries with high labour costs.

Further specialisation and outsourcing (especially within the electronics industry) could eventually contribute to a further disintegration of individual firms, strengthening the position of highly specialised firms, service providers and contract manufacturers.

All parts of the electronics value chain promote e-business

In contrast to other industry sectors, where a "battle of power" and a systematic divergence of interests could be observed between different stages of the value chain (for example between System Integrators and OEMs in the automotive industry), the advantages of e-business are clearly recognised and solutions are jointly promoted by all parts of the value chain in the electronics industry. However, the conflict of interest between SMEs and larger firms in the sector remain a central issue in industry-wide e-business adoption. At the level of individual firms, companies are still struggling with front-to-back-end integration of their e-business initiatives. This often requires consolidating individual solutions that have been tacked onto the existing organisation, without yet having a significant impact on structures. It also requires integrating legacy information systems such as EDI and other operating software (for example, ERP). In addition, linking with customers and suppliers in an efficient and manageable way is another challenge.

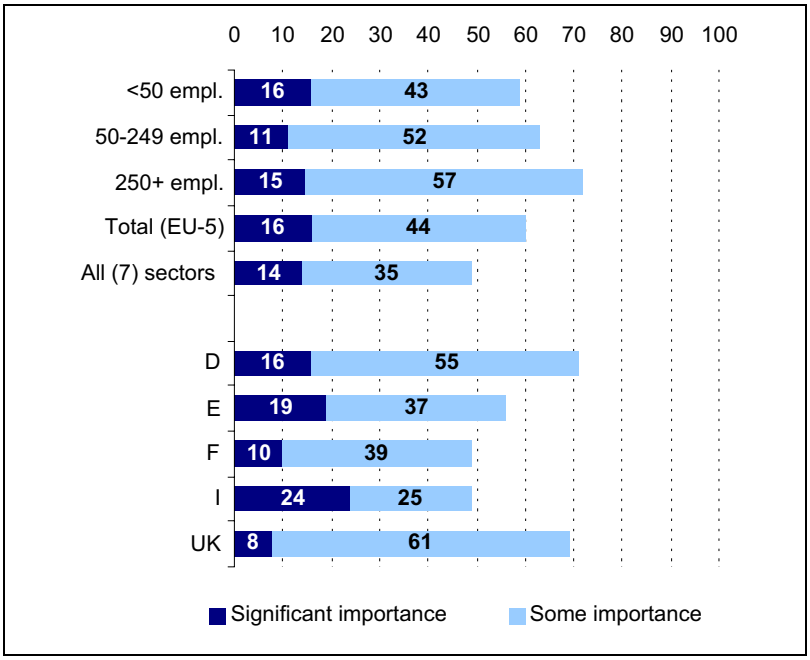
The perceived importance of e-business in 2003

Consequently, e-business has already gained wide acceptance in the electronics and electrical machinery industry. 60% of firms in the sector agreed that e-business already has some or significant importance for the way the company operates today. There are no significant differences between large and small companies in this respect. The regional breakdown shows that only France and Italy slightly fall behind in this respect.

Exhibit 5-4: Electronics and electrical machinery: Importance of e-business in 2003 as perceived by companies

Base: EU-5, all enterprises (N=502). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



The overall satisfaction with e-business is high. Almost 90% of firms reported that they are very or fairly satisfied with the overall effects of their e-business activities and initiatives. Only 9% of firms are fairly disappointed, and 2% are very disappointed. Although this provides evidence that most firms actually benefit from e-business, it also shows that success of e-business initiatives is not guaranteed.

5.2.2 E-readiness: ICT infrastructure and skills development

ICT infrastructure

Basic ICT infrastructure (computers, Internet access, e-mail and WWW usage) is available in nearly all firms of the sector. More complex IT network applications, such as Intranet, Extranet, LAN, and WAN, are also widely implemented. However, the more sophisticated network applications only make sense for enterprises that exceed a certain minimum size. Consequently, small firms exhibit much lower adoption rates than large firms in this regard. Large firms also lead in the adoption of remote and wireless access systems to their computer networks. This is also conclusive because only firms that have a computer network (at least a LAN or Intranet) can provide remote or wireless access to this network.

Overall, 38% of employees in the sector work in firms that have Internet access with more than 2 Mbit/s bandwidth. The percentage of enterprises using broadband is almost three times higher for large than for small companies. This is because all Internet users in a company need to share the available bandwidth of the enterprise to access the Internet. Consequently, large firms with many employees have a larger demand for overall bandwidth than small firms with a low number of Internet users. Broadband is most common in Germany, where already 60% of firms have access.

Exhibit 5-5: Electronics and electrical machinery: Availability of IT infrastructure

Available ICT infrastructure	All (7) sectors°	Electronics and electrical machinery			
		Total°	<50 empl.	50-249 empl.	250+ empl.
Computer usage	93	99	99	100	100
Internet access	87	98	97	100	98
E-Mail usage	83	98	96	100	98
WWW usage	77	95	87	97	98
Intranet	49	77	39	71	90
Extranet	17	25	6	21	31
LAN	61	89	63	92	96
WAN	34	57	9	31	77
Remote access *	43	63	27	51	77
Wireless access *	14	27	7	14	37

Base: EU-5 (D, E, F, I, UK), all enterprises (N=3515 for all sectors and N=502 for electronics and electrical machinery), except*: enterprises using computers (N=3318 for all sectors and N=498 for electronics and electrical machinery).
Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising …% of employees").
Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

IT skills development

The overwhelming majority of European enterprises in this sector support some kind of networking and IT skills development of their employees. 93% of sector employees work in firms that provide some kind of computer training, with only slight deviations across the five countries.

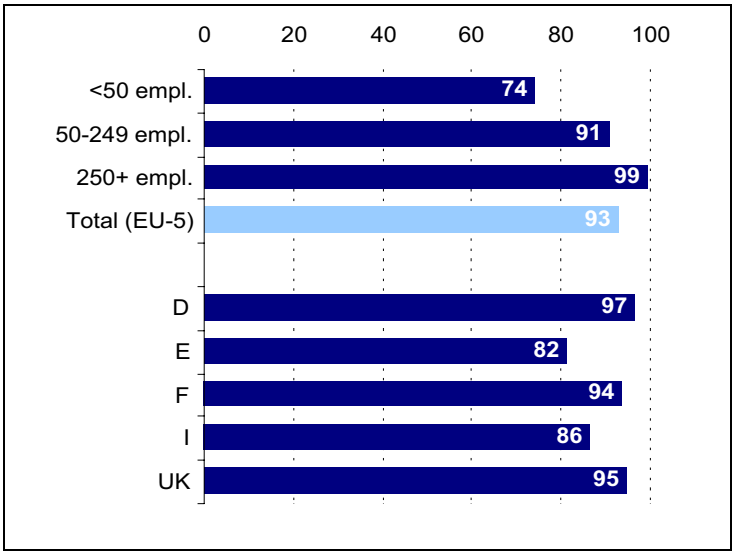
In large and medium-sized companies, in-house computer training, IT training offered by third parties, and allowing employees to use working time for learning activities are all equally common. Roughly 75% of large enterprises offer at least one of these training measures. Small companies, however, show a different pattern. Even though 62% of small enterprises allow their employees to use working time for learning activities, only 31% (32%) of them offer in-house computer training (IT training by third parties). Obviously, small firms do not take such a structured approach to training their employees in IT skills than larger firms do.

Exhibit 5-6: Electronics and electrical machinery: Companies supporting any kind of networking and IT skills development

Base: EU-5 (D, E, F, I, UK), all enterprises (N=501).

Figures for EU-5 total and for countries weighted by employment ("enterprises comprising …% of employment offer support"). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



5.2.3 Adoption of online technologies for internal business processes

Internal collaboration

The industries covered in this report are already very advanced compared to other sectors in the usage of online technologies to support internal processes. The sector average for electronics and electrical machinery is clearly above the all sector average for all applications listed. The most widely used application is sharing documents online and performing collaborative work using the Internet. 30% of firms in the sector currently use this basic application. E-learning and tracking working hours and production time through online technologies is used by 10% of companies in the sector. Automatic reimbursement of travel cost and support of human resource management with online technologies is used in 5% and 7% of sector enterprises respectively.

The technologies listed in the following table are explicitly used to make internal processes more efficient and cheaper. This is particularly relevant for large firms, where many people perform these processes on a regular basis. The advantages of these technologies for small firms are, however, limited in relation to the required fixed investments. Consequently, all of these technologies exhibit a clear usage bias towards large enterprises, e.g. with a factor nine difference between usage rates of automatic travel cost reimbursement in large and small firms.

Exhibit 5-7: Electronics and electrical machinery: Usage of online technologies

Online technologies used	All (7) sectors	Electronics and electrical machinery			
		Total	0-49 empl.	50-249	250+ empl.
To share documents / perform collaborative work	19	30	28	49	64
To automate travel reimbursement of employees	3	5	4	10	37
To track working hours and production time	6	10	9	34	45
To support the human resources management	5	7	6	22	49
For e-learning	7	10	9	11	36

Base: EU-5 (D, E, F, I, UK), all enterprises (N=3515 for all sectors, N=502 for electronics and electrical machinery). Figures in % of companies. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

Customer Relationship Management (CRM) and Supply Chain Management (SCM)

CRM and SCM software solutions are more frequently used by large firms, because both applications require substantial up-front investments. SCM aims at reducing inventories and optimising the flow and timing of supply along the value chain. Saving potentials are increasing with the scale of production of a company. CRM is a tool used to optimise the management of customer relations for companies where individual customer contact is not possible and needs to be complemented by electronic means of communication. The goal is to reduce process costs, increase customer satis-

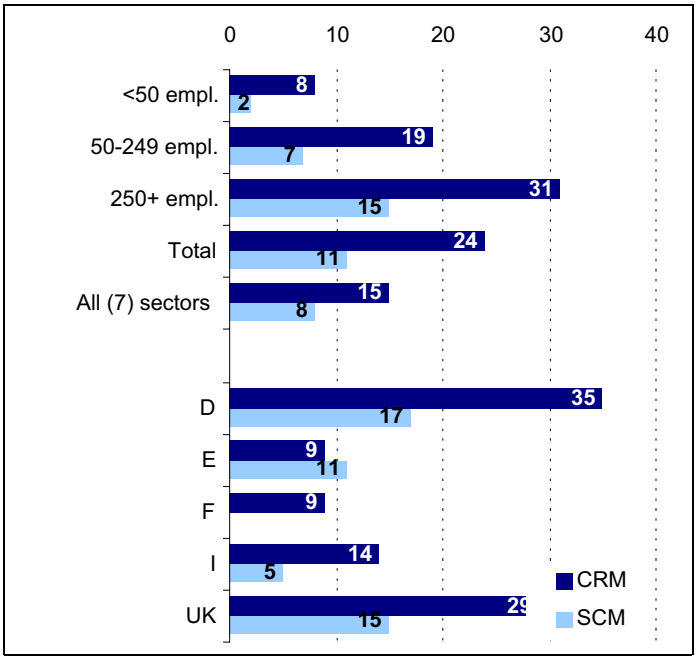
faction, and make optimal use of information about customers. Again, potential benefits of CRM increase with the number of customers and thus with the size of the company. Large firms use CRM and SCM tools therefore more frequently than small firms.

Exhibit 5-8: Electronics and electrical machinery: Usage of CRM and SCM systems

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for EU-5 total and for countries weighted by employment ("enterprises comprising …% of employment"). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



The country breakdown shows that enterprises in Germany and the UK are leading in the adoption of SCM and CRM tools, whereas Spain, Italy, and France report comparable, lower figures.

CRM has gained a much wider acceptance than SCM. 24% of enterprises in the sector already use CRM, compared to 11% that use SCM. Interviews with sector experts indicated that SCM is frequently regarded as too complex and difficult to implement to gain wide acceptance in the industry.

5.2.4 Processes of the extended enterprises

With “processes of the extended enterprise” we mean all activities that are neither purchasing or selling, but still involve interaction, collaboration and exchange of information with people or organisations outside of the company itself. This includes activities such as collaborating with business partners to design new products, to forecast demand, manage capacities, negotiate contracts, or exchange documents. Online technologies are available to support these processes.

In this area, the electronics and electrical machinery industry exhibits usage figures that are also clearly above the average of all seven sectors. Exchanging documents with suppliers and customers are the most frequently used applications, being used by 47% of enterprises in the sector respectively. Using the Internet for these purposes does not require the set-up of expensive and sophisticated software. Consequently, these applications are being used regardless of enterprise size-classes.

Online collaboration with business partners to design new products and to negotiate contracts are conducted by approximately every fifth enterprise in the sector. Using the Internet to manage capacities and forecast product demand is not yet very common – only slightly more than 10% of enterprises in this sector make use of this application. A reason might be that implementation of such systems is very complex and costly.

5.2.5 Purchasing

The survey carried out in 2002 already demonstrated that purchasing online is one of the most widely used e-business applications in the sector. This was confirmed by the recent survey from March 2003. Approximately 55% of enterprises in this industry already purchase goods or services over the Internet

(comprising 59% of sector employees). The UK and Germany lead with participation ratios of well over 70%, followed by Spain (53%), Italy (43%), and France (32%). The low number of firms stating that they plan to start purchasing online by March 2004 seems to indicate that the diffusion of online purchases is approaching saturation levels.

Exhibit 5-9: Electronics and electrical machinery: Companies making online purchases

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for EU-5 total and for countries weighted by employment ("enterprises comprising …% of employment"). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*

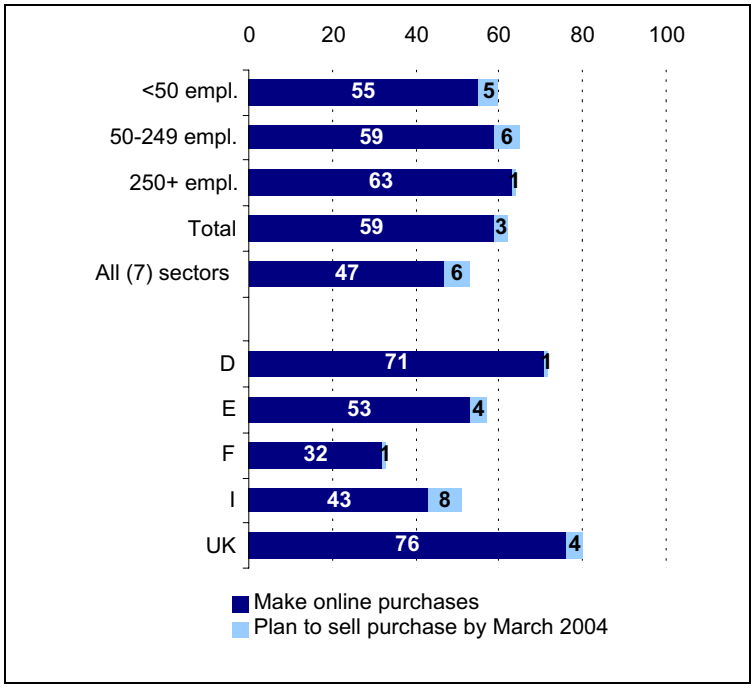
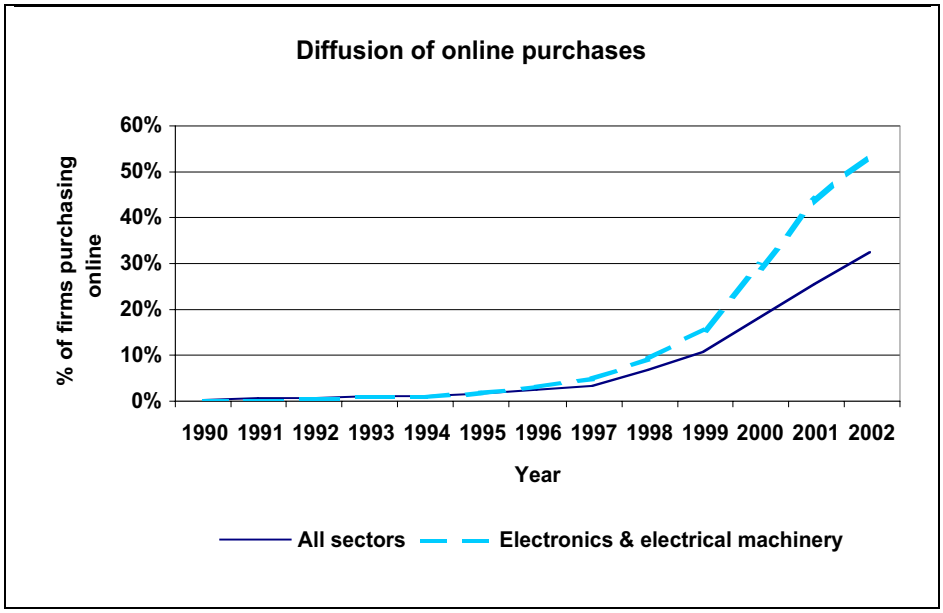


Exhibit 5-10: Electronics and electrical machinery: Diffusion of online purchases

Base: EU-5 (D, E, F, I, UK), enterprises purchasing online and reporting date of first activity (N=1284 for all sectors, N=236 for electronics and electrical machinery).

Figures in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



The electronics and electrical machinery industry had a head-start in introducing online purchases. Adoption gained momentum in 1999, when 15% of companies in the industry already purchase online. In 2001, the number had already increased to 45% of firms. Since 2001, the diffusion process seems to slow down again and it can be expected that it will reach its saturation level in approximately three to four years. However, interviews with sector experts pointed out that these extremely high diffusion figures need to be put into perspective: Despite promising diffusion figures, utilisation levels of the more complex e-procurement systems are often not yet very high. To reach positive ROI, bundling of best-in-class suppliers, re-design of company internal processes, and continuous activities to raise utilisation levels are indispensable. As a result, active support of senior management is needed to reach these objectives.

Also, the fact that a firm declares that it purchases online does not say anything about the relative importance of online purchases compared to the total purchasing volume of a company. In fact, the relative share of online purchases is still rather low. 45% of the enterprises that purchase online report that the online share of their purchases is below 5% of their total purchasing volume. Only 9% of companies that purchase online say that more than 50% of the total volume is procured online, and such high online transaction volumes are usually reported by small firms.

B2B electronic marketplaces

As an alternative to company-specific e-procurement systems, firms can also participate in independent third-party or consortium-led online marketplaces. They are cheap to use and often offer implementation services to their participants for free. Another advantage is that well-established marketplaces which have reached critical mass provide access to potential customers and offer buyers greater transparency about price levels and availability.

But this high level of transparency can be a disadvantage for sellers because it lowers their ability to bargain with customers and often gravitates competition to prices, leaving sellers with lower margins. In addition, participating in public marketplaces can have negative side effects for sellers on their long-standing relations with other customers. For example, a firm which tries to sell over-capacities on an online marketplace, at a price level that is close to or even below the price level negotiated with a long-standing customer who believes himself to be purchasing at a good price, might experience conflicts: If such low-price transactions become known to the long-standing customer, trust or even the entire business relationship could be jeopardised.

According to a PriceWaterhouseCoopers (PWC) study, the electronics industry is leading in e-marketplace usage. PWC argues that the close relationship between e-business and the products of the electronics industry is one reason for the leading role of the industry in online marketplace adoption. Secondly, many typical components needed by the electronics sector are predestined for electronic trading. For example, semiconductors are easily describable, highly standardised, easy to transport and to store, which makes them suitable for trading over long distances in general. The high volatility of chip prices also creates a need for market transparency, which can be offered by good online exchanges (PWC 2002, p. 44). In the PWC survey, more than 100 marketplaces for the electronics industry were evaluated under different criteria, and the following results were found:

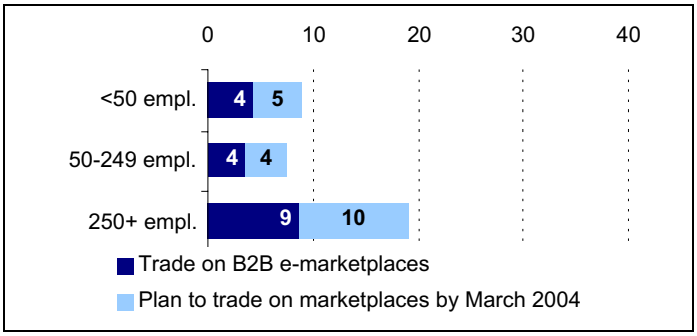
- The number of marketplaces in the electronics industry is higher than in other industries.
- Most marketplaces do not only offer a trading platform, but provide additional information and services as well.
- Integration of back-end-systems, such as inventory control systems, and of elements of users' supply chains, such as logistics, finance, insurance etc., is a weakness of most marketplaces. Users often have to adapt their systems to the marketplace which is costly and time-consuming.

Despite the high level of sophistication of e-marketplaces in the sector, the number of firms actually using B2B e-marketplaces is still limited. Less than 5% of all enterprises in the sector currently participate in an online marketplace, showing no upward trend since the last survey in June 2002.

Exhibit 5-11: Electronics and electrical machinery: Participation in B2B e-marketplaces

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



5.2.6 Marketing and sales

66% of companies in the electronics and electrical machinery sector have a website. This is significantly more than the all sector average (45%). 22% of these enterprises make use of a Content Management System, compared to 29% in all sectors. This indicates that although websites are more frequently existent in the electronics and electrical machinery sector than on average, a large share of enterprises seems to maintain rather static web content such that a CMS is not as widely needed as for instance in the tourism sector.

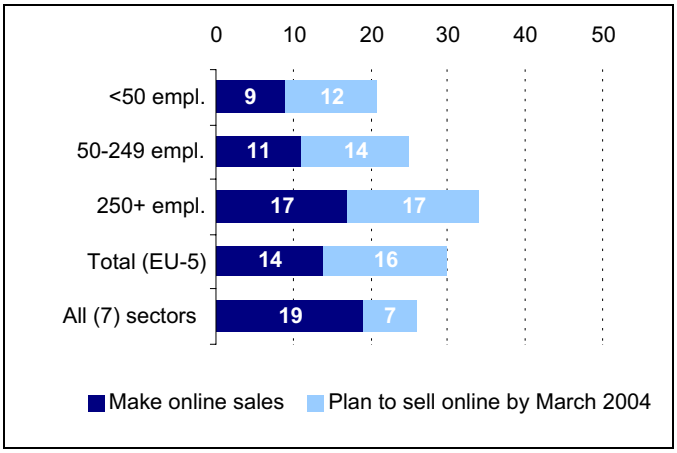
Enterprises that actually sell online are still rather rare, even though the sector is among the most intense users of e-business technologies. Currently, 9% of all enterprises in the sector sell online – 17% of large firms, 11% of medium-sized firms, and 9% of small enterprises. Together, these enterprises represent 14% of the sector employees. A large number of enterprises currently plans to start selling online by March 2004. If these plans are realised, the number of firms selling online could more than double within the next 12 months.

Exhibit 5-12: Electronics and electrical machinery: Companies selling online

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for totals are weighted by employment ("enterprises comprising …% of employment "). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



About every fifth company that sells online receives orders through an IT system that is integrated with a specific customer (for instance with e-procurement or SCM systems). Only 17% of enterprises in this sector say that their online sales are fully integrated with their back-end system (for example ERP). In the majority of enterprises selling online, an incoming order simply generates an automatic email or a fax that is then processed manually in some way (55% and 17% respectively). Consequently, only a smaller share of enterprises reports that online orders trigger some kind of business process (25%). The sophistication of online sales integration is significantly higher in large enterprises than in small ones. This makes perfect sense because the main reason for integration is to decrease process cost and to achieve data consistency, which is not such a high priority in small firms with limited number of orders coming in (small firms). In addition, implementation of such systems requires a highly developed IT infrastructure (including Intranet, ERP, and standardized processes), is costly (e.g. programming of middle-ware and interfaces) and therefore less suitable for small firms.

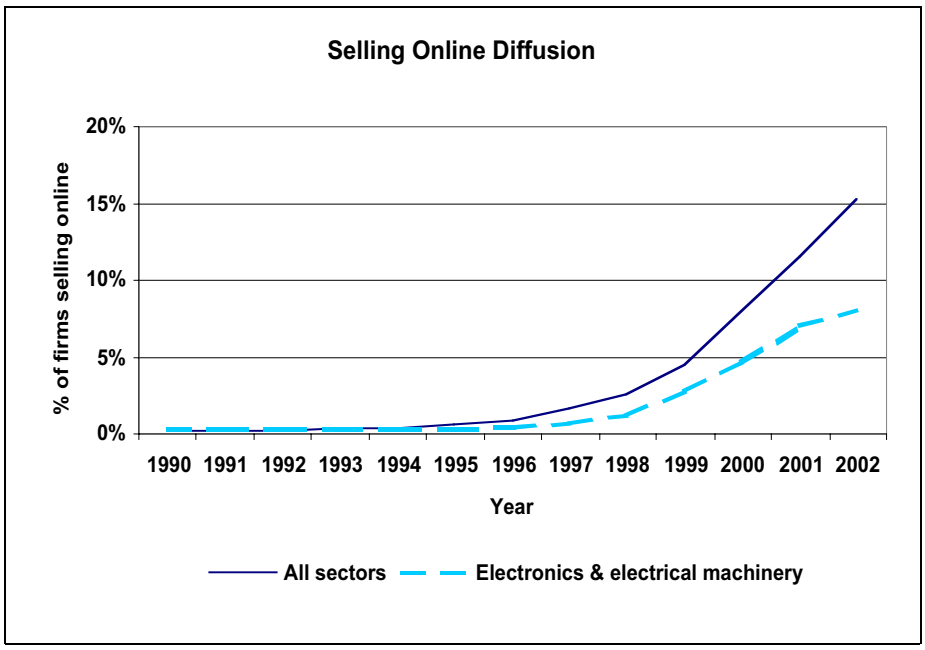
Roughly every second company that offers online sales uses a save communication protocol for transactions (SSL), while every third company offers online payment options. The chart below shows the diffusion of online sales over time, compared to the all sector average. The all sector average is turned up by three of the seven sectors that exhibit particularly high usage rates of online sales (tourism, retail, ICT services). Compared to this average, the electronics sector is currently lagging behind. However, the diffusion of online sales still exhibits an intact upward trend.

Exhibit 5-13: Electronics and electrical machinery: Diffusion of online sales

Base: EU-5 (D, E, F, I, UK), enterprises selling online and reporting date of first activity (N=455 for all sectors, N=46 for electronics and electrical machinery).

Figures in % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



5.2.7 E-business development 2002 – 2003: main trends

There are hardly any statistically significant changes from June 2002 to March 2003. The majority of percentage changes (for online sales, online purchases, CRM, SCM, B2B online marketplaces) are within the respective confidence intervals.[1] This means that we cannot reject the hypothesis that differences are merely due to the fact that different companies were interviewed in both survey rounds, although selection was based on the same sampling procedure. Practically speaking, the time interval between both survey rounds was rather short for deriving statistically significant changes. However, this is a methodological issue for quantitative surveys and does not imply that e-business development has slowed down or even stopped. On the contrary, results from the new survey suggest that e-business diffusion still continues at a rapid rate.

Firstly, the figures presented in this report show that the electronics sector is already advanced in e-business usage and continues its development from a comparatively high base. Time-series diffusion figures show that we still exhibit an intact upward trend for usage of online sales and online purchasing. Plans of companies indicate that online sales, B2B marketplaces, CMS, CRM, and website usage could gain further momentum in the near future, whereas online purchasing is already so common that this application exhibits only small growth rates and begins to approach its saturation level.

The utilisation levels of online purchasing and online sales systems still appear to be rather low, the majority of firms purchases and sells less than 5% of their overall volumes over the Internet. In particular e-catalogue based systems often lag initial expectations and make reaching positive ROIs a long-term objective for many firms. To realise all the benefits of e-procurement and online sales, support of senior management and continuous activities to raise utilisation levels remain indispensable.

38% of enterprises plan to increase their e-business spending, while only 1% plans a decrease in the next 12 months. The remaining 57% plan to keep their e-business expenditures at the current level. Compared to the last survey round, this is a significant increase in companies reporting that they plan to spend more on e-business in the near future. In particular, Italy and Spain exhibit a high share of companies planning to increase e-business spending. This amplifies the impression that e-business development is still dynamically progressing and far from having reached its full potential yet.

[1] Two indicators exhibit sign. decreases: E-learning and HRM. We attribute the changes in e-learning and HRM to a slightly different way of asking about these applications in the questionnaire.

5.3 Conclusions

The electronics industry in particular is very suitable for e-business because of the high degree of standardisation of products, globalisation of production, and specialisation of firms along the value chain. In addition, this sub-sector is naturally IT-savvy and pre-destined to be open to experiment with new technology-driven management solutions. Consequently, the entire sector is among the early adopters and already advanced in the usage of e-business. Within the sector, the electronics industry is clearly more advanced than the electrical engineering industry.

5.3.1 Economic implications

The most important changes are perceived with respect to internal work processes and relations to suppliers, where already substantial impacts seem to have occurred. 39% of sector employees work in companies where e-business has already changed internal work processes.

Electrical machinery and electronics: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **Increased efficiency of business processes**: E-technologies can lead to greater speed and efficiency of procedures, for example by improving internal information flows, or automating procedures. They therefore create opportunities for cost savings. The potential for cost savings increases when procedures are carried out by a large number of people and with high frequency. Thus, there are economies of scale which make these sort of applications especially attractive to large firms where overheads might be reduced. Examples are online tools to automate travel cost reimbursement or human resource management. • **Bulk discounts**: Bundling of internal orders via an e-procurement system can help to achieve higher bulk-discounts from suppliers, and thus reduce costs. • **Access to information**: E-technologies can also provide access to new resources, channels, and information that would otherwise not be available. Thus, they create opportunities for improving decision making or expanding business opportunities. Examples are online B2B market-places, websites and online shops for reaching customers on a global basis. • **Better collaboration**: Advantages can be gained from a better collaboration with suppliers and customers. Outsourcing and specialisation are enhanced, and strong strategic partnerships can be built in an industry group. Globally dispersed business units can be connected and integrated in efficient communication platforms. Experience shows that customer satisfaction and loyalty can be increased if e-commerce channels are offered and used.	• **Complexity**: Implementation of e-business solutions is not trivial. Sometimes, the system simply does not function as proposed, or the training of employees is insufficient to make it work effectively. The new system may also prove incompatible with other existing systems and processes. • **Investment risks**: The considerable investments required for many e-business solutions could eventually be better applied to other areas of operation, such as product development etc. Hence, investments involve opportunity costs. • **Eroding profit margins**: Market transparency involves the risk of eroding profit margins. Suppliers often seem to fear that e-business will increase the pressure on prices and margins. This provides lowest cost producers (usually large firms) with an advantage, at the expense of firms competing primarily based on personal service, high quality, or generally higher cost structures.

Enablers	Barriers
• **Propensity to IT issues**: The electronics industry is naturally IT-savvy, has a high degree of IT competence, and is willing to experiment with new technology-driven problem solutions. • **Pressure to decrease costs**: Intense competition creates pressure to experiment with new ways to improve cost structures, production and engineering, products and customer service. E-business provides a set of powerful tools for these objectives and can thus become an important competitive asset. • **Access to technology** is not a problem. Necessary IT infrastructures are widely implemented and used.	• **Implementation costs** are a barrier to e-business initiatives, especially for firms with constrained budgets. • **Need to re-engineer business processes**: Although this is an opportunity to improve overall business performance, it often involves changes to the work routines that can easily lead to conflicts. • **Return on investment issues**: Investments of e-business initiatives have to be justified by positive ROIs. On the other hand, business cases that rely purely on cost saving arguments often underestimate the potential benefits of initiatives that can also consist of soft factors (such as customer satisfaction, or greater ease of doing things) and, thus, slow down e-business adoption.

Implications for the industry structure

Dual impact on SMEs

Industry-wide implementation of e-business has a dual impact on SMEs. The typical cost-benefit structure of e-business projects seems to imply that large firms can more easily profit from e-business than small firms. But even large firms cannot fully exploit the advantages of external e-business applications (such as e-procurement and SCM) without winning the support and co-operation of their suppliers and business partners.

Consequently, small firms are often confronted with external pressure and incentives from their larger business partners to join e-business initiatives. This offers benefits for them, such as maintaining or even amplifying good relations with their large customers. But it also creates problems, such as having to deal with implementation and maintenance costs, often increased price pressure and lock-in effects to consortium-led marketplaces or single customers.

Although the conflicts between business partners in implementing industry-wide e-business are less pronounced in this sector than in some others (for instance, the automotive industry), evidence through interviews, case-studies and publications still support the argument that e-business adoption in SMEs is not just a straight and easy road to success, but creates challenges that require careful judgement and action. In fact, lock-in to certain customers or solutions might limit the strategic options of smaller firms. Increased price pressure usually intensifies the trend towards consolidation – that is, the emergence of a small number of price leaders at the expense of less cost-efficient (usually smaller) firms.

E-business further speeds up globalisation and specialisation

At the sector level, it is likely that the Internet and e-business solutions will further speed up the process of globalisation and specialisation. These trends towards specialisation (both of firms and of economic regions) should exploit comparative advantages and thus improve the overall sector productivity and economic growth.

Exploiting comparative advantages does not lead to equal benefits

However, this does not automatically mean that all regions and all firms will benefit equally. Exploitation of comparative advantages does involve re-allocation of production and development facilities to regions with especially profitable surroundings. The re-allocation of chip and component manufacturing facilities to Asia and the emergence of CEMs during the last decade is such a consequence. In the electronics industry, further specialisation and outsourcing enabled by e-business could eventually contribute to a further disintegration of individual firms, strengthen the position of highly specialised firms, service providers and contract manufacturers. On the other hand, high value-added research, engineering, and development tasks often remain in the high-skill industrialised European countries. The electrical engineering industry in particular is likely to remain a strong presence in Europe.

5.3.2 Policy issues

Improving the competitiveness of European regions as a prerequisite to increase ICT manufacturing

The ICT-manufacturing sector experienced dynamic growth and contributed considerably towards GDP, productivity growth, and employment. However, ICT production is a global business that exploits comparative advantages of regions. Therefore, in order to maintain or increase ICT-manufacturing in Europe, the competitiveness of European regions needs to be continuously improved. The production and development of ICT goods is globally mobile. The industry is increasingly taking advantage of specific economic conditions in different regions, forming globally dispersed production and know-how clusters. The implementation of industry-wide e-business will further contribute towards this trend. Competition takes place not only between firms, but also between economic regions. Obviously, Europe will not be able to compete with the rest of the world based entirely on lowest wages. Instead, European policy can focus on providing high quality infrastructures, improving education and schooling schemes, ensuring legal systems that allow for intense but fair competition and trade, supporting regional innovation and production clusters, and contributing towards a stable but not over-regulated legal environment.

Providing the required e-business skills calls for a change in education strategies and schemes

A lack of e-business skills is often said to slow down e-business adoption. The main difficulty for businesses in this respect is the requirement to train users every time their work routines are changed and new software packages – each with unique functions and properties – are implemented. Re-training of staff and re-organisation of business processes are part of the implementation costs for e-business initiatives. Continuous re-qualification requirements throughout the entire employment biography are an essential characteristic of a knowledge-based economy.

However, this calls for a change in education paradigms. A good basic (university or technical) education is still of very high importance, but no longer sufficient for most people to cope with the rapidly changing challenges of modern work life. Part of the responsibility (and incentive) to educate employees lies with the enterprises. In some countries firms seem to be better at this than others (Finland is a best case scenario, see 1st sector report No. 11-I). However, even extensive educational efforts by employers cannot make up for deficits in basic education. In addition, the role of public policy in “life long learning” has still to be defined. Questions of organisation, financial responsibilities, quality regulation and certification as well as models of public/private partnership are issues to be discussed in this context.

Exploring the long-term impact of e-business: the need for continuous research

Continuous research is needed to assess the progress and impact of ICT and e-business to better understand the impact of ICT investments and e-business on sector structures, market dynamics, market failure, and macro-economic indicators, such as productivity and employment. Research should be based on sound economic theory and high quality empirical data, provided by independent research organisations that do not have a commercial interest in promoting specific trends or solutions. The *e-Business W@tch* provides a good basis for these objectives and should also enable efficient communication of research results to the wider public. The results of the *e-Business W@tch survey* should be further used in scientific research to improve our understanding of the questions outlined above.

References

3G – 3G News Website (11.02.2003): "Wireless Hotspots Hit 327% Growth in 2002", http://www.3g.co.uk/PR/Feb2003/4863.htm.

PWC - PriceWaterhouseCoopers Unternehmensberatung GmbH (2002): "Elektronische Marktplätze: Chancen und Risiken für Betreiber und Teilnehmer", http://www.pwcconsulting.de/misc/getattach.asp?id=704.

VDA – Verband der Automobilindustrie (2003): "Auto annual report 2002", http://www.vda.de/en/service/jahresbericht/auto2002/index.html.

VWD – Vereinigte Wirtschaftsdienste (11.03.2003): „CEBIT/BITKOM: WLAN hat Potenzial zum Massenmarkt", http://www.vwd.de/vwd/news.htm?id=20448672&navi=home&sektion=branchen&r=0&awert=elektroindustrie.

VWD (20.03.2003): „Elektroindustrie mit Umsatz-Minus - Weitere Investitionen im Ausland erwartet", http://www.localglobal.de/sixcms/detail.php?id=356724&_t=branchen&_inhalt=elektro%2C%20mechanik%2C%20optik.

B.6 The retail sector

6.1 Economic profile and trends

The *e-Business W@tch* analysis focuses on the retail trade, particularly retail sales in non-specialised stores with a prevalence of food and beverages (52.11) or non-food items (55.12), or in stores specialising in the sale of new goods other than food and beverages or cosmetics and pharmaceuticals (52.4).

Exhibit 6-1: Structure of the retail trade sector (G52) in the EU 2001

NACE Rev. 1		Turnover	No persons employed
		Euro (m)*	persons*
52.1	Retail sale in non-specialized stores	816.153,7	4.199.272
52.2	Retail sale of food, beverages, tobacco in specialized stores	117.667,8	1.136.900
52.4	Other retail sale of new goods in specialized stores	720.231,9	5.449.571
52	Retail trade, repair of personal and household goods	1.960.951,2	12.542.424

* EU-13 = EU-15 excluding Greece and Ireland.

Source: Eurostat New Cronos, estimates by DIW Berlin.

The retail sector plays an important role in the economy of the EU, in which it represents 30% of companies (4.7 million units), 16% of the jobs, and 13% of GDP and added value. It comprises retail and wholesale trade, specialised and non-specialised stores. There are a significant number of medium-sized enterprises, a few very large multinational enterprises, and numerous small independent traders.

The sector is polarised between a very large number of SMEs and a few large enterprises which exploit economies of scale, using large distribution outlets with centrally co-ordinated distribution networks. The competitive scenario of the past decade has been influenced strongly by the strategies of the largest players. Most of the biggest European food retailers figure amongst the 50 largest business groups in Europe.

Taking a closer look at the distribution structure and shares in grocery distribution – the most important category in non-specialised distribution (NACE 52.1) – it is apparent that the productive structure is rather fragmented in countries like Spain, Italy, Portugal and Greece, where so-called traditional retail outlets account for a particularly large percentage (between 75% and 90%) in terms of numbers but only a very small share of the market.

With the exception of Ireland and Italy, where the level is slightly lower, modern distribution has a market share of at least 90%, demonstrating that the European distribution system – with slight differences in the incidence of the different forms it may take in the various countries – is dominated by modern distribution. The structure of the formula is association and/or integration, in some cases preserving independent company operation but striving to achieve efficiency, organisation of processes, and economies of scale.

Consolidation and rationalization

In recent years the retail trade sector has undergone a deep-seated reorganisation of supply.[2] In Western Europe the sector is now undergoing a process of consolidation and rationalization, both as a result of the general slowdown in consumption and due to the dynamic of rapid growth in the action of a number of chains. This need is directly affecting network technologies, called upon to play an important role in the process of commercial and administrative integration of previously separate entities.

The general slowdown in growth of consumption in the EU nations and the difficulties some dealers are having making sufficient income, reveal the need for rationalization of activities, through attempts

[2] cf. *e-Business W@tch*, Sector Impact Study on Retail No. I: Background, issues and key figures. October 2002.

to improve network efficiency, cut structural costs and improve financial structure (less capital tied up in relation to turnover).

Prospects for widening the European Union to include central and eastern European nations are already driving this thrust for expansion in that direction in the short term. For adhesion to a common legislative framework eliminates the barriers posed by a number of candidate nations to commercial penetration by big European retailers. At the same time, the issue of the balance between small local businesses and large organized enterprises in the trade is revealed as somewhat problematic, as the two forms will soon find themselves facing off.

Rediscovery of the neighbourhood formula

Demand, on the other hand, is feeling the impact of the rediscovery of the neighbourhood formula and a drop in appreciation of stores which are growing larger and larger. Despite the fact that inflationary thrusts and slowdown are increasing consumers' awareness of the price factor, hypermarkets are performing poorly, or at least worse than the other formats, on the main European markets. The reasons lie in the fact that points of sale such as supermarkets, which allow customers to achieve the savings typical of modern stores with all the convenience of a store located close to home, are attracting increasing attention in comparison with formulas such as the hypermarket which emphasise economic savings but cannot, for structural reasons, satisfy the criterion of convenient location.

Recent trends and prospects for intermediate (from the size point of view) formulas, favoured by dynamics in demography (ageing of the population) and legislation (legislation regarding selling below cost and opening of large stores) may be interpreted as a positive signal for promotion of e-commerce. It is true that these formulas overlap with an important basic need which is satisfied by online sales (the need to save time), but on the other hand, it is also true that they confirm the presence of potentially significant demand even for relatively common products, and that the e-commerce could be based on more than just competitive prices and availability of an assortment which cannot be found in physical stores.

Exhibit 6-2: Supermarkets and hypermarkets: increases in sales over the previous year

	1999	2000	2001	2002 (six months)
Hypermarkets	+2.8	+3.4	+1.9	+1.2
Supermarkets	+3.5	+5.5	+4.5	+2.8

Source: Agra processing of FCD – Féderation des enteprises du commerce e de la distribution - data

Another evolutionary aspect which may affect the success of e-business in the sector is represented by the growing popularity of demand in relation to products with private labels.

Growth and competition in private retail labels

According to a survey conducted by Plma (the private label manufacturers' association) in 2002 (Retail Trend 2002), 90% of retailers intended to expand on the private label component of the supplies they offer. The survey also revealed that private labels compete horizontally (other stores' private labels). Expert observers have deduced that competition in the future will be based not only on price but also on products' and brands' added value. For the purposes of this study we may deduce that, while growth in private labels in general offers fertile ground for the exchange of relationships and information between retailers and suppliers, the potential qualitative evolution in supplies could shift this relation framework from the exclusive field of logistics to a broader scope of definition of the characteristics of the supply (just think, for example, of the potentiality of ICTs not only for interaction between buyers and suppliers, but also for testing and the refinement of product features).

Partly related to this, in that it has the same impact on the evolution of the supplier pool and on how it relates to distribution chains, is polarisation of demand between the global brands which are increasingly strong and representative in terms of market shares and the emergence of new niche markets (for example, organic, vegetarian, fair trade, ogm free). The niche markets are generating a need to set up supply relationships with new counterparts. Suppliers will most likely be able to expand their geographic range due to their greater added value with respect to conventional products, but also

due to the fact that niche products tend to reach an optimal production scale more easily on a broader scale than the regional or national. This development may also have a positive impact on the use of e-business tools (for instance electronic marketplaces, web-EDI) for identification of new sources and in continuing relations with them.

Food distribution will also increasingly be affected by the issues of traceability and food safety in general, which are also affecting intermediate suppliers (logistics companies above all). In the future we may see the emergence of an element which identifies not only the characteristics of a product but the history of its movements, and which will allow identification of the party responsible at any point in the value chain at any time. This element combined with the evolution of the bar code system into the electronic label, multiplying its functions but also the number of parties involved in sharing operating costs (suppliers of various kinds and inspection authorities).

6.2 Usage of ICT & e-business in 2003

6.2.1 The role of ICT and e-business

The structural and evolutionary characteristics of the retail sector give e-business a very important role. In addition to the necessity of upstream integration in the supply chain and of downstream communication with the customers, what is peculiar to retail, particularly in the case of larger companies, is the connection and the exchange of information within the same company, as a consequence of network organization of the points of sale and distribution networks. In this regard, an important variable involves the size of the company, considering the substantial differences between small enterprises and large retailers in terms of organisation, competitive strategy, cost structure and the creation of value.

In addition to this element is a high degree of complexity dependent on the large number of products and on decision-making timeframes that are under enormous pressure due to the need to optimise the balance between service (constant availability of goods in stock) and efficiency (minimum inventory). The information technology of trade enterprises is thus structured as a full-fledged production technology that affects the productivity and flexibility of physical processes.

Drivers for the adoption of e-business

The evolution of the competitive scenario of this sector represents a driving element toward the spread of ICT in the retail sector and the changeover to procedures for performing company functions and activities with the support of new technologies. In fact, the sector is concerned by an increased competitiveness, that entails the need to streamline and lower the costs of large retail companies and at the same time, the need to differentiate one's offer in order to partially divert the competition from the price factor.

The concentration process and increase in average business size has made the organisations increasingly complex, thereby increasing the need to exchange and optimise information on a domestic and international level.

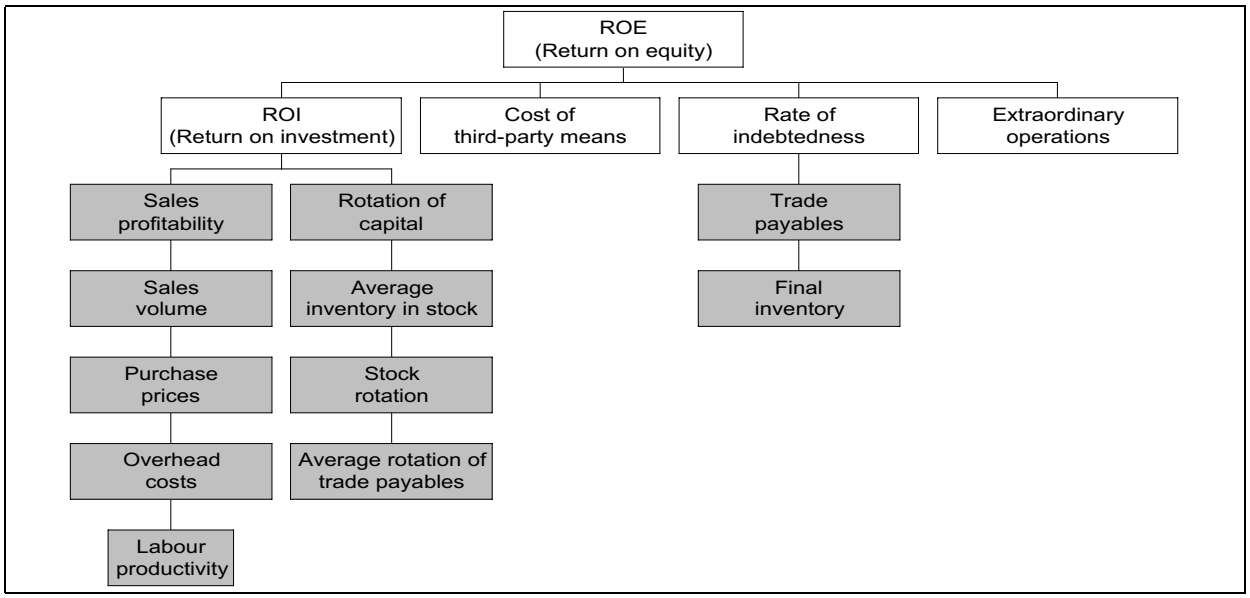
To understand the adoption of e-business in retail, it is important to consider that the sector is characterised by rather low sales margins. Competition is therefore based on the reduction of purchase prices and on the optimisation of stock of products (and capital) required to generate a certain turnover.

These dynamics underscore the fact that the critical processes of companies in this sector involve procurement and the management of logistical flows: these are precisely the processes that are most involved in the diffusion of e-business.

Personnel represent another important cost item for a distribution company. From this standpoint, computerising orders and automating warehouses will help reduce the cost of personnel involved in handling merchandise and payment transactions.

The diagram below highlights the elements that can directly be influenced by the e-business solutions adopted by firms, as part of the mechanism for generating value for these companies.

Exhibit 6-3: Impact of e-business solutions on determinants of ROI



Source: Databank Consulting

E-business applications carry out the dual goal of improving the profit margins and overall efficiency of the system. In fact, the main areas in which retailers are investing in applications are (i) supply chain configurations, (ii) management of store operations and (iii) interaction with customers. The latter can sometimes lead to the creation of a true sales channel as an alternative to the physical one.

The main e-business applications lead to a redefinition of the value chain of this sector, which entails a reduction of the phases upstream from the sales process (from procurement to logistics, and store management), in order to benefit the activities involving interface and building customer loyalty. This area includes online sales.

Perceived importance of e-business in retail

Generally, the importance of e-business for retail is found on a level that is slightly lower than the average of the sector aggregates considered in the *e-Business W@tch* Surveys 2002 and 2003, but it must also be considered that the overall assessment of the importance of e-business in the sector suffers an even more limited penetration of e-business initiatives: as emphasised during the analysis, procuring online involves a total of 26% of the sector's companies while selling 10%. Also relatively elementary functions, such as document exchange in electronic format, present an insignificant penetration, all things considered. More than 40% of the companies are convinced that the new technologies present some (32%) or significant (10%) importance for the sector.

6.2.2 E-readiness: ICT infrastructure and skills development

Adoption of ICT infrastructure

Retail sector IT infrastructures are rather heterogeneous. This characteristic can be essentially traced to the structural differences within the sector: on one hand are the large chains that concentrate sales, financial resource availability for IT and require a high level of integration on the vertical level with suppliers and on the horizontal level among the various points in the sales network; on the other are the small operators, whose availability and needs for horizontal relations do not justify significant investments.

Apart from basic computer equipment (computer usage), in fact, the data regarding network technology penetration point out significant differences between the two realities. Internet access represents a widespread reality that concerns about 70% of the companies and over 90% of medium and large ones. It seems to have almost reached a diffusion peak considering that only an additional 6% of potential penetration exists, based on company statements: a percentage over 20% states that network connection is not included in their plans.

Exhibit 6-4: Retail: Availability of ICT infrastructure (2003)

Available ICT infrastructure	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Computer usage	87	83	83	100	98
Internet access	76	69	69	93	95
E-mail usage	68	59	59	92	95
WWW usage	58	48	48	84	87
Intranet usage	24	23	23	56	58
Extranet usage	6	4	4	22	21
LAN usage	34	30	30	75	81
WAN usage	7	6	6	27	47
Remote Access*	22	17	17	37	37
Wireless Access*	7	7	7	10	15

Base: EU-5 (D, E, F, I, UK), all enterprises except * (N= 3515 for all sectors, N=502 for the retail sector). In % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

The polarisation between the two realities is more evident in the passage from pure access technologies to those that assume an active role in communications. Starting from the diffusion of e-mail usage, this remains substantially aligned with the Internet diffusion between the large companies while the small companies have a higher rejection: about 40% of them probably do not have communication tools other than the "traditional" ones. In other network infrastructures the difference is even more significant, reflecting the importance for the major retailers of the internal exchanges between the points of sale and the head office. This helps to explain a higher diffusion in percentage amongst larger enterprises (81% of them have a LAN and 58% an Intranet).

Wireless access technologies – a large application potential for retail companies

Wi-Fi technology deserves a separate discussion, in the introduction phase both in small and medium sized companies. This type of technology, in fact, is able to revolutionise the overall retailer's organisation since it connects to levels that have been substantially distinct from the infrastructure standpoint to now: the first is represented by the point of sales technology, the second by its integration in the supply chain management. The main potentials of the new technology are identified in the improvement of the overall service efficiency level (with the reduction of stock-outs and the general improvement of the ability to timely forecast demand trends) and the integration with supplier computer systems.

The application potential of Wi-Fi technology is huge particularly for large retailers. According to a survey conducted by IBM during 2002, with a sample of American and European companies mainly composed of organisations with annual sales over 500 million dollars, about half of those interviewed expect the wireless network infrastructure and the use of PDA by personnel or other mobile communications tools to be widely used in their points of sale over the next 24 months. About one third believe that pallet-level radio frequency identification (RFID) tags will be widely enabled in that same time. Only 18% of retailers affirm that electronic labels will never be widely diffused in their points of sale.

Therefore, a rather strong relationship exists between Wi-Fi technologies and the diffusion of an electronic labelling system that would elevate potential, generating a technological revolution for the sector that is comparable to the outdated one which, using the technology acquired from bar codes, introduced the first large automation core in the sector. The electronic labelling system also seems

more technologically suitable to contain information regarding product passage through the production/distribution chain, whose certification could become a central element in the coming years.

The use of wireless technology potentially involves consumers: aside from kiosks, already widely diffused in the same examined sample, the use of PDA or other mobile devices in their points of sale is foreseen in 31% of cases within the next two years but in 60% within 5. Those interviewed also foresee a wide diffusion of systems for payment automation.

The analysis of the typology of connection is more meaningful if carried out paired with the one regarding the bandwidth, that measures the effective potential of the web to be used like a working tool, that is as a technology in a position to assure an adequate capability of data loading and speeding both downstream and upstream. Only 13% of small companies have a bandwidth over 2 Mbit/s. The percentage increases significantly as a function of company size classes. This diffusion must, however, be integrated with two considerations:

- Internet does not represent the only way to transmit data in the sector: it conserves a certain importance, also for a reason connected to the consistency of dedicated investments, EDI network usage as a connection infrastructure for data transmission.
- A more massive diffusion of broadband connections should be expected in coming years, due to the supply evolution by TLC carriers and institutional type incentives.

Band availability is mainly associated with the type of connection adopted by companies, for which only the most significant details are listed: about 60% of companies have a standard analogue or ISDN connection. Connection methods have similar proportions between small and medium sized companies (where ISDN is more popular) changing drastically for large companies where only 6% still conserves connections using a traditional modem.

Exhibit 6-5: Retail: Quality of internet connectivity (2003)

Available ICT infrastructure	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Internet access	87	77	69	93	95
* of those: access with >2 Mbit/s	31	25	13	29	39

Base: EU-5 (D, E, F, I, UK), all enterprises / * enterprises with internet access. N= 3515 for all sectors, N=502 for the retail sector.
Figures for all enterprises / all sectors are weighted by employment, figures for size-classes are in % of enterprises.
Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

IT skills development

18% of companies have recruited (or tried to) personnel with specific IT skills in 2002/03. This figure is rather standard among the various countries and below the all-sector average. Among this group, the percentage of those who met difficulties in finding resources is slightly lower than the average of other sectors. The combined reading of the two aspects can be traced to the fact that IT is not conceived as a group of strictly defined skills structured in specific figures but as an enabling technology whose knowledge is often integrated with other skills within companies. However, sector companies demonstrate a certain sensitivity (62%) in support of their resources in IT and networking skill development. The size element highly affects this data, being a calculated indicator with reference to overall employment: almost all large companies (but also the medium sized ones) started initiatives to increase the IT skills of their employees while only 45% of those who work in small companies enjoy this benefit.

Exhibit 6-6: Retail: Companies supporting IT and networking skills development (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (excl. DK/NA) (N= 3515 for all sectors, N= 504 for the retail sector).

Note: figures weighted by employment ("enterprises comprising…% of employees").

Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

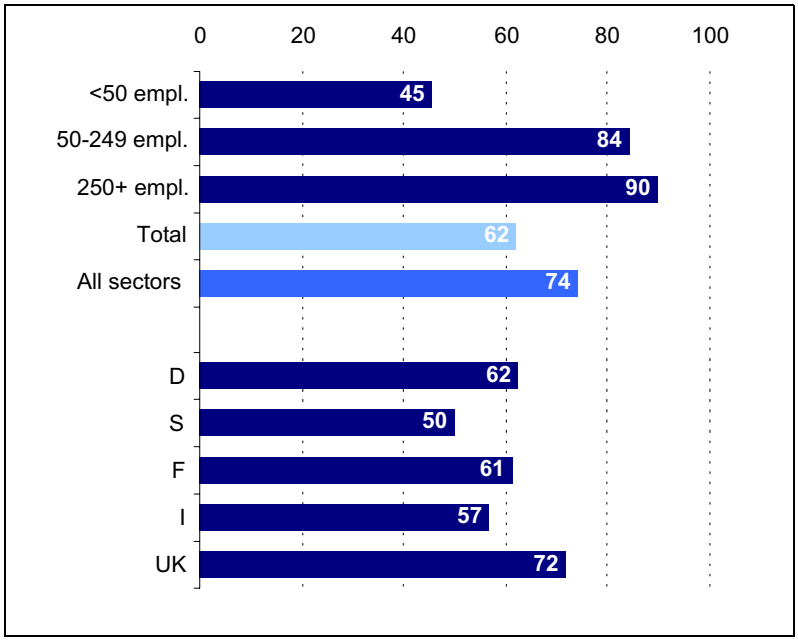


Exhibit 6-7: Retail: IT training offered to employees (2003)

IT training offered to employees	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
In-house computer / IT training	42	29	16	51	51
Computer / IT training by third parties	50	35	25	52	52
Usage of working time for learning activities	59	47	35	62	67

Base: EU-5 (D, E, F, I, UK),all enterprises (excl. DK/NA) (N= 3514 for all sectors, N=502 for the retail sector). Note: figures weighted by employment ("enterprises comprising…% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

6.2.3 Adoption of online technologies for internal business processes

The use of online technologies presents a limited impact for small companies. The only category with a certain significance is represented by the share documents/to perform collaborative work. This process acquires a certain consistency in companies with over 250 employees, even if the values are quite distant from a diffusion that can be considered standard from the internal process organisation point of view.

Exhibit 6-8: Retail: Usage of online technologies (2003)

Usage of online technologies	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
to share documents / to perform collaborative work	19	14	14	33	49
to automate travel reimbursement of employees	3	3	3	9	13
to track working hours and production time	6	4	4	18	13
to support the human resources management	6	5	5	12	18
for e-learning	7	5	5	12	13

Base: EU-5 (D, E, F, I, UK), all enterprises (N=3515 for all sectors, N=502 for the retail sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

The growing integration between administrative and general business organisation aspects (purchasing, supplier relations) and the consolidation prospective of the distribution structure in some countries imply a development of the processes that can be traced to this area in coming years, and for the entire sector.

Diffusion of e-business software solutions for integrating business processes

A confirmation of the poorly structured usage of online technologies comes from the analysis of the diffusion of specific e-business solutions, for which the retail sector is substantially aligned with the general average, and no particular sector specifics emerge, not even regarding the usual discrimination of size classes. In absolute terms, only Enterprise Resource Planning (ERP) systems are not yet widely diffused and, in perspective, present lower growth potential. Customer Relationship Management (CRM) and Supply Chain Management (SCM) software seem to present higher dynamism that, however, suffer from insignificant current consistencies. In general, looking at the prospective phase, larger companies express less propensity for the introduction of new e-business solutions: for example, none of the companies interviewed with more than 250 employees is planning to use SCM solutions or ERP systems. It is true that in relative terms these companies are those that present a higher diffusion of e-business solutions, but this diffusion has not yet reached levels that justify explanations traceable to the saturation of the same.

Probably the reasons for the companies' attitude are related to the scheduling and conduction methods of some past experiences, but in part can find justification in a IT supplier offer that still cannot express the so-called killer application. In general, it can be confirmed that the possibility of a higher penetration of the relevant supply, that still has considerable room, may only effect applications that are considered effectively strategic for business conduction.

Exhibit 6-9: Retail: Usage of special e-business software (2003)

Usage of special software solutions for integrating e-business	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
SCM usage	4	5	5	9	6
CRM usage	6	5	5	17	9
Use a Knowledge Management Solution	5	5	5	4	12
Use an ERP system	9	10	10	25	22

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 3515 for all sectors, N= 502 for the retail sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

6.2.4 Processes of the extended enterprises

Use of online technologies within the value chain

Vertical type exchanges that involve suppliers and customers now assume a higher significance and represent, in aggregate terms, 60% of overall network technology usage motivations in an extended fashion. To this regard, it is evident that the exchange of relations, if considering the companies in the whole, concern relatively common processes: it can be affirmed that the new technologies are now essentially perceived as an accelerator of conventional communication processes. The processes that present a more strategic character now appear even more rare, even if the distribution of these usage methods of online technologies present a difference between small and large companies more emphasised than the one regarding more common processes.

The growing space that sales brands are occupying in the sector will soon constitute a positive impulse for the adoption of technologies that permit the optimisation of partnerships between retailers and manufacturers. Intensity reduces – in fact – the contrast that in some cases negatively effects the relationships between the two parties, are mainly motivated to optimise flows by the reduction of the negotiation component. Technologies that can benefit are those concerning collaboration processes for product development, demand forecasting and warehouse management.

Exhibit 6-10: Retail: Usage of online technologies within the value chain (2003)

Usage of online technologies within the value chain	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Online collaboration with business partners for designing products	12	9	9	9	16
Online collaborating with business partners to forecast product demands	10	9	9	14	11
Online management of capacity / inventory	10	9	9	16	18
Electronic exchange of documents with suppliers	37	38	38	46	43
Electronic exchange of documents with customers	28	22	22	28	20
Online negotiation of contracts	12	8	8	15	8

Base: EU-5 (D, E, F, I, UK), enterprises with internet access (N=3055 for all sectors, N=347 for the retail sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

6.2.5 Purchasing online

Companies in the retail sector resort to procuring online less than the average of all sectors. In this sector too, the data is very sensitive to the size variable: 70% of companies with more than 250 employees resort or consider resorting to procuring online shortly; this percentage drops to 52% for the medium sized class and to 29% for those with less than 50 employees. This represents one of the few spheres where the larger companies' propensity to adopt practices tied to online is higher than that of other categories, demonstrating the centrality that procuring holds for sector companies and its substantially positive assessment.

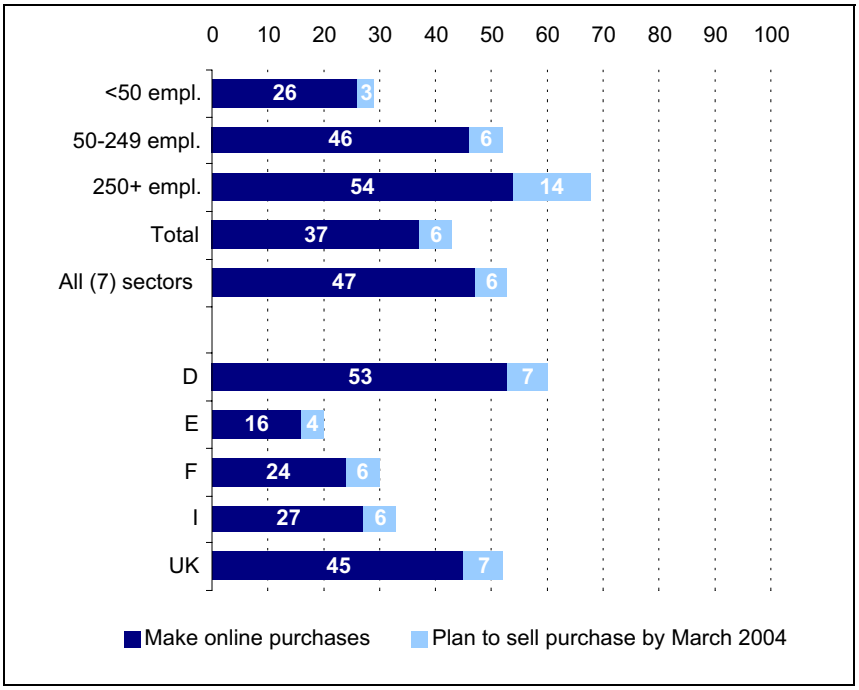
Exhibit 6-11: Retail: Enterprises procuring online (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (excl. DK/NA) (N= 3515 for all sectors, N= 504 for the retail sector).

Figures for sector total, all sectors and countries are weighted by employment ("enterprises comprising …% of employment"), figures for size-classes are to be read as "% of enterprises".

Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



The analysis of the channels used for procuring online indicates how companies that resort to it are highly flexible in their usage. This characteristic is particularly marked for small companies that are the most open to a variety of solutions. The procurement diffusion data via EDI network is particularly surprising for these organisations, as EDI is traditionally associated with larger companies due to the need to sustain investments associated with dedicated network infrastructures. In this regard – as indicated by the dedicated section – a considerable contribution comes from EDI diffused on standard WEB, confirming the importance of open solutions and technologies that do not present particular barriers to diffusion.

Exhibit 6-12: Retail: Online procurement channels (2003)

Online procurement channels	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
E-procurement through company web site	83	82	82	82	79
E-procurement through electronic market places	28	33	33	36	20
E-procurement via extranet	27	35	35	41	29
E-procurement via EDI*	42	50	50	27	28
IT system integration with suppliers for placing orders	24	35	35	33	18

Base: EU-5 (D, E, F, I, UK), enterprises procuring online except* (N=1443 for all sectors, N=158 for the retail sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

The impact of procuring online is generally positive: 60% (aligned with the average of other sectors) express a positive opinion on procurement costs. The figure deviates positively from the average, however, for the evaluation about relations to suppliers. The area of internal processes is instead perceived as having a lower impact, therefore confirming the need for improvement in internal relations of the entire supply chain. Less sensitive, in absolute terms, is the influence of procuring online on logistics and inventory costs that is found over average but does not concern most companies: the motivations are, in fact identified in the types of tools used that privilege purchasing over those capable of integrating supply chain management up to now.

B2B electronic marketplaces

The participation in marketplaces is still not highly diffused and still involves a rather meagre minority of companies (note that – even referring to the share of companies that procure online – companies that resort to the marketplace represent about one third of the total). In aggregate terms, some interesting elements emerge: in national contexts where company adherence to marketplaces has a higher relevant incidence (I and D) the prospective of new adhesions are very positive compared to the historical situation. And it can be confirmed that within one year the virtual marketplace participant base will double in the UK. In the sector as a whole the situation is slightly less optimistic because France and Spain may not generate new adhesions based on declarations of intent.

An interesting element is the interest of small and medium sized companies in the tool: the most consistent declarations of future adherence come from these two categories. Large retailers indicate a rather detached attitude to the prospective of new adhesions: the impression received is that there is a group of operators who have strongly embraced the tool's potential, while others, who did not immediately adhere, have much less interest in a solution that is seen as cooperative or unable to generate long-lasting competitive advantage. Smaller companies, for which the behaviour assessments of the other operators are less significant, express higher interest, which within a year could determine a marketplace participation level higher than that of larger companies.

6.2.6 Marketing and sales

Website availability is relatively limited among the retail sector companies. This data seems rather structural if service features are compared to those in the manufacturing sector. Small retail companies have, in fact, a limited geographic scope and, unless they are interested in developing an e-commerce or mail order project, are less motivated to implement tools, the main characteristic of which is to extend the range of action of their contacts. Website diffusion with small sector companies is therefore less than one third of the total, while it is approaching saturation level when larger companies are considered (also taking into consideration companies that intend to launch a site within 12 months).

Exhibit 6-13: Retail: Enterprise with a website across countries (2003)

Enterprise with a website	D	E	F	I	UK	EU-5
Have a website	40	32	21	33	22	31
Plan to have a website by March 2004	15	23	7	8	20	14
Use a Content Management System *	13	37	15	57	16	33

Base: EU-5 (D, E, F, I, UK), all enterprises (N=504), except *: companies with a website. In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

About 10% of all retail companies (accounting for 16% of employment) sell online. This is similar to the average diffusion of e-selling in the seven sectors surveyed in 2003. The divide is clearly among the small enterprises and the medium-sized ones. The most used e-commerce tool (88% of online sellers) is the company web site, also considering the prevalent B2C nature of sales relations. The lesser significant of exchanges in a B2B context is indicated by the diffusion of extranets (9%) and EDI (5%), especially when compared to the corresponding procuring percentages. The level of business integration of online selling also reflects the sector's relationship aspect (mainly B2C) that tends to express itself in rather de-structured forms. In most cases (almost 80%) of sales, the purchasing process is managed via e-mail. Only 8% have integrated their online sales processes with the back-end systems.

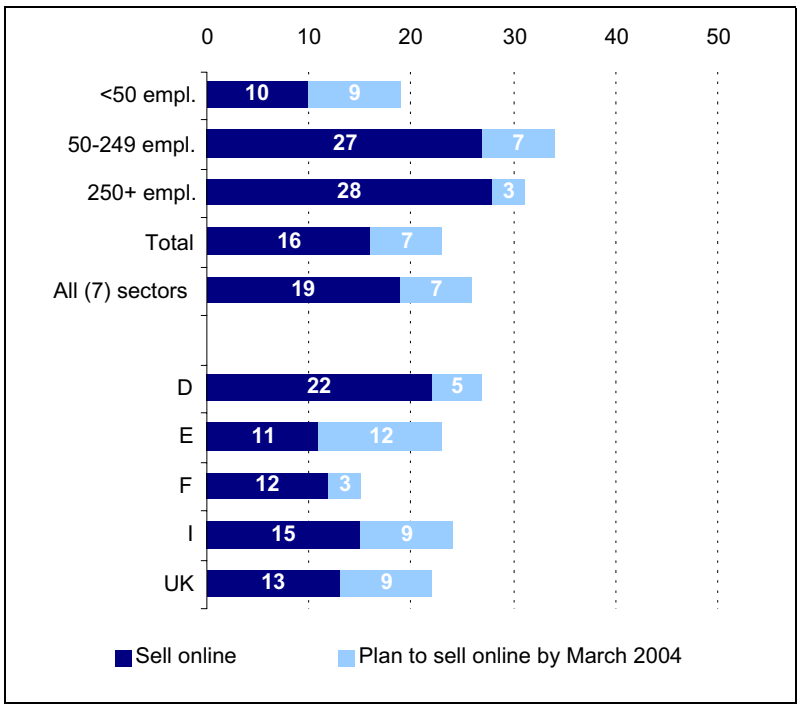
Exhibit 6-14: Retail companies selling online (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 3515 for all sectors, N= 504 for the retail sector).

Figures for sector total, all sectors and countries are weighted by employment ("enterprises comprising …% of employment"), figures for size-classes are to be read as "% of enterprises".

Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



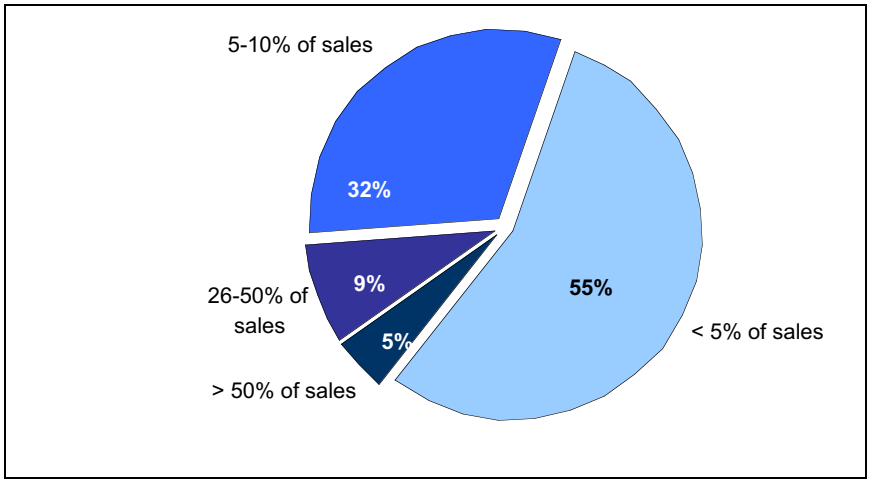
About three-quarters of European companies achieve less than 10% of their turnover through online sales: this figure must not however be negatively interpreted with regards to the online channel. A rather consistent share of initiatives still reaches satisfactory demand levels, but even in a long-term prospective the data probably does not significantly deviate from these levels. It is in fact related to the structural characteristics of e-commerce supply in Europe where traditional retailer integrate the online channel with the conventional one (so-called click and mortar operators).

There are some operators who are more capable of taking advantage of the opportunities derived from the online channel but it can be generally foreseen at least for the most common references, that online retail will be conceived by sector operators as an alternative to the traditional channel. Pure players will focus on niche initiatives or service organisations that reap a structural type competitive advantage from their presence online (experiences include, for example, auctions, end of season stock sales and items such as books that benefit more than physical channels from the catalogue expansion on the international level).

Exhibit 6-15: Retail: Share of online sales as % of total sales (2003)

Base: EU-5 (D, E, F, I, UK), enterprises selling online (N=68 for the retail sector). In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



6.2.7 E-business development 2002 – 2003: main trends

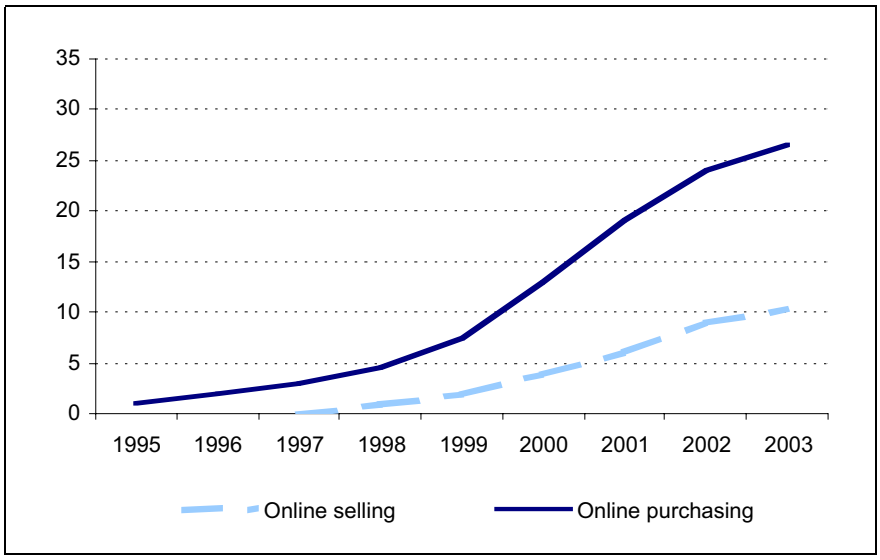
E-business presents considerable application potential in the retail sector for the sector's structural characteristics, that are based on relations within the supply chain and on the horizontal level for those operators who have a chain organisation.

This potential is only partially expressed and, in fact, the sector presents a certain delay compared to other sectors on rather substantial elements: the diffusion of procuring and selling online and infrastructure elements such as Internet access, electronic communications usage, web sites. These delays decisively affect the differences between the larger retailers and small firms, who present a higher dynamism and receptiveness to the opportunities provided by new technologies.

Exhibit 6-16: Retail: Adoption process of online selling and e-procurement

In % of enterprises. Based on survey question: "When did your enterprise start selling online / making online purchases?"

Source: *e-Business W@tch* (2003)



The perceived importance of e-business suffers from this relevant delay and – while the operators' opinions are still substantially positive – only one third of these explicitly acknowledge a certain importance to e-business in the overall economy of the managed activities. Certainly, even in light of a more disenchanted attitude regarding the potential of the new economy and a rather difficult economic situation, the new initiatives will be challenged on an increasingly more concrete level, as far as they can be measured with the ROI ruler.

An important game will be played regarding the combined diffusion of radio frequency identification (RFID) and electronic labelling. The crucial node is represented by the standardisation and economic accessibility of the electronic labelling system which, favouring radio-control, could permit integration between flows of goods out of and in-store that would represent a true technological revolution for the sector.

Exhibit 6-17: Retail: Expected expenditure in e-business (2003/04)

Expected expenditures on e-business technologies for period 3/ 2003 – 3/2004	All (7) sectors	Retail			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Increase expenditure compared to previous 12 months period	29	25	25	31	31
Decrease expenditure compared to previous 12 months period	2	1	1	7	9
Maintain current level of spending	64	68	68	58	58

Base: EU-5 (D, E, F, I, UK), all enterprises (N= 3515 for all sectors, N= 504 for the retail sector).
In % of enterprises. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

The problems, in this regard, are essentially identified in the sustainability of initiatives on the cost level and in the implications regarding privacy: the Benetton Group (Italy) experience on RFID technology application and the electronic labelling of a significant share of articles sold by the company is of note. Announced for March 2003 by technological partners, that quantified radio labels foreseen by the technology implementation phase as 15 million, the initiative was then denied by the company, that confirmed interest in RFID but denied its introduction. The episode caused discussion by players involved – but also by other parties (companies) involved in the introduction of the new system – on the possibility of controls outside the point of sale, that create inevitable problems for consumer privacy.

The sector's technological evolution towards a growing point of sale and supply chain automation level should cause a significant reduction in the labour force required for overall business management (from administrative to warehouse and cashier positions). On the short-term, especially in a weak consumption context, this element could paradoxically represent a deterrent to new investments. On the long-term the situation could evolve either to a gradual reduction of the sector's labour force intensity or in a re-conversion of a part of the same from operative or handling positions to assistance/promotion roles in sales. In this case the new technologies could also play a substantial role because the strengthening of marketing and front-office activities will extend through workers' access to computer systems, applications and tools for their job and to available customer data.

This customer relation element seems to be the other large innovation trend that could steer IT and e-business investments in the retail sector: the prospect of growing competitive pressure tied to growing market saturation and the widening of the international business dimension will in fact extend competitive advantage from the traditional tools of price and localisation to the best purchasing experience and overall customer satisfaction. The result is the achieved goal of winning the consumer's loyalty.

Similarly online will emphasise its complementary channel character. On the one hand, there will be pure players, able to position their supply on those products for which the network dimension represents a real competitive advantage (catalogue breadth, geographical demand served, purchasing occasions and methods); on the other – the more common references – the online channel will represent integration (the up to now positive experience in click and mortar or simple support of the physical channel). The online channel has become a true new media: it will continually lend itself to the function of information/comparison but can also be used as a promotional/information tool supporting the physical channel. Already, according to Forrester Research, 22% of Europeans search online but buy offline, almost half of cross-channel shoppers defect to competitors' shops; and net-influenced offline sales yield 83 billion Euro today – almost three times the value of online sales.

A third innovation trend – mobile commerce – is more uncertain and in some way has the previously identified two as assumptions. A series of applications exists in this sense -from pure purchasing on mobile terminals to receiving location based messages, passing through intermediate solutions that the sector's peculiarities allow development of. Ahold in Norway recently conducted the world's first trial with Bluetooth wireless technology in retail stores (Bluetooth is a technology that allows devices to synchronise data and exchange files within a 10-meter radius). Using mobile phones with WAP and Bluetooth technologies, customers of the pilot store were able to pay for goods, check their accounts and find about current offers.

6.3 Conclusions

Electronic business holds a decisive role even compared to other sectors, as the intermediary with end users. As indicated below, in the detailed analysis of the economic implications of e-business for the sector, however, the diffusion of e-business in the sector is far from a pervasive reality or even aligned with the diffusion standards of other sectors.

This trend is, however, affected by a peculiar feature of this sector. Many SMEs, in fact, are clustered and organised in such a way that, although not impacting on their ownership, involves them in organisation forms (such as buying groups, franchising) which allow unique concentration on the relations with the upstream and downstream players in the value chains.

Supply is the main e-business application area within the sector: the most significant share of relations within the value chain is generated by the exchange of electronic documents with suppliers, while procuring online is the most consistent activity out of those managed through new technologies.

6.3.1 Economic implications

A brief assessment of the impact of e-business in the retail sector paints a rather disappointing picture in both absolute terms and in comparison with the other sectors monitored by the *e-Business W@tch*. Unlike other diffusion and impact indicators, in this case the size variable – reflecting the sector's structural characteristics – does not influence the evaluations. As for the comparison with other sectors, the negative assessment is mainly due to the gap between the actual and potential deployment of e-business in a sector which, with its network organisation, should constitute the ideal application area for e-business and the development of its potential.

The reason for this are:

- Downstream, the clients' mainly B2C nature which, in some way, is penalising this sector compared to other B2B oriented sectors where e-business presents a longer tradition and has currently taken more root
- Upstream, the variety of sectors and suppliers that determine a levelling out of the most widespread communications and reporting methods between the organisations (an effect we could define as "shared minimum"). This is demonstrated by the fact that, as soon as a privileged supply situation from the quantity/frequency standpoint occurs, this tends to be structured through e-business tools

Retail: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **E-business as a marketing tools catalyst**: The flexibility of using new technologies permits basic business strategies to be strengthened and emphasised. Web marketing, mobile marketing and in-store promotions develop more selective and targeted relationships between businesses and customers, exponentially increasing the impact of differentiation strategies. At the same time, the web, favouring research and comparison operations, can give those companies that intend to present themselves via price leadership a particularly efficient tool. • **Product/service cost management optimisation**: The contribution provided by e-business to marketing mix management has a positive impact on the resources intended for these activities. Thus the availability of communications forms with greater orientation to the right target leads to a reduction of promo/advertising investments in the traditional areas, generally the more costly ones. Interactions between the point of sale, purchase centres and, upstream, manufacturers, permit a more efficient and timely management of product policies (starting from the testing phase); distribution costs may be better distributed on products and do not generate diseconomies such as stock-outs; even promotions and, generally, price policies can be more efficiently managed. • **Supply cost reduction**: using e-business tools lets companies reduce supply costs, both direct and indirect. In the first case the new technologies favour the recruitment of and relations with a higher number of suppliers, thus broadening the company's scope to act on the supply market in more transparent conditions and with higher margins. Using e-business tools also implies accessory advantages, associated with purchasing and administration procedure standardisation and automation that reduce error and manual intervention of management once implemented. Considering the high number of transactions that characterise this sector, this component – apparently marginal – may be significant in overall business management. • **Expansion in new markets**: the web offers companies an important opportunity to diversify their business, facilitating the expansion of the points of sale's normal attraction base but also reaching new market segments. For small businesses, or for those businesses that work in niche segments, the web can represent the chance to reach a optimal dimension of the market they serve, permitting them to cover areas that recognise a higher added value for supply. In some cases the web can implement business models that could not be proposed (or only partially) in the traditional channels.	• **Instability of investment amortisation period**: the perception of the continuous system and technology upgrades connected to e-business may make the reliable assessment of the time validity of the adopted solutions difficult for companies and in several cases, may favour a waiting attitude. This conviction, that the need for quick technological upgrade impedes the emergence of experience curves associated with e-business management, could prevent the passage of e-business from adoption by innovators to that realised by the majority. • **Higher competitive crowding**: the fact that the opening of an online point of sale conventionally meets lower entry barriers compared to a conventional sales point and, in general, that it includes new organisations in the sector, determines higher competitive crowding. In a context where final consumption does not significantly grow over time, this could result in increased resources being necessary to achieve the same result. These dynamics (profit decrease) could occur on the sector level, but as has been said before, e-business still provide great benefits • **Need to develop new skills**: companies that begin to be involved in e-business face unusual business activities that imply sometimes considerable efforts to reorganise business attitude and culture. They must also face re-conversion costs, personnel training costs to adapt to the new roles or to the evolution of previous ones. Companies also face new problems connected not only to the management of burgeoning data and information, e.g. security, but also to their efficient use.

Enablers	Barriers
• **Recent trends** within this sector, for example dynamics in demography, legislation, and consumer choice, are seen as a positive signal for the promotion of e-business. The potential to offer services to the public who may not necessarily be patrons of a local store, at any hour of the day, and supported by loyalty cards and increased choice (bulk items etc) with reliable home delivery are undoubtedly a key component of the competitive scenario. • **Need to set up of supply relationships**: Distribution chains are currently polarised in terms of global brands, which are increasingly strong and representative in terms of market shares, and the emergence of new niche markets (for instance organic, vegetarian, fair trade, gm free). These niche markets require the set up of supply relationships with new counterparts and expanding their geographic range. This development may have a positive impact on the use of e-business tools (marketplace, web-EDI) for identification of new sources of supply and distribution, and in continuing relations with them. • **New private labels**: The majority of retailers (90%) intend to expand their offer of private label products. Private labels compete horizontally (with other stores' private labels), not only on price, but also on the brand's added value. The area of private labels is a fertile ground for improved relations and the exchange of information between retailers, suppliers and customers. This is not only impacting logistics, but also the interaction between buyers and suppliers – through consumer testing and the offering of suggestions for refinement of product features.	• **IT skills gap**: Small companies are experiencing greater difficulties in IT recruitment than their larger counterparts (with half of enterprises citing such issues). As a result specific IT skills tend to be developed internally. Diffusion of ICT is therefore constrained by the training and retention of such skills within SMEs. • **Lack of basic interest in Internet among 20% of companies**: By and large, basic Internet access has arrived, as 70% of small and 90% of medium/large enterprises being connected). As a result, connection has almost reached a diffusion peak, with only an additional 6% of enterprises expressing further interest – however, leaving 1 in 5 enterprises being excluded from the Internet.

Implications for the industry structure

Integration of the supply chain

E-business favours the integration of the operators involved in the retail sector supply chain. The latter's aim to reduce the quantity of goods to be stocked under the same sales conditions, and to accelerate supply flows to offer better customer service, finds a useful tool in e-business. In fact, e-business tools permit information sharing between chain partners (retailers, logistics providers, manufacturers), which brings up the topic of e-extended supply chain, where ideally demand drives and automatically determines supply flows. The real application of this principle, however, faces the normal expectations of the parties for a contract-like attitude which in some cases ends with a reduction of e-business potentials. These expectations have not prevented the creation of important integration forms, for instance in the case of relationships between retailers and manufacturers for their sales brands or in the so-called Factory Gate pricing, i.e. in supply negotiations that only considers the manufacturer's industrial costs, as the other functions are directly managed or coordinated by the retailer.

Redefinition of the role of human resources

The use of e-business tools and the innovations connected to the diffusion of IT determine a reduction in the demand for labour required for operative or staff functions. Examples are the simplification of the administrative procedures or the gradual automation of technologies regarding the point of sale, cashiers or stockmen. This allows companies, especially those that rely on high service level, to assign more resources to customer service: pre and post sales assistance but also in overall purchasing experience. Human resources, together with the new technologies, will thus play an increasingly important role and will be strategic in a sector where the loyalty goal is growing in significance.

6.3.2 Policy issues

Encourage and promote the standardisation of the computer languages used in the more advanced forms of supply chain management.

Using a shared language is a must in developing and improving relationships between all chain partners. It is therefore important, for both the computer language used in logistics and more advanced SCM integration and (if confirmed in the future) in the transmissions regarding electronic labels, that there are confirmed universal and open standards. Solutions that are not coordinated in this direction and particularly the economically legitimate interest of some suppliers in promoting proprietary standards, could make the mass diffusion of new technologies more difficult, and access by the less economically endowed more restricted. Language standardisation regarding supply chain management could involve other organisations, for example, the quality control boards or food traceability systems. In this regard, it seems opportune to ensure the involvement of new technologies in the provisions on traceability since the same can usefully integrate the information on food origins with their handling and supply chain information.

Design a regulatory base on privacy between European countries, aimed at integrating the emerging aspects tied to technological development

Customer privacy assumes fundamental significance in e-business management since the new technologies often imply the collection and processing of a large quantity of information provided by either the same consumers (essentially personal/sociological) or by the retailers (behavioural). The potential of these two typologies of information is enhanced by the possibility to cross them. The definition of a group of shared norms by the concerned parties – consumer protection associations, industry and distribution representatives, national authorities on the relevant legislations – will promote a more balanced development of the new technologies. This is in order to protect consumer rights and the subsequent restraints on e-business tools but also to avoid risks that lead to the excessive congestion of information for the operators concerned. Although it is difficult to define the operative details of solutions yet to be defined from the technological point of view, the application/extension of general principles to the same appears important, e.g. reconciling company stress to taking advantage of the innate potential of the new technologies with the consumer's right of choice and information.

Dismantling barriers presented by e-business for SMEs

SMEs certainly represent the most motivated business category for the adoption of e-business solutions. In addition to promoting open standards based on Internet connections and the diffusion of faster and cheaper access, small business access to new technologies could be favoured by initiatives aimed at optimising hardware investments and infrastructures generally. For example, the promotion and coordination of technology buying groups could be useful tools, including consultancy activity specifically dedicated to the implementation of e-business, especially if distributed through the association forms mainly connected to the territory (i.e. Chamber of Commerce).

Coordination with initiatives specifically dedicated to supplier sectors (i.e. food) could be strategic in allowing standard and interchange conditions between suppliers. This may also prevent an altering of

the competitive scenario. At the same time, the sector's overall technological upgrade may act as a driving force, transmitting standards and experiences from the more evolved sectors to the less developed ones, becoming a true enabler and launching a virtuous path for retail.

Promote IT and e-business training and motivation opportunities also involving operators in EU candidate countries.

The sector is still characterised by a cultural attitude that does not fully support e-business, often considering it a cost rather than an investment. In this regard, more knowledge of the effects and sustainability of e-business initiatives would be of benefit, even with respect to those markets (US) where these have a higher maturity level. The success of the e-business initiatives would also benefit from a more widespread ICT culture in the sector; the lack of this represents a hindering factor especially for SMEs and negatively impacts the implementation of the solutions.

The need for a more widespread ICT culture also involves the retailers of the new EU accessing countries. In this case, alignment with the Western world's technological standards would permit them to compete on the same level as Western retailers who are advantaged by the relation methods with international suppliers interested in penetrating those markets.

References

Accenture (2002) - Accenture Scientific Retailing: Bringing Science To The Art of Retail

Accenture 2001: The Unexpected eEurope

Accenture (2002) – mCommerce Exploring the Opportunities

Accenture (2002) - Accenture Scientific Retailing: Bringing Science To The Art of Retail

Accenture (2002) – mCommerce Exploring the Opportunities

AILOG (2001) – Logistic Forum: Strumenti per governare l'evoluzione della supply chain

Bertero, P. (2000) – Il controllo di gestione nelle imprese di grande distribuzione

Castaldo, S.- Cillo, P. (2000) Il loyalty management nelle imprese commerciali. L'attivazione dei driver di fiducia

CHL (2002): Relazione sulla gestione al bilancio d'esercizio

Colla, Enrico (2002) – La Grande distribution européenne. Nouvelles stratègies de differenciation et de croissance internazionale

Deloitte Touche Tohmatsu- 2002 – Global Powers of Retailing.

EAN International (2002): Electronic commerce in the EAN Community 2001

ERRT (European Retail Round Table) – 1999: Retailing n Europe: A dynamic force driving employment opportunities

Ernst & Young Special Report (2000): Global Online Retaling

Eurocommerce (2001): Priorities of the commerce sector for the Belgian presidency of the European Union 2nd semester 2001

Eurostat (2002): E-Commerce in Europe

Food Marketing Institute and Grocery Manufacturer of America (2003) Global Technology Iniziative E-Commerce and Global Standards

IBM (2003) Enhancing the customer shopping experience: 2002 IBM/NRF "Store of the Future" survey.

ICE (2001) : eMarket Services Italia. eMarketplace in Italia e ruolo degli eMarketplace nel commercio internazionale

IEIAC-Università Bocconi (2000) Le nuove aree di generazione di valore nei rapporti tra industria e distribuzione

Mark Up/KPMG (2002) – Scenari e Classifiche della Distribuzione europea

Metro Group The Future Store in Rheinberg – An Asset for both Retailers and Customers

Lugli, Gianpiero (1998) Economia e gestione delle imprese commerciali

OECD: Business-to-consumer E-commerce statistics

PicewaterhouseCoopers (2000): Consumer nation: Retailing 2010. Global Retailing in a Consumer-Centric Universe.

The Boston Consulting Group (2000): The race for Online Riches: E-Retailing in Europe

The Boston Consulting Group (2001): The next charter in business-to-consumer e-commerce. Advantage Incumbent

The Boston Consulting Group – Forrester Research (2002) The State of Retailng Online

Varian, E.-Litan, R., Elder, A, Shutter, J (2002) The Net Impact study

B.7 Tourism

7.1 Economic profile and trends

Tourism is usually defined as services for people travelling to and staying outside their usual environment for less than one consecutive year for leisure or for business purposes. This sector does not fit easily into any current industry classification but is covered by a wide range of business activities from the NACE classification. Tourism involves transport, accommodation, restaurants, cultural activities and leisure and could be more effectively viewed and evaluated as a market rather than an industry. For the purpose of the *e-Business W@tch*, the scope of the sector has been defined as shown in the table below. Park activities (92.33), museum activities and historical sites (92.52), as well as botanical gardens and nature reserves (92.53), lack comprehensive statistical coverage. Campsites, holiday villages and other forms of short-stay accommodation (55.2) are included as important users of online reservation tools. Restaurants, canteens and catering services are excluded because they do not fit the criteria presented above.

NACE Rev.1		Activity
Division	Group	
55		
	55.1	Hotels
	55.2	Campsites and other forms of short-stay accommodation
62		
	62.1	Scheduled air transport
63		
	63.3	Activities of travel agencies and tour operators; tourist assistance activities n.e.c.
92		Recreational, cultural and sporting activities
	92.52	Museum activities and preservation of historical sites and buildings
	92.53	Botanical and zoological gardens and nature reserve activities

As one of the fastest-growing sectors in the European economy, tourism contributes significantly to the EU economy. Around 2 million enterprises were directly involved in tourism activities in 1998, employing around 8 million people. Tourism has in addition an important effect on employment in related services. The sector has grown rapidly in EU countries over the last fifteen years. Its remarkable development has been supported by the impressive evolution of mobility and communications and by the growing internationalisation of the world economy. The most recent advances in the process of European integration and, in particular, the introduction of the Euro are likely to contribute significantly to the growth of European tourism in years to come.

The World Travel and Tourism Council (WTTC) estimates that tourism and travel contribution to global GPD was about 10% in 2002. Recent estimations by the World Tourism Organization (WTO) regarding short-term international tourism are somewhat cautious. There was some settlement in early 2002. Any estimate is subject to rapid changes due to the industry's high sensitivity to external events. International crisis such as September 11, the war in Iraq and the SARS epidemic have led to overall redistribution of tourism flows and a change in the type of trips preferred by tourists, at least at the level of macro-trends: there has been growth in domestic and medium-range tourism over long-range tourism and greater use of transportation other than the aeroplane.

Tourism levels by country

The top fifteen nations attracting the most arrivals and revenues continue to constitute 60% of all arrivals and revenues. But as a consequence of these events, the classification of the top fifteen destinations in 2001 has been transformed. While France remained the top destination for world tourism, the fall in visitor numbers to the US (-12.6%) caused this part of the world to drop from second to third place. Spain took over second place with 3.3% more visitors. Italy remained at fourth place in the WTO classification, even though international arrivals dropped by 5.6%. In the classification by revenues, the US remained in first place, despite an 11.9% drop in revenues from

tourism. Europe is especially important on the world tourism scene – it has the highest number of visitors and revenues and the European population has a strong tendency to take vacations (over 60%). This proportion is even higher in Northern Europe, but the trend is changing toward a preference for shorter vacations spread out over the course of the year.

Overview of business trends

Growth in European tourism in recent years has only latterly translated into quality evolution in the industry, in terms of both the goods and services offered and the organisation and management of businesses themselves. The principal reasons which may be assumed to underlie this incomplete evolution are:

- the fragmentary nature of the sector, which incorporates a large number of small and medium-sized businesses, though this varies in different countries within Europe and Destination Management Organisations are trying to bundle the offers of local and regional tourism suppliers;
- the prevalence, among SMEs in the industry, of family-run businesses (often run by their owners);
- the gradual privatisation of organisations, including airlines;
- the domination of large, integrated distribution companies;
- the complex nature of the product on offer – the tourism product is a sum of micro-products including travel, accommodation, meals, recreational activities, etc.

7.2 Usage of ICT & e-business

7.2.1 The technical evolution of ICT systems for tourism

The world tourism industry was one of the first to make large-scale use of the new information technologies; focusing on information and communication technologies it appears that technological progress over the past thirty years has allowed the most innovative tourism enterprises to redefine not only their own organisational structure but their relationships with partner organisations, thus achieving the twin goals of optimising operating costs and increasing ability to generate value for their customers. There have been three main innovation waves impacting the tourism scenario in recent decades:

- the development of the Computer Reservation System (CRS) in the 70s
- the development of the Global Distribution System (GDS) in the 80s
- the Internet in the 90s

Computer Reservation Systems and Global Distribution Systems

CRS and GDS systems made it possible to create, develop and globalise the availability of basic tourist services through the intermediation of travel agencies which had exclusive access to automated booking systems. These booking systems are based on proprietary networks which are very sophisticated from the technological point of view and have very high implementation and running costs. They are the means currently used for purchasing tourist services and packages through Travel Agencies.

A GDS is basically a network connecting and integrating the automated booking systems of different organisations, reaching the end user through the intermediation of a travel agency GDS originate from airlines. The supply of such services is presently highly concentrated, with four global suppliers owned by airlines companies: Sabre, Amadeus, Galileo International and Worldspan. Their presence is based upon a network of agreements with local partners ensuring access to travel agencies all over the world. The main features of these systems are:

- the network is based on proprietary systems accessible only to professional users;
- the high costs of implementing and running them;

- the players involved are mainly large multinational players (hotel chains, airline companies) excluding SMEs;
- they are not commercial brands, as they are not known by the final users and are not visible on the market; this poses constraints to the successful exploitation of the end users' market.

The technological innovation brought about by GDS broadened the gap between large and medium or small suppliers of tourist services, as only the former could actually benefit from broader market access and the enhanced level of service.

Internet

The advent of the Internet changed the scenario: all categories of players are now directly accessible and have implemented their Internet strategy. The Internet provides all players with a means of reaching end users and being reached by them. The big tourist organisations rapidly implemented Internet strategies and set up their own Internet business areas or, in some cases, specific divisions or companies. In addition, the Internet has extended this possibility to the end user, redefining the business system and the notion of the channel of tourism products, in that it gives access to technologies to large masses of potential consumers and tourism enterprises of all sizes.

The exploitation of opportunities related to the Internet, however, is not automatic, as it requires the definition of a marketing strategy calling for changes in structure and organisation, not to mention the importance of a communication strategy. Many Internet-based organisations had unrealistic expectations and inadequate business models and eventually failed. The implementation of an Internet strategy has to take into account a number of challenges, including the compatibility of pricing strategies over different channels and the channel conflicts that may arise.

For the traditional tourism intermediaries (GDS, tour operators, travel agencies), the Internet means opportunities for broadening their activity but also forces them to justify their existence. For example, airlines put pressure on GDS to reduce costs or eliminate them and sell directly through the Internet. The four GDS brought their databases onto the web either directly (Amadeus and Galileo) or through newly created brands (Sabre established travelocity.com). They are also becoming providers of Internet-based solutions to the other players in the value chain. Tour operators and travel agencies increasingly use the web as an additional channel to sell products to end users.

Impact of e-intermediaries on traditional booking systems

Another relevant effect of the advent of the Internet is the birth of new players in the sector. Besides online agencies, the role of new e-intermediaries such as travel portals and regional and local tourist portals is quite important. Travel portals have been established with the specific mission of offering tourist products via the web. This kind of initiative is quite complex and requires remarkable know-how and bargaining power, which is the reason why most of them are being carried out by the larger organisations already active in the sector (e.g. trip.com, now cheaptickets.com, implemented by Galileo). The main generic portals also offer tourism products via the web, exploiting their commercial and brand image potential.

As a result of the introduction of new tourism e-intermediaries, customers' choices for searching for product information and to book autonomously have increased significantly. A wide range of e-intermediaries has emerged that use the Internet as the main distribution channel (Buhalis/Licata 2002).

- single tourism firms' websites on which suppliers such as airlines, car rentals or hotel chains distribute their products directly to the customer (for example, www.britishairways.com, www.avis.com)
- multi-supplier websites (for example for the airline industry – www.opodo.com, www.orbitz.com)
- Destination Management systems (for example www.tiscover.com)
- web-based travel agencies (for example www.expedia.com, www.ebookers.com)
- online last-minute agencies (for example www.lastminute.com).

Traditional intermediaries have to re-think their Internet strategies to cope with the new Internet competitors. Competitive pressure is further enhanced by the gradual emergence of mobile business and Interactive TV in the tourism sector. These applications are only of marginal importance up to now but are expected to become the most important e-platforms beside the Internet within the next five years. Internet distribution allows GDS to better fulfil customer requirements. Despite the new competitors there is still a need for institutions that bundle the huge supply of holiday products.

Impacts of ICT on the tourism value chain

The value chain of the tourism sector is quite heterogeneous when it comes to the types of players involved. It is based upon:

- tourist service suppliers, including: hotel accommodation, (single and chains), other short stay accommodation, the companies licensed to carry passengers (air, sea and land), other players offering amusement and entertainment services;
- travel agencies, which operate as service brokers. These act both as intermediaries and as front-office towards customers;
- tour operators which combine the services offered by the various suppliers;
- the recipient agencies which are the local correspondents of the tour operators and whose function is the provision of services to the end customer at the destination site. With reference to the structure of the package tour market, the Internet has deeply influenced and re-shaped the sector value chain.

The Internet has become the new medium for interactions previously carried out through different means (for example, between hotel chains and their direct customers), it has allowed direct interaction between customers and suppliers (for instance with tour operators), it is impacting on the role of traditional intermediaries (dis-intermediation) and has favoured the entry of new e-intermediaries (re-intermediation).

The Internet can also have a significant impact on "do-it-yourself " tourism, especially with regard to SMEs. In order to understand to what extent e-business affects this segment of the tourism sector, we must take into consideration that the tourism industry is dominated by very small enterprises. Unlike larger tourism organisations, such as hotel chains and holiday villages, these small enterprises need, in order to satisfy customers, a wide range of local support services (restaurants, entertainment, sport, leisure), usually provided by other very small enterprises.

On the other hand, "independent" travellers search for information about destinations, accommodation and travel conditions and prices through direct contact channels with local tourism organisations which can play a significant role in promoting, marketing and disseminating information on tourism enterprises operating locally, avoiding the risk of an individual offer being diluted among the huge amount of information available.

7.2.2 The role of ICT and e-business in the tourism industry

The *e-Business W@tch* asked decision makers in enterprises from the tourism sector if e-business constituted a significant part of the way their company operates in March 2003. 19% of the interviewees attributed significant importance to e-business, 39% some importance. These figures are higher than on average in the seven sectors surveyed in 2003 which indicates the relative importance of e-business in tourism.

ICT and e-business in the accommodation sector

The accommodation sub-sector is characterised by a close link with their local setting and high impact of labour on the quality of service offered, and an increase in aggregation among businesses, with the franchising formula representing one evident form.

While the highly evolved framework of the big hotel chains have progressively introduced computer technologies on a massive scale both in the back office (administration and accounting) and, especially, in the front office (marketing, Internet promotions and advertising, inclusion in GDS data-

bases, construction of marketing databases for CRM), other forms of accommodation have not yet made this "quality leap" in use of ICT. The decision whether or not to invest in such technologies often depends on the degree of awareness of the owner/manager.

New technologies offer smaller businesses significant opportunities, especially if we take into account that many of the limitations of businesses of this type in accommodation and other tourism business areas (characterised by the duality of small/large businesses, such as lack of sensitivity, lack of business know-how, lack of financial resources), could be overcome by adoption of co-operative strategies permitting a number of businesses to work together on a joint e-commerce and/or online promotion project, thus achieving more economies of scale. A number of new distributors such as worldres.com and hotels.com have emerged, offering very cheap rates but at the same time putting pressure on the hotels' yields.

Amusement activities

The amusement sub-sector consists of organisations both publicly and privately owned and very diverse in nature and in scope of action. In this sub-sector, too, new businesses have been born due to the Internet, joining the market to operate exclusively as online commercial intermediaries for administration of ticketing services for a large number of activities ranging from theatre productions to sports events, museums, and concert halls. These new forms of e-commerce have gradually expanded their presence on the Internet with increasingly complete and integrated sites offering characteristics which are better equipped than they were in the past to:

- make sites easier to use, especially in terms of structure (graphics, ease of browsing, architecture of information) and functioning (internal search engines, cookies, site map);
- be "customer-focused" and therefore capable of supplying information on customers' rights; the presence of customer service activities (call centres, e-mail addresses to which customers may send complaints and communications, information centres), and brand communication (product information sheets, discounts, promotional offers) is particularly useful in this regard;
- attract potential customers and gain their loyalty through games, online publications, chat rooms and discussion groups through which promotional offers, loyalty points, and newsletters may be offered;
- handle orders, payments and delivery: including all functions involved in e-commerce, breaking down the entire process of online purchasing into stages, from order to payment, delivery and post-sales services.

Scheduled air transport

The scheduled air transport sub-sector includes 164 scheduled airlines in Europe in 1998. It has gone through major structural changes in recent years. The airlines were without doubt Europe's first major users of the new information technologies, first "turning" their booking systems, rates, schedules, destinations, etc. into CRS/GDS and then using the Internet as a sales and marketing tool and for relations with end users.

The Internet is helping to shift pricing and information relationships between airlines and consumers in ways that are benefiting both parties. Specialized search functions offer powerful new tools to shop for the best deal and remove some of the information and pricing advantages that airlines once held over consumers.

More recent developments in ICT enable airlines to track sales for each service very efficiently and design pricing formulas that will maximise revenues, based on yield management or price discrimination. Based on previous seat sale patterns and predictions of how many more seats will be sold at a given price, the computer adjusts fares constantly as sales proceed. Technically speaking, yield management is designed to convert consumer surplus into producers' surplus. Today's computer reservation systems, at least in some airlines, are so sophisticated that very few seats are sold at the same price and load factors are increasing.

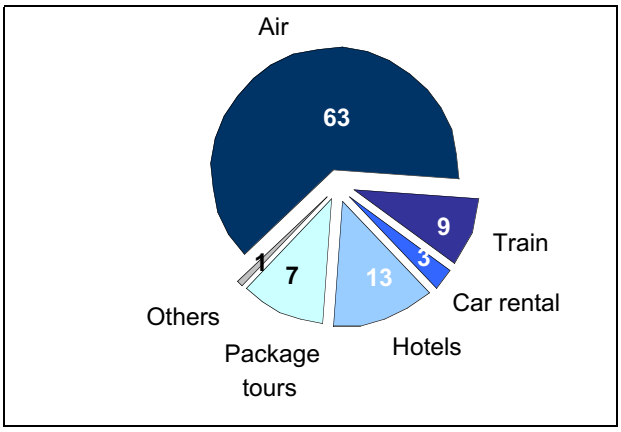
Air travel currently comprises by far the largest volume of online sales with over 60% of the transaction volume. This is due to the relatively low product complexity of air travel products. Customers need only minimal information about flights, e.g., time of departure and arrival. Hence, customers are enabled to

find all necessary data about their flight without the help of an intermediary and to carry out the booking process on their own. In contrast, complex travel products such as lodging or the choice of holiday resorts require much more information. Details about the surrounding area and the property largely influence the buying decision. The more complex a travel product is, the more difficult is it to replace the knowledge and experience of a travel agent online.

Exhibit 7-1: Tourism industry: Online travel market in 2002 by type of service or product category

In % of overall online transaction volume

Source: Marcussen (2003)



Intermediation

The intermediation sub-sector of the tourism industry which comprises tour operators and travel agencies is one of the areas in which use of ICT has been and still is most widespread, especially after the Internet "revolution". One of the consequences of the innovative effect of the Internet has been profound changes in the approach to this sector by businesses, who have gradually broadened their sphere of intermediation by implementing commercial projects on the web which first took the form of showcase sites attractively presenting their offer and later developed into e-commerce sites permitting end users to perform all steps in making a purchase directly online.

However, the trend towards dis-intermediation has revealed some highly critical areas in the management of complementary marketing channels (traditional and online channels) and conflict arising within the industry. As for online sales to the final customer, the web is an additional channel which tour operators seem quite reluctant to exploit. Factors limiting the exploitation of the web as a direct channel are the potential conflicts with the distribution network and the risk of cannibalisation. In a number of countries, where almost all tour operators have their own website, these share the characteristic of not offering online sales, but putting off signature of a travel agreement to a visit to a travel agent, because the tour operators themselves realise that there is a evidently a risk of penalisation by the travel agencies and of conflict situations arising.

Travel agencies are the players for which the Internet can be most detrimental, given that their role as intermediaries can be provided by the web. Currently they enlarge their presence on the web but it seems that their overall strategy needs to be readjusted towards a new value proposition to the customer which emphasises the tailored services they are able to offer, such as help in selection, personal contact, trust and proximity. Some new players focus exclusively on the Internet, reselling vacation packages designed by someone else, sometimes with particular labels such as "last minute" vacations.

7.2.3 E-readiness: ICT infrastructure and skills development

Adoption of ICT infrastructure

Basic ICTs are to be found in the vast majority of tourism enterprises. Enterprises representing 93% of the employees in the tourism sector use computers, 88% have Internet access, 85% use e-mail, and 77% use the WWW. These levels are very similar to the average of all sectors under consideration. However, as regards more specific ICTs, the tourism sector lags behind. Enterprises representing 32% of the employees have an intranet, which is much lower than in all sectors taken together (49%).

The levels are also lower in extranet (10% / 17%), Local Area Networks and Wide Are Networks, remote access to the companies' computer system and wireless remote access.

Exhibit 7-2: Tourism industry: Availability of ICT infrastructure (2003)

Available ICT infrastructure	All (7) sectors°	Tourism			
		Total°	<50 empl.	50-249 empl.	250+ empl.
Computer usage	93	93	91	99	100
Internet access	87	88	85	100	95
E-Mail usage	83	85	81	99	95
WWW usage	77	77	70	90	93
Intranet	49	32	21	56	71
Extranet	17	10	7	19	21
LAN	61	46	33	74	90
WAN	34	18	6	25	60
EDI	25	9	5	14	24
Remote access *	44	30	22	38	53
Wireless access *	14	10	7	10	18

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502) except*: enterprises using computers (N=470). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

Exhibit 7-3: Tourism industry: Availability of ICT infrastructure across countries (2003)

	D	E	F	I	UK	EU-5
Computer usage	96	99	75	100	94	93
Internet access	95	93	59	97	91	88
E-Mail usage	84	93	54	97	90	85
WWW usage	91	67	45	78	90	77
Intranet	28	36	22	28	41	32
Extranet	12	13	9	8	7	10
LAN	45	49	20	55	56	46
WAN	12	14	13	12	31	18
EDI	9	10	8	8	11	9
Remote access *	30	26	17	27	39	30
Wireless access *	13	9	2	7	14	10

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502), except*: enterprises using computers (N=470).
Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

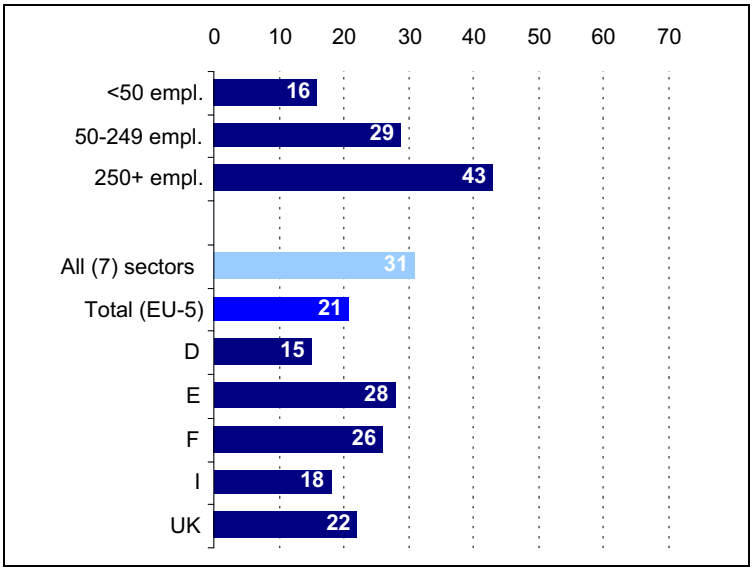
Source: *e-Business W@tch* (2003)

Exhibit 7-4: Tourism industry: Companies having internet access with >2Mbit/s bandwidth (2003)

Base: EU-5 (D, E, F, I, UK),
companies with Internet access (N=449).

Figures for EU-5 total, for all sectors and for countries weighted by employment ("enterprises comprising …% of employment "). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



Broadband Internet access is not common in the EU tourism industry. Of those firms that have access to the Internet, enterprises representing only 21% of the employees have Internet access with more than 2 MBit/s. This is below average.

IT skills development

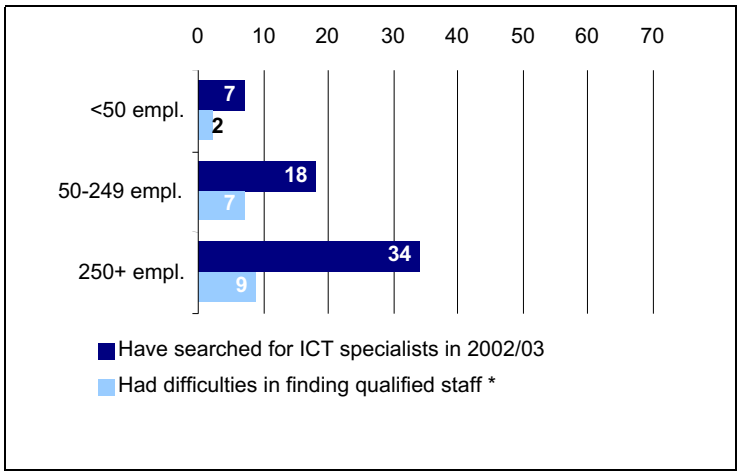
Activities to recruit ICT specialists have been quite low in the tourism sector. Enterprises representing 12% of the employees in the tourism sector reported that they recruited or tried to recruit staff with special ICT skills in the past twelve months. The level is twice as high (24%) in all sectors taken together. 4% of the tourism firms stated that they experienced great or some difficulties in their recruitment activities.

Exhibit 7-5: Tourism industry: ICT recruitment intensity and difficulties* (2003)

*Difficulties in recruiting = companies reporting that they had experienced great or some difficulties in recruiting staff with special ICT skills.

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502). Figures in % of companies. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



Support of IT training measures for employees

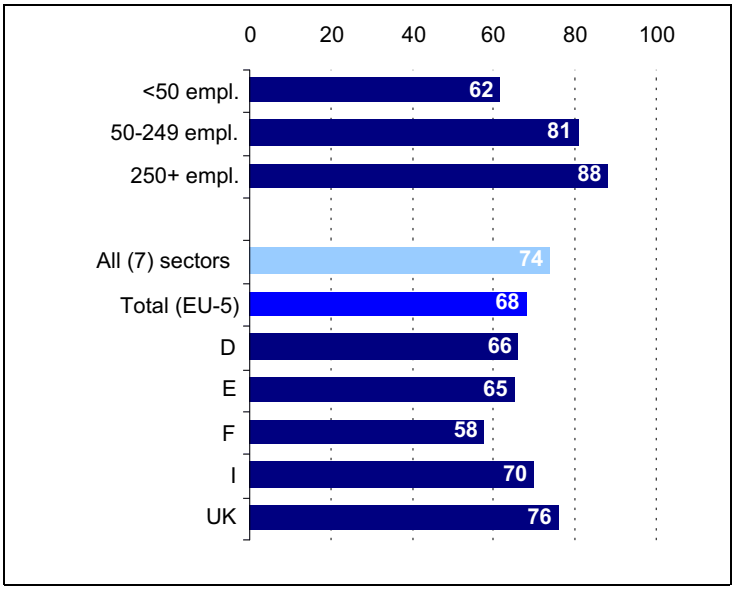
Two thirds of tourism enterprises (68%) support some kind of IT skills development through training measures. Use of working time for learning is the most prevalent kind of support (56%), followed by third-party training (41%) and in-house training (33%). As can be expected, ICT skills support is highest in large companies (88%) and medium-sized firms (81%), leaving small firms behind (62%). From a regional perspective, companies from the UK reported the highest level of skills support.

Exhibit 7-6: Tourism industry: Companies supporting any kind of networking and ICT skills development (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for EU-5 total, for all sectors and for countries weighted by employment ("enterprises comprising …% of employment "). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



7.2.4 Adoption of online technologies for internal business processes

32% of enterprises from the tourism sector use online technologies to share documents or to perform collaborative work, 13% to support human resources management, 11% for e-learning, 9% to track working hours and production time, and 5% to automate travel reimbursements of employees. In

general, large firms have a higher demand of using online technology for internal business processes than medium-sized and small firms.

Exhibit 7-7: Tourism industry: Usage of online technologies (2003)

Online technologies used…	All (7) sectors°	Tourism			
		Total°	0-49 empl.	50-249 empl.	250+ empl.
to share documents / perform collaborative work	39	32	21	45	64
to automate travel reimbursement of employees	13	5	3	9	11
to track working hours and production time	21	9	4	22	19
to support the human resources management	21	13	7	21	30
for e-learning	14	11	7	11	22

Base: EU-5 (D, E, F, I, UK), all enterprises (N=3515 for all sectors, N=502 for Tourism). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

Diffusion of specific software solutions for integrating e-business

13% of the companies – and 37% of the large enterprises – in the tourism sector report to use a CRM (Customer Relationship Management) system, 5% use a Knowledge Management software and a 3% an SCM (Supply Chain Management) software system.

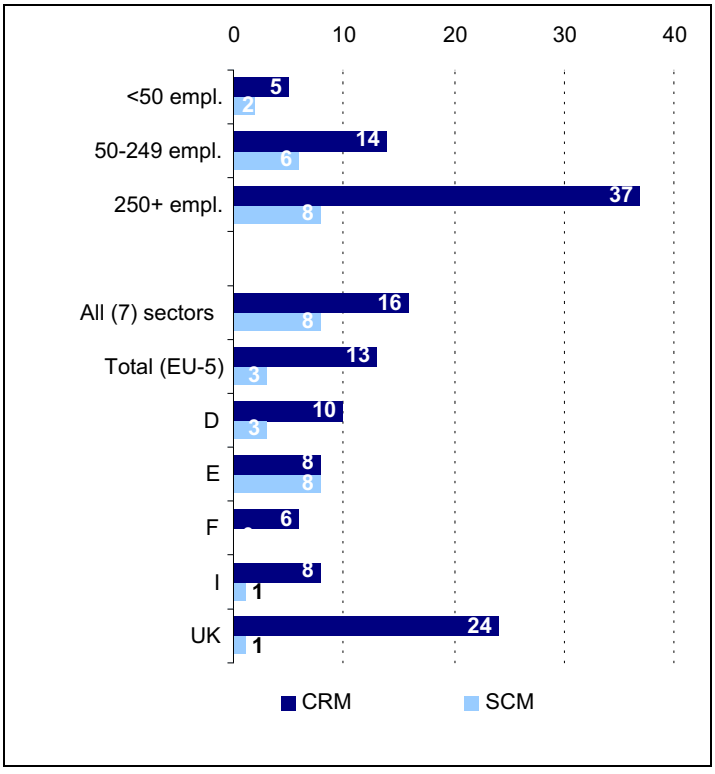
Exhibit 7-8: Tourism industry: Usage of CRM and SCM systems (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for EU-5 total, for all sectors and for countries weighted by employment ("enterprises comprising …% of employment "). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

CRM = Customer Relationship Management, SCM = Supply Chain Management

Source: *e-Business W@tch (2003)*



Despite its currently low adoption rate, SCM systems offer potential high benefits for the travel industry. Tour operators can streamline their front-office activities. In order to co-ordinate the offerings of various suppliers such as accommodation, transport, and entertainment, and to tailor these offerings to customer requirements, they need complex applications. Existing technical solutions include the following features:

- Accommodation-driven search screens providing displays of availability for requested dates, characteristics and locations,
- facilities to allocate passengers to flights and accommodation,
- features that allow several changes of client inputs before the booking is finally confirmed,
- automated e-mail facilities that allow reports to be sent to resort representatives quickly and at low cost.

Knowledge management is an opportunity to gain competitive advantage, for example in the accommodation sub-sector where competition between large and small hotels at local levels is fierce. Business intelligence software can help enterprises use information about customers more efficiently, particularly when combined with CRM. Behavioural patterns of clients can be discovered, for example by analysing transaction data, website visits, and destination information usage. Thus hotel managers can adjust their strategies to the needs of the customers and tailor offerings. By restoring data about customer behaviour, the performance of marketing activities can be assessed more effectively. Internal processes can become more efficient, for example by integrating business intelligence into property management or pricing systems.

7.2.5 Processes of the extended enterprises

Online collaboration activities can increase the efficiency of value chain processes. However, online collaboration with business partners with ICTs other than e-mail[3] is practised by only a minority of tourism enterprises. The highest shares are found for electronic exchange of documents with suppliers (37%) and customers (31%). Online negotiation of contracts (15%), online collaboration with business partners for designing products (13%) or to forecast product demands (11%) as well as online management of capacity and inventory (12%) are quite rare. In all these indicators the tourism industry is lower than the all-sector total. Online negotiation of contracts is the only exception; the level is two percentage points higher than the sector total in this case. The common feature of large companies surpassing SMEs in e-business use does not apply to online collaboration. The good performance of medium-sized firms may be due to the fact that many of them are vertically integrated into large networks of tourism firms.

Exhibit 7-9: Tourism industry: Usage of online technologies within the value chain (2003)

Value chain activities	All (7) sectors°	Tourism			
		Total°	0-49 empl.	50-249	250+ empl.
Online collaboration with business partners for designing products	20	13	10	20	19
Online collaborating with business partners to fore-cast product demands	14	11	10	16	13
Online management of capacity / inventory	16	12	8	17	28
Electronic exchange of documents with suppliers	44	37	33	37	48
Electronic exchange of documents with customers	37	31	31	37	37
Online negotiation of contracts	13	15	15	25	13

Base: EU-5 (D, E, F, I, UK), enterprises with internet access (N=3128 for all sectors, N=449 for Tourism). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising …% of employees"). Reporting period: March 2003.

Source: *e-Business W@tch* (2003)

7.2.6 Purchasing online

44% of the tourism enterprises in the sample purchase online in 2003 and 6% plan to purchase online by March 2004. However, the majority of those enterprises that purchase online buys only small amounts on the Internet. 40% of the online purchasers make less than 5% of their total purchases online and 28% make 5-10% of their purchases online.

The websites of other companies are the preferred way to procure online: enterprises representing 84% of the tourism employees choose this means – exactly the all-sector average. E-procurement via EDI (43%) is much more common than in other industries (25%) in contrast to e-procurement via extranets of suppliers (24% versus 31% in all sectors) and through electronic market places (23% versus 31%). Enterprises representing 14% of the tourism employees stated that their ICT system is integrated with that of a supplier for placing orders.

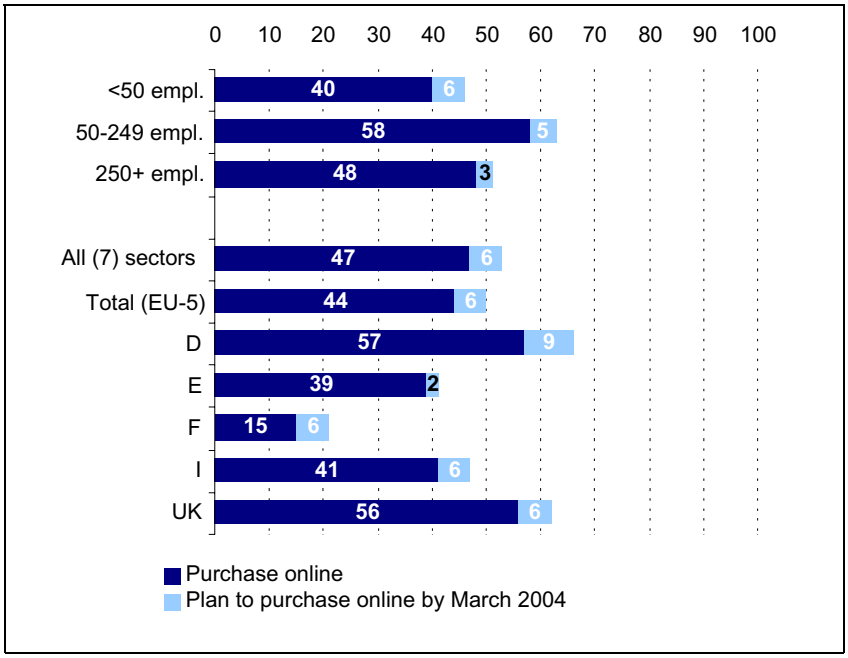
[3] E-mail was excluded to prevent artefacts of e-business usage. An example for an online collaboration tool is a “restricted area” in a website where business partners can communicate.

Exhibit 7-10: Tourism industry: Companies purchasing online (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for EU-5 total, for all sectors and for countries weighted by employment ("enterprises comprising …% of employment "). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



7.2.7 Marketing and sales

74% of the tourism enterprises in the survey have some kind of a web presence and 10% plan to implement one. A website content management system that allows different departments to access the website and update information is used by 33% of the tourism firms.

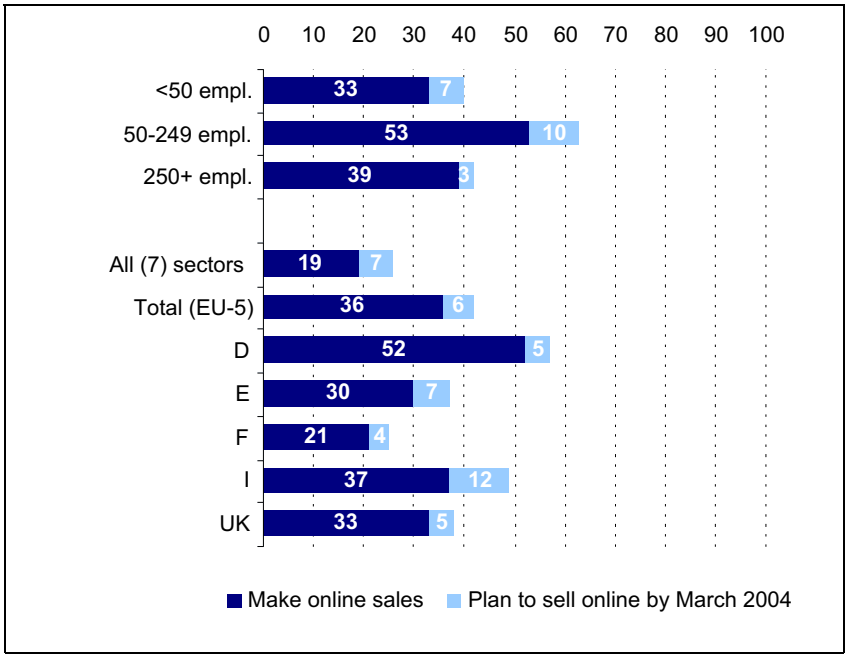
36% of the tourism firms sell online and 6% say they plan to do so. This is significantly more than the all-sector average of 19%. The importance of online travel booking has also been revealed in other studies. According to Marcussen (2003) the online travel market was worth 7.6 billion Euro in 2002, accounting for 3.6% of the travel market. However, although the frequency of companies selling online is high, the survey suggests that, with respect to intensity, the Internet is not yet a very important sales channel. Around two thirds of the online sellers sell less than 5% of sales are conducted online and another third reports sales of 5-10%. Browsing and pre-sales information gathering, which is not included in these statistics, may have a higher importance, though.

Exhibit 7-11: Tourism industry: Companies selling online (2003)

Base: EU-5 (D, E, F, I, UK), all enterprises (N=502).

Figures for EU-5 total, for all sectors and for countries weighted by employment ("enterprises comprising …% of employment offer support"). Figures for company size-classes in % of enterprises in the respective size-band. Reporting period: March 2003.

Source: *e-Business W@tch (2003)*



7.2.8 E-business development 2002 – 2003: main trends

The *e-Business W@tch* carried out two enterprise surveys based on similar questionnaires in June 2002 and in March 2003. This makes it possible to identify trends in the diffusion of e-business applications and practices in the tourism sector, as this was one of seven sectors included in both surveys. However, the comparison of survey results in a sector which is as heterogeneously structured as the tourism sector meets some challenges. The findings depend to a large extent on the weight of each of the sub-sectors included in the surveys (for example, accommodation, scheduled air transport, intermediation, amusement). The two surveys differ slightly in sub-sector composition insofar as the accommodation sub-sector was represented slightly more in the second survey compared to the first one, and vice versa for the intermediation sub-sector. This affects the survey outcomes because the accommodation sub-sector tends to have a lower e-business use than the intermediation sub-sector. In order to allow for a trend discussion, these two sub-sectors, which comprise 85% of the interviews in the tourism sector in both surveys, are considered separately in the following. Notwithstanding this restriction in comparability, some trends of e-business use in the tourism industry can be identified and are presented in the following paragraphs.

Online purchasing

In both sub-sectors the share of enterprises purchasing online was significantly larger in the 2003 survey. In the accommodation sub-sector, the share of online purchasers increased from 30% to 41%, in the travel agencies and tour operators sub-sector from 44% to 73%. Plans to purchase online were also reported to be larger; among accommodation firms the level increased from 7% to 15% and among travel agencies and tour operators from 3% to 25%. The practice of online procurement appears to have gained much importance in the travel industry in the past twelve months. If all travel agencies and tour operators realise their online procurement plans, almost all firms in this sub-sector will be online procurers in the near future.

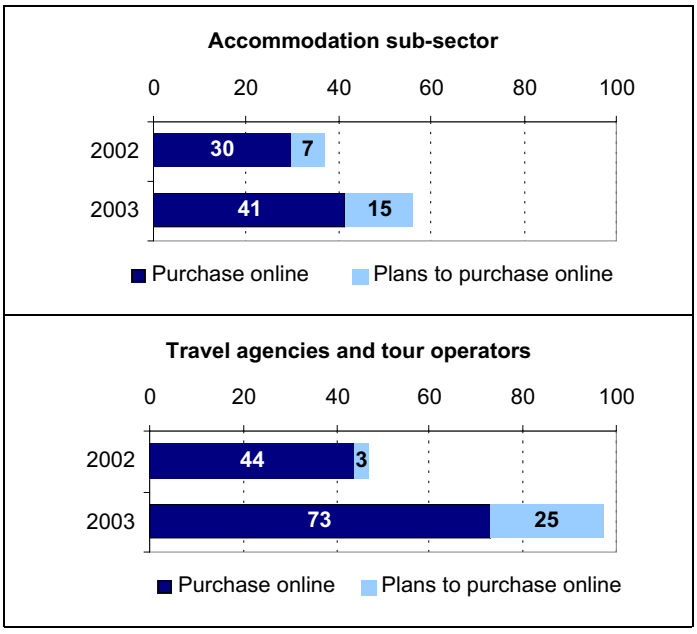
Exhibit 7-12: Tourism industry: Online procurers and plans to procure online in survey 2002 and 2003

Base: EU-5 (D, E, F, I, UK), all enterprises (accommodation suppliers: N=271 in 2002 and 338 in 2003; travel agencies and tour operators: N=153 in 2002 and 92 in 2003).

Figures weighted by employment ("enterprises comprising …% of employees").

Reporting period: June/July 2002 and March 2003.

Source: *e-Business W@tch* (2003)



Marketing and sales

The 2003 sample included slightly less firms of the accommodation sub-sector that sell online – 39% versus 34%, while plans to sell online within one year were the same (5%). Integration of online orders in the back-end system was the same in both samples (17%).

The share of enterprises reporting highly positive impacts of online sales on overall sales volume remained also the same, while the level of firms reporting slightly positive impacts on sales volume increased from 39% to 68%. This may suggest that online orders of hotel rooms and other accommodation have become more popular in the past year.

In the travel agencies and tour operators sub-sector, the level of online sellers in the 2003 sample was much larger than in 2002: 53% versus 33%. This may reflect a high level of online selling plans in 2002 (15%) that were realised. The level of enterprises reporting that online orders are integrated with the back-end system was almost the same in both surveys (25% versus 23%).

Exhibit 7-13: Tourism industry: Online sellers and plans to sell online in survey 2002 and 2003

Base: EU-5 (D, E, F, I, UK), all enterprises (accommodation suppliers: N=271 in 2002 and 338 in 2003; travel agencies and tour operators: N=153 in 2002 and 92 in 2003).

Figures weighted by employment ("enterprises comprising …% of employees").

Reporting period: June/July 2002 and March 2003.

Source: *e-Business W@tch* (2003)

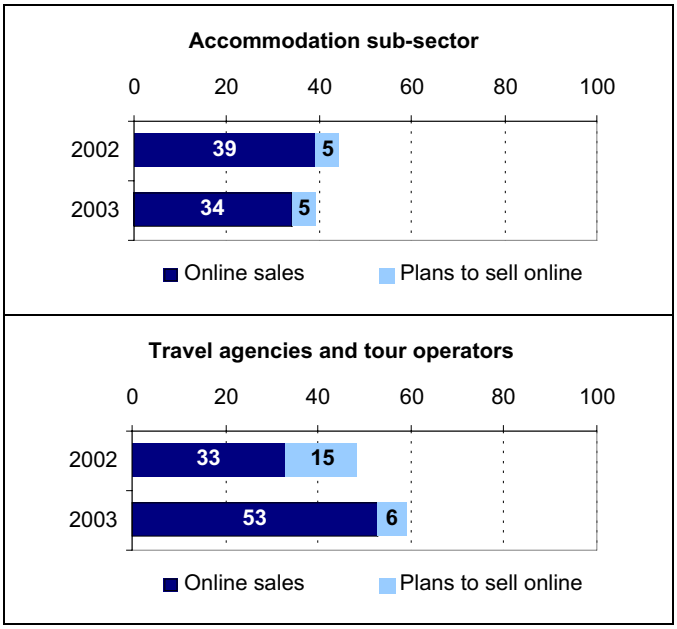
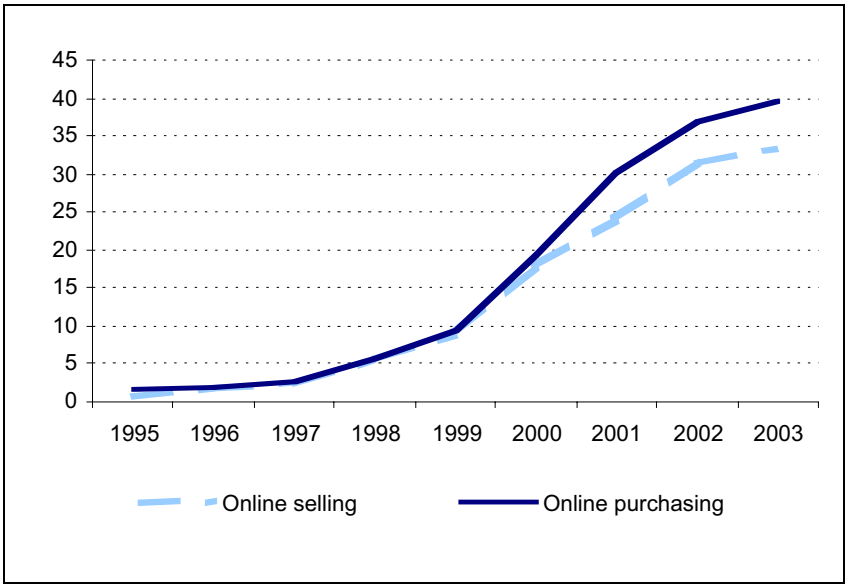


Exhibit 7-14: Tourism industry: Diffusion of online selling and e-procurement (1995-2003)

Base: EU-5 (D, E, F, I, UK), enterprises procuring online (N=218). In cumulated % of enterprises having started to sell/procure online in the respective year. Data in % of enterprises.

Reporting period: March 2003.

Source: *e-Business W@tch* (2003)



7.3 Conclusions

7.3.1 Economic implications

E-business has had more intense impacts on tourism enterprises than on firms in other sectors. Enterprises representing 30% of the tourism employees reported that e-business has changed the organisational structure, 38% stated a change of internal work processes, 37% of customer relationships, and 33% reported a change in the offer of products and services. In all these cases the all-sector average of reported changes are smaller. The largest difference between tourism and the other sectors, 10 percentage points, is recorded for “change in the offer of products and services”. This complies with the relatively high level of tourism firms having a website and selling online as well as with the large importance of the website as a distribution medium for online sales in the tourism sector.

A breakdown of e-business impacts by company size class reveals significant differences between large, medium-sized and small firms. With regard to customer relationship, relationship to suppliers and offer of products and services, medium-sized firms reported the largest changes. Thus medium-sized firms experienced the largest impacts in the business processes oriented towards the outside world. In contrast, large firms stated the most intense impacts in internal work processes. As regards the organisational structure, all three size classes perform equal values.

Tourism: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **Improve customer relationship**: E-business offers opportunities for enhancing customer relationship through the implementation of innovative e-CRM systems. Examples are frequent flyers clubs. Tourism companies can rely on long-existing customer databases and the content of those can be fully exploited for marketing purpose. Considering the opportunities of CRM, the diffusion rate of 13% appears to be rather low compared with the all-sector average of 16%. • **Cost reductions in procurement**: About 44% of the tourism companies procure online and the percentage of SMEs undertaking online procurement outperform large firms. The reported effects on costs and efficiency of internal process indicate that e-procurement is likely to become more and more a key success factor in a scenario where price competition is getting fiercer. • **E-Marketing**: Online promotion and sales offer particular opportunities to tourism enterprises as they can be a means to increase the volume of sales, the number of customers and the quality of customer service. The survey shows that the opportunities are assessed to be larger than in other sectors. The benefits of interactive relationships are economically difficult to quantify; they comprise a variety of features that are generally considered as positive in reducing costs through reviewing and improving organisational inefficiencies and activities through open and trusted communication.	• **Threat for intermediaries**: E-business poses new challenges to the players who are more directly threatened by the process of dis-intermediation. Traditional intermediaries, such as travel agencies, will have to enhance their ability to propose tailored services such as help in selection, personal contacts, trust and proximity. • **Digital divide**: Micro businesses that do not adopt ICTs because they lack capital and skills may be destroyed. • **Skills development**: The analysis of skills development indicators shows that the tourism industry makes less efforts than other industries to maintain and enhance its ICT knowledge base. The level of search for ICT specialists is only half the all-sector average, and the level of ICT training offers is lower. These are hints that the tourism industry may run the risk of slightly neglecting its ICT knowledge base. The findings reflect the fact that the tourism industry in general neglects training and underpays its employees which is partly due to the seasonal character of business.
Enablers	**Barriers**
• **"Do-it-yourself"**: Dis-intermediation and the corresponding cost effects are a driver of e-business. The Internet can be used as a complementary sales channel, offering the possibility to sell most of the services directly to the final customer, from air tickets to hotel stays, from "all inclusive" packages to theatre tickets and events. • **Re-intermediation** takes place in the form of the entry of new e-intermediaries that use the Internet as a cost-reducing communication channel between customers and, for example, tour operators.	• **Investment costs**: Despite the important results achieved, it will be necessary to make further efforts to increase the adoption of new technologies in the tourism sector. This applies especially to SMEs which are so relevant for the industrial structure but which are mostly "held back" by the limits deriving from the available resources, the existing managerial culture and know-how. • **Self-cannibalisation**: Large firms also appear to have difficulties in adopting e-business practices as far as relations to the outside world are concerned. Conflicts with traditional sales channels, notably tourism intermediaries, as well as internal inertia and a focus on mass tourism through integrated networks may be important reasons for large firms being outperformed by medium-sized firms with regard to online procurement, online sales and online business collaboration.

Implications for the industry structure

E-intermediaries emerged as new players in the tourism sector

The Internet has given birth to new players in the sector. Besides online agencies, new e-intermediaries such as travel portals and regional and local tourist portals play quite an important role. Travel portals offer tourist products which can be quite complex and require know-how and bargaining power. The e-intermediaries have reached a state of certain maturity with mergers taking place. In the future, other intermediaries such as GDS and tour operators will have to justify their value added.

New forms of interaction between customers and suppliers through the Internet

The Internet has become the new medium for interactions that were previously carried out through different means. For example, hotels and their customers may communicate via e-mail or web-based forms supplementing or replacing communication on the phone or by fax. The Internet has also allowed direct interaction between customers and suppliers, e.g. between travellers and tour operators, and it is thus impacting on the role of traditional intermediaries leading to dis-intermediation. There is a drive towards ICT-enabled services such as e-tickets.

Possible benefits for small enterprises through more direct communication with customers

By facilitating direct communication between customers and suppliers, the Internet can have a significant impact on "do-it-yourself" tourism. This may offer particular opportunities to SMEs. Unlike larger tourism organisations, such as hotel chains and holiday villages, small enterprises, in order to satisfy customers, need a wide range of local support services such as restaurants, entertainment, sport and leisure. These are usually provided by other very small enterprises. "Independent" travellers who search for information about destinations, accommodation, travel conditions and prices may benefit from SME networks and local tourism organisations that promote, market and disseminate information on local tourism enterprises through local portals. This is a huge opportunity for small businesses but only a limited number of SMEs has so far realised this opportunity.

7.3.2 Policy issues

Support the diffusion of standardised systems

Largely supported by proprietary networks, tourism firms have been conditioned in the adoption of new technologies for their operation. It is important to ensure that all the players in the value chain can fully exploit the opportunities of e-business. Therefore, it is also required to carry out all those actions, both at a national and EU level, aimed at widespread technologic progress: increasing Internet access speed, transaction security, the set-up of platforms and architectures for open and flexible systems to improve the management of internal and external exchanges and, at the same time, progressively lower ICT access costs for both companies and end-users.

Encourage collaborative SME initiatives

Co-operation among SMEs is a key challenge in a situation of increasing competition. The set-up of collaborative initiatives should be encouraged as this would support regional development policies. The Internet offers unique opportunities for collaborative initiatives aimed at promoting local and regional tourism. A few successful initiatives have been set up, based on the so-called Destination Management Systems (DMS). It is an integrated information system enabling the collection of all the tourist information and services required, making them available for promotion and sale through a website. Thanks to these activities, local SMEs can play a proactive role in promoting their business and can achieve important goals both in terms of promotion and sales. Local governments can act as co-ordinators, using ad-hoc committees managed by operators or an Internet marketing agency.

Build customers' trust through awareness raising actions and enhanced security.

Customers' hesitance has been highlighted as one of the major barriers to the performing of online sales. Customers are now well informed and aware of the price competitiveness of the Internet. They are however still reluctant to finalise their purchasing after collecting commercial information. The enhancement of customer awareness in terms of enabling them to recognise the advantages of e-business should be encouraged. Efforts to increase the level of secure online payment could also be helpful considering the fact the percentage of tourism firms operating with a Secure Sockets Layer is below the all-sector average.

Promote specialised research, education and knowledge transfer

Considering the relatively low level of training activities and ICT expert recruitment in the tourism sector, the research and education system could contribute more to e-business penetration in the tourism sector. Student education as well as political and business consulting in the tourism field may benefit from promoting tourism e-business in university research and teaching. Networks of excellence between public research institutions and tourism firms can be established and promoted to facilitate a transfer of knowledge about technology and business practice. Links to universities may also ameliorate difficulties of recruiting IT specialists.

References

Aharoni Y. (2002), "European Air Transportation: Integration, globalisation, and structural changes" presented at European Integration in Swedish Economic Research, Mole

Buhalis D., Licata M. (2002), "The future eTourism intermediaries", Tourism Management Vol. 23, pp. 207 – 220

Buhalis D., Spada A. (2000), "Destination Management Systems: Criteria for Success. An exploratory Research", in ENTER 2000 Conference Proceeding

Bywater M. (1992), "The European Tour Operator Industry", Special Report – The Economist Intelligence Unit

CST (a cura di) (1999): "Il franchising nel settore alberghiero e della ristorazione" , Franco Angeli

eCTRL – e-Commerce and Tourism Research Lab (2002), "User modelling and decision making in travel and tourism emergent systems", abstract from the eCTRL Workshop in Trento, April 9 -10, 2002

EITO, European Information Technology Observatory (2001), "European Information Technology Observatory 2001", Frankfurt a.M.

European Commission, DG Enterprise (2001), "SME commerce: project output report" chapter 7, pag. 152-177

IBIT (2001): "Study on Electronic commerce in the value chain of the tourism sector"

ICT (2001): "E-commerce and development report" – Part 2, chapter 3, pag. 3-24

Franch M., Mich L. (2001), "Un modello per la valutazione dei siti web", Università di Trento – Dipartimento di Informatica e Studi Aziendali

Marcussen C.H. (2003), "Trends in European Internet distribution – of travel and tourism services", updated 28 April 2003, http://www.crt.dk/uk/staff/chm/trends.htm

Marcussen C.H. (2000), "Quantifying Trend in European Internet Distribution of Travel and Tourism Services", presented at workshop Information Technology & Strategic Tourism Management, University of Westminster, London

Martini U. (2001), "L'impatto di Internet sulla struttura del mercato turistico leisure", Università di Trento – Dipartimento di Informatica e Studi Aziendali

Minghetti V., Russo A., van der Borg J. (1998), "La diffusione delle tecnologie informatiche e telematiche nell'industria turistica italiana", Quaderno n° 20/98 CISET - Centro Internazionale di Studi sull'Economia Turistica

WTO, World Tourism Organization (1999), "Marketing tourism destination online".

WTOBC, World Tourism Organization Business Council (2001), E-business for tourism. Practical guidelines for destinations and businesses".

B.8 Electronic business profiles of other sectors

8.1 The media and printing industries

Sector profile

The media and printing sector, as defined by the *e-Business W@tch*, comprises sectors that produce media content (e.g., publishing, motion picture production, radio and television activities) and sectors of the economy that put content in a physical form suitable for traditional distribution (e.g., printing, reproduction of recorded media). Not included in this analysis are all downstream distribution channels for materialised content such as wholesale or resale of such products. The sector plays a relatively small role in the national economies of the EU – the production value accounted for 4.6% of total manufacturing production in 2000 and for 5.1% of total employment in manufacturing. However, the special importance of the media industries is not only constituted by their economic activities but also by their important function for democracy and culture.

NACE Rev.1		Activity
division	group	
22		Publishing, printing and reproduction of recorded media
	22.1	Publishing
	22.2	Printing and service activities related to printing
	22.3	Reproduction of recorded media
92		Recreational, cultural and sporting activities
	92.1	Motion picture and video activities
	92.2	Radio and television activities

In the year 2000, the publishing and printing sector in the EU (excluding Greece and Luxemburg) generated over 233 billion Euro of production value. Slightly more than 100 billion Euro of value added at factor cost was created. In the last few years the industry has been characterised by rapid growth. Between 1997 and 2000, the production value in the sector grew by 53%. Value added increased even faster, by 65%. Over 50% of the sector's total production value can be attributed to the publishing sub-unit (NACE 22.1).

Electronic business in the sector in 2002/03 - key trends at a glance

Digitisation has a profound impact on the media industries, as the services they deliver – the "content" – can potentially be fully digitised, making it independent of the medium by which they are delivered. This has resulted in the convergence of formerly independent industries (print, music, audiovisual). Previously clearly-defined industry structures are dissolving, and integrated media companies are emerging that cannot be defined within traditional sector boundaries. Traditional printing companies turn into cross-media service companies and traditional publishers into new media ventures, which publish across various distribution channels, such as Internet, wireless devices or CD-ROM.

Many of the major challenges that media and printing companies have to deal with today could potentially be facilitated and coped with through the use of ICTs and e-business applications. However, there are still many uncertainties as to how the electronic[1] / interactive publishing landscape will develop, and which applications will finally reach market maturity. Uncertainties are mainly caused by the two big questions that are critical for any new media service to be introduced: first, whether consumers (or professional users) will like it, and second, whether they will also be willing to pay for the service the required amount of money to make the service profitable for the operator.

Companies in this sector make extensive use of ICTs and e-business. Firstly, they use ICTs and e-business applications for the support of internal processes and B2B transactions such as procurement and production. Electronic procurement, however, is limited to a small fraction of inputs, since most

[1] The term refers to both the digitisation of the printing process (i.e. the technological advancement in the production of printed matter) and the digitisation of the delivery process to consumers (i.e. the delivery of information and entertainment services through electronic networks, in particular through the internet or via digital television).

inputs cannot be fully standardised and require face-to-face contact between buyer and seller. The use of ICTs plays a major role in the print transaction and production process. In text-based content production the use of ICTs is mainly confined to online content, in audiovisual content production the entire value-chain is increasingly impacted by the use of new technologies.

Secondly, companies use digital networks as new distribution channels on B2C markets to distribute online content products with new features and value added services. With rising availability of broadband connections audiovisual content will also increasingly be distributed over the Internet. In addition, the Internet enables companies from this sector to generate sources of income from not content-related sources, such as e-commerce. In this context, however, a problem for all e-commerce activities is that internet users have learned to regard the internet as a free gift and are very reluctant to pay for content (see for example the attempts of the music industry to offer music files for download). Furthermore, it will still take some time before a critical mass of consumers will have fast access to the internet which is a requirement for a number of online services that could be sold online in theory (for example, movies).

Media and Printing (6/2002) (NACE Rev. 1 D 22, O 92.1+2)		**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	50	91	100	74	67
	Have access to the internet	95	99	100	97	91
	Internet access with >2 Mbit/s bandwidth	11	34	47	28	24
	Remote access to company network	23	53	68	43	40
	Use an intranet	34	65	89	58	51
E-Commerce	Use EDI	12	28	35	22	23
	Use an extranet	8	31	45	25	19
	Sell online	17	35	36	26	17
	Make >10% of their sales online	5	6	15	8	5
	Purchase online	45	66	60	53	43
	Make >10% of their purchases online	15	12	18	14	13
	Trade on B2B e-marketplaces	5	5	14	7	7
E-Integration	Online tools for tracking working hrs. / prod. time	11	33	34	21	26
	Use e-learning applications	12	27	42	23	19
	Use CRM software	6	22	29	15	17
	Use SCM software	2	2	15	6	7
	Online collaborative product design	24	31	48	32	20
	Online management of capacity / inventory	10	17	35	20	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	27	40	54	39	33
	• customer relationship	27	30	36	31	27
	• relationship to suppliers	23	26	46	31	26
	• offer of products / services	23	28	39	30	21
	E-business constitutes significant / some part of how company operates today	54	62	72	63	55

Base: EU-4, 15 sectors, all enterprises (N=404 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.

Source: *e-Business W@tch* (2002/03)

Media and printing: E-business opportunities, risks, enablers and barriers

Opportunities

- **"Create once, distribute many"**: The digitisation of content enables companies to distribute their products online at low marginal cost over various distribution channels such as the Internet, wireless networks, cable and satellite. The combination of offline and online content distribution potentially allows for an increase in profit margins by exploiting cross-media publishing concepts.
- **Expansion into new markets**: As communication industries are converging, it becomes easier for companies to creatively expand the range of their services. Publishers, for instance, are diversifying into content syndication and e-commerce services and include new features in their products. Audio-visual companies have a variety of new distribution media and channels available such as pay-TV or interactive-TV.
- **Increased efficiency of workflows**: More than in other sectors, ICTs facilitate the workflow within media and printing companies and with their external business partners and customers. This decreases the costs of collaboration and of the whole (content) production process. In fact, according to survey results, sharing documents and performing collaborative work are considered as the most important uses of online technologies in the media and printing sector.

Risks

- **Uncertainty about acceptance of new services**: Launching new online services can require substantial investments in technology and content production. Many of the (digital) "opportunities" for media companies are therefore ventures in the strict sense of the word as the bursting dot-com bubble has shown. Ex-ante market research is difficult, as potential customers can only seriously assess the usefulness of a service once it is available. A risky process of trial and error is therefore to some extent unavoidable.
- **Investment pressure**: The high speed of technical change in the current period of transition requires companies in the media and printing sector to constantly invest in new technologies, even if they do not invest in new business opportunities, simply to remain competitive. In addition, employees in this sector are under strong pressure to keep up with technological change. They must be able to constantly adapt to changing technologies and need strong IT skills to make use of the new opportunities. Making the right ICT investment at the right time is a constant challenge.
- **Copyright issues** pose a major new challenge for companies in this sector. As ICT make it possible to create perfect copies of digital content and to distribute it world-wide via the internet, existing copyright schemes are being eroded. Adapting business models to this challenge is a major task for enterprises as well as for policy institutions, involving considerable risks for service providers.

Enablers

- **Production for small audiences**: Digital printing could make the production of very small volumes and personalised printing technically and economically feasible and thus be a viable method to overcome the high first-copy costs in traditional print production. Printers have started exploring print-on-demand and small-scale printing.
- **The knowledge society**: Although consumers are reluctant to pay for online content, their thirst for cool IT gadgets and applications is larger than ever, even in the current economic down-turn. The knowledge society is at the same time the age of the communication and media industries.

Barriers

- **Substitution effects**: New digital distribution channels will to some extent cannibalise existing media formats or revenue sources. For instance, the volume of classified ads in newspapers is decreasing due to corresponding online services with enormous added value for users (e.g. search options, extended regional coverage). Media companies are sometimes hesitant to launch services which they consider as "self-cannibalisation" (being oblivious of the fact that others will do it, if they don't).
- **Audience fragmentation**: The enormous increase in the offer of digital media services, on the internet and through digital television, leads to a fragmentation of the audience. It becomes more and more difficult to reach critical mass in such a highly competitive environment.
- **The internet as a "free lunch" (for consumers)**: Consumers have grown to expect content on the internet to be free. Commodity services are well accepted – as long as they do not cost anything. Consequently, media companies have started to cut back some of their ambitious online ventures.

8.2 The metal products industry

Sector profile

About 3.2 million people in the European Union are employed in companies manufacturing metal products. The sector accounts for every sixth enterprise and 6.3% of total production value of the EU manufacturing sectors. Typically, metal product companies are small enterprises that specialise in one particular product line or customer group and operate primarily on a local (or at most national) market. In comparison to other sectors, e-business potential for metal product manufacturers seem to be limited due to product characteristics, the predominance of small enterprises, and the local focus of business activities.

NACE Rev.1		Activity
division	group	
28		Manufacture of metal products
	28.1	Manufacture of structural metal products
	28.2	Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
	28.3	Manufacture of steam generators, except central heating, hot water boilers
	28.4	Forging, pressing, stamping and roll forming of metal, powder metallurgy
	28.5	Treatment and coating of metals; general mechanical engineering
	28.6	Manufacture of cutlery, tools and general hardware
	28.7	Manufacture of other fabricated metal products

Electronic business in the sector in 2002/03 – key trends at a glance

The potentials of e-business suggest that there should be a strong interest in the industry to engage in this new way of doing business. However, e-business is currently not a big issue in the metal products industry. Opportunities were mainly discussed during the hype around 2000, but the topic seems to have lost its appeal for the sector and is not an important issue at the moment. At conferences, fairs, and in industry publications, e-business issues currently play little if any role at all. Most of the available publications, statements, and initiatives date back to 2000 and early 2001. Since then, interest in the topic has plummeted. Even during the period of more intense interest, firms in the metal products sector did not rank e-commerce as a top priority business issue.

In the metal products sector, business is frequently conducted on the basis of personal and long-standing relationships with suppliers and customers. Firms are often specialised in a number of niche products and serve rather small market segments. The number of suppliers and customers for each individual firm is limited, leaving little room for efficiency gains from e-business tools such as CRM or e-procurement. Large shares of business are often based on fixed lot production for specific customers and thus not freely available for sale to an anonymous marketplace. This limits the potential benefits from online shop solutions or participation in industry marketplaces. Furthermore, for those products that are produced “on stock” and can be sold to an anonymous market because they are useable for different purposes and thus require a certain degree of standardisation, producers often fear pressure on price margins from online competition more than they value the potential for increasing market reach and acquiring new customers.

The need for collaborative engineering or other forms of data-intensive communication with business partners is also limited. Metal products are often interim products that are not very engineering-intensive. Customisation of production and engineering exists, but does not require interactive development to an extent that would justify investing in full-scale Internet-based product development solutions.

For these reasons, and also because of the predominance of small enterprises, the heterogeneity of products, and the local focus of business activities, e-business opportunities are limited in the metal products sector compared to other industries.

The results of the e-Business Survey 2002 confirm this assessment. Compared to the sector average, firms in the metal products industry are less frequently equipped with online technologies to support internal processes, such as CRM, sharing documents online, or e-learning. In two applications, however, the sector outperforms the average: This is in the usage of ERP systems (25% in metal products, 20% on average) and in Internet-based Knowledge Management solutions (12% in metal, 10% on average). Eventually, positive experiences made with these technologies will lead to the adoption of other e-business tools for internal processes as well in the future.

Manufacture of Metal Products (NACE Rev. 1 D 28)		**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	39	84	97	62	67
	Have access to the internet	84	100	100	92	91
	Internet access with >2 Mbit/s bandwidth	5	13	20	10	24
	Remote access to company network	15	36	60	29	40
	Use an intranet	27	51	66	42	51
E-Commerce	Use EDI	7	26	57	22	23
	Use an extranet	3	11	27	10	19
	Sell online	5	9	6	6	17
	Make >10% of their sales online	1	<1	<1	<1	5
	Purchase online	24	40	58	35	43
	Make >10% of their purchases online	4	5	0	3	13
	Trade on B2B e-marketplaces	1	7	14	5	7
E-Integration	Online tools for tracking working hrs. / prod. time	16	33	36	25	26
	Use e-learning applications	11	13	18	12	19
	Use CRM software	2	7	15	6	17
	Use SCM software	1	6	13	5	7
	Online collaborative product design	13	17	20	16	20
	Online management of capacity / inventory	7	13	19	11	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	19	27	21	21	33
	• customer relationship	21	22	19	21	27
	• relationship to suppliers	18	22	8	16	26
	• offer of products / services	14	12	7	12	21
	E-business constitutes significant / some part of how company operates today	38	42	51	41	55

Base: EU-4, 15 sectors, all enterprises (N=436 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.

Source: *e-Business W@tch* (2002/03)

Metal products industry: E-business opportunities, risks, enablers and barriers

E-business opportunities	E-business risks
• E-business helps to expand into new regions and win new customers within domestic markets, to support staff at foreign locations, and to improve customer service and sales. • Excess supply can be sold in online auctions, which optimizes inventory and reduces related costs. Inventory can further be reduced by improving communication with key customers. In addition, participation in online auctions offers the opportunity for first-time contacts with new customers. • Streamlining procurement and sales activities, and speeding up the transaction processes offer potential for cost savings. • Internet-based B2B services help to outsource elements of administration processes without losing control and efficiency. • Internet presence helps to improve a company's image and visibility. A corporate website has also proved to be an efficient means of communicating products and services, and of sharing information with interest groups.	• IT investments must compete against investments in product improvements, new production machinery, or personnel, which might offer comparable or better return on investment. Investments are therefore subject to opportunity costs. • Perfect information and transparency of online marketplaces can lead to ruinous price competition and eroding of profit margins. • Due to technical concerns and insufficient e-business skills, companies face implementation risks.

Enablers	Barriers
• Large enterprises, often pioneers in e-business adoption, exercise pressure on their supplier base to connect to their e-procurement or SCM systems. Offering electronic transactions might thus become a prerequisite for market participation. • Intense competition creates pressure to experiment with new technologies, to improve cost structures, production, logistics, customer service, and to gain access to new markets and customers. E-business offers a variety of tools to support these objectives and to implement the strategies accordingly. • Access to technology does not appear to be a problem. Necessary communication infrastructures are widely implemented, ranging from high-quality telephone networks, computing hardware, and a range of competing software and network access suppliers that vie for business.	• Implementation and maintenance costs are a major barrier to e-business initiatives, especially for small firms with tight budgets. • The introduction of e-business often requires the re-engineering of business processes: although this is an opportunity to improve overall business performance, changes to the work routines can easily lead to conflicts. • The implementation of e-business technologies and process re-engineering requires extensive training and motivating measures. This is costly, time-consuming, and often seen as an impediment to doing “productive work”. • Industry specific online marketplaces are missing in the metal products sector. Since portals and industry specific online marketplaces are subject to network effects, a critical mass of users is required to “take off”. In the metal products sector there is no sign of an industry marketplace or portal that is close to reaching critical mass. Thus, an important part of e-business infrastructure is missing. • Lack of data standards leads to misunderstandings and cumbersome communication. • Lack of fairness and transparency: Much of the resistance of metal products suppliers to engage in online trading stems from buyers’ strategies of using e-procurement primarily as a tool to reduce prices, without adequately considering the interests of their suppliers.

8.3 The machinery and equipment manufacturing industries

Sector profile

The machinery and equipment sector is one of the largest branches in the European manufacturing industry, accounting for about 10% of EU production value and employing more than 10% of manufacturing workforce (about 2.7 million people). The sector achieves a production value of 395 billion Euro. The industry outputs in the machinery and equipment sector do not go directly to consumers. Customers are companies in other sectors and the machinery supplied allows them to produce consumer goods, or to carry out their business (from aerospace, automotives, agriculture and construction, to packaging). As a consequence, Europe's ability to be competitive in other sectors, such as in manufacturing generally, hinges on the products and services provided by machinery and equipment manufacturers: For example, 65% of innovations in manufacturing are supported by technology embodied in machinery and equipment (Eurostat innovation, 2001).

NACE Rev.1		Activity
division	group	
29		Manufacture of machinery and equipment
	29.1	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
	29.2	Manufacture of other general purpose machinery
	29.3	Manufacture of agricultural and forestry machinery
	29.4	Manufacture of machine-tools
	29.5	Manufacture of other special purpose machinery

Electronic business in the sector in 2002/03 – key trends at a glance

The major business focus within the machinery and equipment manufacture sector is on improving customers' productivity, reducing manufacturing down-time and adding value to their products and services. In this respect, the adoption of ICTs and e-business will play a critical role in the ability of European machinery and equipment manufacturing enterprises to sustain their current position of world-class manufacturers.

Within machinery and equipment manufacture there are several strategies upon which companies can develop their market, and these affect the business drivers for e-business uptake. The first type is series product supply, which is generally used by machine tools and sub-component equipment manufacturers. Within this strategy price and standardisation are often decisive factors for gaining market share. The second type of marketing strategy is customised engineering machinery and equipment supply. This includes machinery and plant, which tend to comprise new or modified components. Significant negotiation between the manufacturer and client is required, especially between technical staff. The last type of market strategy tends to be know-how focused. Companies here lead a technological niche where intellectual property is a key to market access. This activity tends to be information intensive, with significant exchanges between client and producer, often involving third party intermediaries such as research institutions. There are significant opportunities here for ICTs and e-commerce to increase a company's ability to become a global market player.

Within manufacturing, supply chains constitute the fabric of the sector, and machinery and equipment manufacturing is no exception to this. In fact the sector's supply chains are both broad and deep. Technological developments filter through these supply chains, enabling improved products and processes (for example improved energy efficiency, increased safety, higher productivity machines). Here, interchange between suppliers and customers are key to driving these innovations. But the costs of modified designs are high, and competition fierce. Against this backdrop, many within the industry predicted a fertile ground for e-business investment. As such, prophecies on the widespread transformation of the sector were predicted. Many scenarios were explored, and illustrated the rise of Internet based sales, procurement and information exchanges, with production in the middle being linked to both. This would produce virtual chains of enterprises and potentially new sales routes.

However, the finding of the e-Business Market Watch Survey revealed that the impact of e-business upon the sector is still limited. Up until the year 2000, many enterprises considered e-business as a periphery IT issue with little strategic implication. Since then the sector has undergone significant change, and whilst it is still playing catch up in some e-business activities, in some it is ahead of the industrial average.

An important aspect is this context is that the re-configuration of manufacturing islands of activity, to align procurement, design, manufacture, production, and the installation of SCM and ERP systems was seen as significantly increasing technological risk. Companies either had to outsource such development, weighing up the risks of cost escalation, or undertake it in-house (with very small IT departments or limited capability). The costs of front-end development and the complexities of back-end development present significant risks for SMEs; consequently this sector tends to address these issues by simple, pragmatic and small/timely investment.

	Manufacture of Machinery and Equipment (NACE Rev. 1 D 29 exc. 29.6+7)	**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	55	88	81	75	67
	Have access to the internet	90	99	94	94	91
	Internet access with >2 Mbit/s bandwidth	8	14	42	29	24
	Remote access to company network	18	38	59	43	40
	Use an intranet	32	55	78	60	51
E-Commerce	Use EDI	8	15	36	24	23
	Use an extranet	5	15	20	15	19
	Sell online	6	3	12	8	17
	Make >10% of their sales online	2	1	1	1	5
	Purchase online	32	49	59	49	43
	Make >10% of their purchases online	5	9	5	6	13
	Trade on B2B e-marketplaces	3	5	19	11	7
E-Integration	Online tools for tracking working hrs. / prod. time	13	35	66	45	26
	Use e-learning applications	10	15	29	19	19
	Use CRM software	4	6	30	18	17
	Use SCM software	3	5	13	8	7
	Online collaborative product design	18	16	18	18	20
	Online management of capacity / inventory	8	9	12	11	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	19	30	35	30	33
	• customer relationship	20	23	18	20	27
	• relationship to suppliers	19	31	23	24	26
	• offer of products / services	17	9	16	15	21
	E-business constitutes significant / some part of how company operates today	49	57	63	58	55

Base: EU-4, 15 sectors, all enterprises (N=434 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.
Source: *e-Business W@tch* (2002/03)

Machinery and equipment: E-business opportunities, risks, enablers and barriers

Opportunities

- **Enhanced communication** between employees, suppliers and customers can decrease transaction costs and pave the way for innovations. Nevertheless, employees' access to ICT in this sector is still below average.
- E-market solutions can help to **foster transparency within supplier-buyer relationships**, as both the buy-side and the sell-side are highly fragmented. At the same time, high distribution costs can be lowered by e-business applications.
- Automated back office processes lead to important **reductions of administrative costs**, removing the execution of highly repetitive tasks by employees.
- Online selling and the corresponding after-sales services can **increase customer satisfaction** to a large extent. Regarding the investments in online selling technologies there were significant differences between countries and company sizes, with obvious advantages for large enterprises.
- The machinery and equipment sector has to deal with the transition from mass manufacturing to automated production techniques. ICTs and e-business tools **improve the productivity and flexibility** of firms, even if the degree of their applicability varies within the industry.

Risks

- **Technological risk**: The implementation of ICT and e-business solutions was seen as a significant technological risk. Companies either had to outsource this process, taking the risk of cost escalation, or to exercise it in-house with very small IT departments or limited capabilities. Both possibilities constitute substantial hindrances for SMEs. Thus, companies in this sector tend to address these issues by simple, small and immediate investments.
- **Online marketing is not core-competency**: Maintaining website services requires various technical functions that are not core competencies of machinery and equipment manufacturers. This is confirmed by the survey, as web hosting, web design and the maintenance of websites are carried out by external service providers. Even with significant outsourcing of web activities and in some cases the introduction of online sales, the usage of content management systems is limited.

Enablers

- **Facilitated intermediation with third parties**: Within several sub-sectors of the machinery and equipment industry, intermediation by third parties plays a crucial role in the distribution of products. However, ICTs and e-commerce allow suppliers to transact directly with buyers, pushing dis-intermediation forward. The position of intermediaries will be determined by the type of value added services they provide, and by the degree of price transparency they provide. Therefore, e-marketplaces can be expected to gather momentum.
- **B2B e-marketplaces**: Industry consortia have build up own independent e-marketplaces. These marketplaces can be classified into buyer driven and seller driven e-markets. Whereas the former are created to optimize the purchases of large enterprises, the latter are found by supplier companies. Both types of private e-marketplaces can help to increase price transparency and to create more intense relationships between buyers and sellers at the same time.

Barriers

- A major barrier to e-business are the necessary **implementation costs**, especially for small and medium sized enterprises.
- The processing of online sales **requires security measures** such as the presence of a secure socket layer (SSL) and is further supported by extensive features (for example online payments or after-sales services). Our survey reveals that the diffusion of these technologies in the machinery and equipment industry is still well below the all sector average.
- Another important barrier is the **lack of online customers** and the reluctance to buy online. More than half of all companies considered these points as hindrances for a further spread of online selling.
- Some products within this sector have limited production runs, high capital intensity, and complex equipment. They do not therefore lend themselves to online sales. Three quarters of the interviewed firms considered this as a major issue.
- More than half of the firms stated that the **adaptation of the corporate culture** to e-business was difficult.

8.4 Credit institutions and leasing enterprises

Sector profile

It is estimated that there are about 300,000 financial services enterprises in the EU. Of these, more than half (56%) had no employees at all (mainly self-employed persons) and over a third (38%) had between 1 and 9 employees. Altogether, however, these very small enterprises (most of which were financial auxiliaries), whilst numerous, did not account for a significant share of activity, as they accounted for just 12% of employment and 4% of turnover. The *e-Business W@tch* focuses on a sector within this industry that includes all of the financial intermediation activities – whether they are monetary or not – except insurance and pension funds as well as financial auxiliaries.

NACE Rev.1		Activity
division	group	
65		Financial intermediation, except insurance and pension funding
	65.12_652	Total credit Institutions
	65.12	Other Monetary Intermediation
	65.22	Other credit granting

Electronic business in the sector in 2002/03 – key trends at a glance

The banking and other financial services sector is one of the most advanced in the usage and diffusion of technologies. Being essentially information business, they do not produce physical products and have been trading electronically for decades. For these reasons hardly any other sector is better suited for e-business which, in fact, is progressing very quickly. ICT impacts on all aspects of the activity and is undoubtedly one of the main driving forces in the sector.

In the past decades, technological advances had already allowed increasing internal efficiency, more recently they have also increasingly influenced delivery methods. Presently, investments are progressively shifting from the management of operational needs (such as year 2000, euro conversion) to the improvement of core internal processes, customer management and marketing. The increasing sensitivity towards more efficiency in core processes is forced by the decreasing profit margins and the turbulence of capital markets.

The results of the survey support a view of Internet (and new ICT in general) as complementary elements and not as predominant assets within the ordinary activity of financial institutions. Almost half of the banks state that electronic business does not play a role in their operations, 41% of banks declare that e-business will play some part in their activities, while only 9% of banks report that e-business constitutes a significant part of their business. According to the empirical findings, it seems that banking activity is very much based upon traditional commercial transactions and that new technologies have a more significant impact on the efficiency of internal processes than on the overall business activity of the banks. This goes against some common but misleading statements that banks will substitute their activity with Internet-based transactions.

One of the main effects of technological development in the retail financial sector regards the size and distribution of physical branches across the territory and the role of other physical (ATM, POS) or remote (telephone, Internet) channels. So far there is no significant evidence that the development of e-banking creates excess capacity. European banks are scaling down their physical network more slowly than expected, in a few cases a further expansion is taking place. Local units, being the physical contact points with customer, are far from losing their role. On the whole, the trend is towards diffused and distributed networks serving customers through the various channels according to different needs. A reduction in the number of branches is likely to be expected in the long-run and this will be conditional upon the spread of e-banking and the competitive and pricing pressure exerted by new more cost-efficient competitors in the sector.

The advent of open network architectures and a sharp reduction in costs have made computerised transactions between financial institutions and clients, which were previously the preserve of relatively

few large companies, available to the broad community of enterprises. Main developments in the B2B market have been:

- The development of Electronic Trading Systems, such as ECNs, are increasingly impacting the competitive scenario through price competition because they have blurred the roles of the different market operators, brokers and market makers, and the market themselves.
- Developments fostered by technological innovation have impacted both the retail bond market but mostly the wholesale fixed income markets. At the end of 1998, most wholesale markets in the EU were telephone based while now they depend heavily on electronic trading also in Europe.
- The creation of digital marketplaces for non-financial firms is a way for banks to expand their role as intermediaries, combining traditional banking business with a broader range of value added services in connection with e-commerce and tailored to the needs of the firms engaged in e-commerce.

Credit Institutions and Leasing Enterprises (NACE Rev. 1 J 65.12, 65.2)		**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	56	87	100	95	67
	Have access to the internet	94	100	94	94	91
	Internet access with >2 Mbit/s bandwidth	14	35	33	34	24
	Remote access to company network	25	26	48	45	40
	Use an intranet	42	81	80	74	51
E-Commerce	Use EDI	13	17	36	33	23
	Use an extranet	12	42	32	29	19
	Sell online	10	25	36	32	17
	Make >10% of their sales online	2	2	16	13	5
	Purchase online	37	52	34	37	43
	Make >10% of their purchases online	10	12	4	7	13
	Trade on B2B e-marketplaces	4	5	1	2	7
E-Integration	Online tools for tracking working hrs. / prod. time	8	17	39	34	26
	Use e-learning applications	23	19	39	34	19
	Use CRM software	8	18	45	39	17
	Use SCM software	1	0	3	2	7
	Online collaborative product design	9	11	23	21	20
	Online management of capacity / inventory	4	7	18	17	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	29	46	47	45	33
	• customer relationship	21	46	51	48	27
	• relationship to suppliers	24	33	24	25	26
	• offer of products / services	21	32	43	39	21
	E-business constitutes significant / some part of how company operates today	49	68	72	70	55

Base: EU-4, 15 sectors, all enterprises (N=402 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.
Source: *e-Business W@tch* (2002/03)

Credit institutions: E-business opportunities, risks, enablers and barriers

E-business opportunities

- **Reducing costs per transaction**: The first goal is to shift highly standardised low value-added labour intensive activities towards computerised applications capable of reducing the unit price of a transaction. Research in different countries has demonstrated significant cost structure differences for communication and transaction channels, with increasingly innovative ICT and e-business channels significantly reducing operational costs.
- **Broadened and easier access to target customers**
- **Improved customer service**: Technology offers more efficient systems (for instance CRM) and techniques for dealing with information on customers. Internet allows companies to market more precisely than ever before.
- Possibility of diversifying into **new business fields**
- More efficient tools for controlling **internal processes efficiency**

E-business risks

- **Increased competition from financial and non financial institution:** e-banking widens the categories of competitors since access is open to non-banking players endowed with a portfolio of customers (Lufthansa, Tesco & Safeway are typical examples) to whom it is also possible to offer other financial services. As a result, banks have been losing their traditional monopoly and are now challenged by new aggressive competitors, including supermarket chains, insurance companies, post offices and telephone companies. In addition, new organisational structures have lead to increasing separation of the vertical value chain.
- **increase in investments** required for establishing and managing the information systems
- **Operational, legal and strategic risks**: Legal risks are related to the uncertainty about a number of regulatory aspects. Operational risks are inherent to the technological development necessary for systems to cope with increasingly complex operational environments, and strategic risks are related to the amount and type of technological investments required.

Enablers

- **Information intensive sector**: Information has a crucial role in the banking activity. It constitutes the core asset of the sector. Therefore, the sector is predestined for using ICT and e-business solutions for enhancing information processing. The technological change in the ICT area enhances the functionality of the banks in terms of availability of information. This increases the reliability of decisional processes and the integration at the internal and external level through the improvement and standardisation of the technical systems
- **ICT determines the delivery of services**: The technological development in this area not only brings about an innovative business thinking, but also affects the design and delivery of financial services and plays a relevant role in determining the dynamics of this business.

Barriers

- **No additional revenues from internet**: Internet appears unable to create new market opportunities for additional revenues that can counterbalance the drop in revenues through increased competition. In this phase the unit prices of all products distributed via the internet undergo a reduction which varies from 10 to 50%. As a result customers' mobility increases which require greater investment in brand promotion and service provision – increasingly requiring subsequent investment in IT & e-service provision.
- **Security and privacy issues**: The Internet has progressively become a more "familiar" technological platform than before, but end users are still concerned about their privacy and are reluctant about providing data to firms.
- **High skills requirement**: The development and implementation of new online services requires hybrid skills at the technology/business interface. In addition, it is crucial that banks focus not only on the development of skills concerning technical procedures, but also on the accumulation of capability aimed at making end users aware of the value of different services.

8.5 Insurance and pension funding services

Sector profile

The insurance sector covers long and short-term risk spreading activities. The relevant NACE Rev. 1 chapter 66 comprises three basic activities: “Life insurance” includes common life insurance and life reinsurance with or without a savings component. “Pension funding” includes the provision of retirement incomes, but not non-contributory schemes where the funding is largely derived from public sources, nor compulsory social security schemes. "Non-life insurance" comprises insurance and reinsurance of non-life insurance business, e.g. accident, fire, health, property, motor, marine, aviation, transport, pecuniary loss and liability insurance.

NACE Rev.1		Activity
division	group	
66		Insurance and pension funding, except compulsory and social security
	66.01	Life insurance
	66.02	Pension funding
	66.03	Non-life insurance

According to the European Insurance Committee, about 4,800 insurance companies were active in the EU in 2000, a 3.8% decrease from close to 5,000 in 1992. Employment in EU insurance firms was estimated at around 900,000 persons in 2000, which was slightly less than 1992. There is a trend towards large insurance or financial groups which operate on a European level and dominate the market. However, these are leaving space for specialist insurers on a national or even regional level.

Electronic business in the sector in 2002/03 – key trends at a glance

Insurers have invested enormous sums in the extension of their Internet activities. The “pioneers” in the Member States have realised useful, interactive and modern Internet presentations. However, these are largely information-oriented and more factual than exciting. This is mainly due to the peculiarities of the insurance product, but also due to the insurance sector's lack of marketing history. In contrast to other sectors, insurers' online presentations are often judged to be conservative and boring. E-business practice in European as well as American insurers is – except for genuine online insurers – relatively low in comparison with other sectors. However, the insurance sectors pioneers in e-commerce functions are holding their own well with other sectors.

In Europe and in the USA, the expectations of e-commerce success (B2C) as well as the success of internal e-business new processes have not yet been fulfilled. Some insurers enabled the customers to conclude contracts for numerous insurance products online, and they developed large-scale e-commerce applications, but demand remained low. As far as the implementation of Internet-based business processes is concerned, most insurers are still at the very beginning, whilst others are in midstream. Only online insurers and online portals are advanced. Insurers draw different conclusions from this lack of short-term success: some continue investing significant amounts, the most apply the brakes for the time being.

Since the insurance business is largely based on information, ICTs and e-business applications can impact greatly on the insurance industry. The Internet increases transparency on the insurance market, giving customers more market power. It allows virtualisation of organisational networks, increasing the opportunity for systematic co-operative service offers. It also reduces the amount of capital needed to enter the insurance market, so that new firms find lower barriers to compete in the market.

The suitability of insurance products for Internet distribution varies, depending mainly on how much individual advice the product requires. Standardised products which can be described and tariffed easily are more suited for Internet distribution than complex and expensive products. Products particularly suited for Internet distribution are private motor, household, private liability and term life insurance.

An important application of ICT in the insurance sector is to automate business processes which can reduce costs significantly: When dealing directly with the customer, the insurance firm can save costs for running agencies and for paying commissions to agents. Processing claims via Internet can save paperwork and, above all, much time.

On the technical side, the assurance, in contrast to many other industries, is determined by powerful legacy systems which need to be replaced or to be made compatible with new applications.

Electronic Customer Relationship Management (CRM) – a core issue: In the insurance sector, eCRM is of particular importance because the industry is characterised by large companies with abundant customer data, insurance policies tend to require personal information, and the insurance business is largely decentralised in companies, agencies and external salespersons. Thus the use of ICTs for customer data warehouse and data mining applications as well as for marketing, sales and service currently is an important issue in the assurance. For example, clusters of customers with particular characteristics can be constructed, allowing marketing to focus on the most profitable and promising ones.

	Insurance and Pension Funding Services (NACE Rev. 1 J 66)	**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	55	91	88	87	67
	Have access to the internet	91	96	99	99	91
	Internet access with >2 Mbit/s bandwidth	8	38	34	34	24
	Remote access to company network	24	58	61	59	40
	Use an intranet	36	73	82	79	51
E-Commerce	Use EDI	32	29	24	25	23
	Use an extranet	11	33	42	40	19
	Sell online	12	20	48	46	17
	Make >10% of their sales online	3	12	3	4	5
	Purchase online	38	37	47	46	43
	Make >10% of their purchases online	12	9	6	7	13
	Trade on B2B e-marketplaces	4	5	6	6	7
E-Integration	Online tools for tracking working hrs. / prod. time	8	34	49	47	26
	Use e-learning applications	16	16	33	32	19
	Use CRM software	10	19	31	30	17
	Use SCM software	1	5	6	6	7
	Online collaborative product design	9	25	19	19	20
	Online management of capacity / inventory	3	9	17	15	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	30	52	58	58	33
	• customer relationship	25	44	43	44	27
	• relationship to suppliers	19	41	34	35	26
	• offer of products / services	19	28	30	30	21
	E-business constitutes significant / some part of how company operates today	52	66	73	73	55

Base: EU-4, 15 sectors, all enterprises (N=292 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.

Source: *e-Business W@tch* (2002/03)

Insurance and pension funding: E-business opportunities, risks, enablers and barriers

E-business opportunities

- **Reducing costs for business processes**: The ICT based automation of business processes in the insurance sector can reduce costs significantly: When dealing directly with the customer, the insurance firm can save costs for running agencies and for paying commissions to agents. Processing claims via Internet can save paperwork and, above all, much time. The automation of processes may also result in reduced staff numbers. Processes can partly be outsourced, even internationally to low-wage countries.
- **Lower price, improved customer services**: Customers can benefit from lower prices and improved services. Firstly, if automation and rationalisation lead to significant cost cuts in the insurance firms, prices may become lower. Secondly, e-business can improve customer service in many ways: information is available all day long on the Internet, the pool of information may be deeper, information can be gathered anonymously, response times may be shorter, and claims management can become more transparent and quicker.

E-business risks

- **Ruinous price competition**: Direct insurers operating completely or mainly through the Internet are increasingly challenging the market. Their cost advantages are a threat to established insurers. This could lead to a ruinous price competition and reduced quality of insurance products.
- **Erosion of consumer protection**: As the insurance business is going online, it will also become more international and competition will further increase. In this new environment, safeguarding consumer protection will become even more important. However, a thoughtful weighing of consumer protection and easy marketing is required. Some insurance regulations may appear to be overly strict, requiring the insurance firms to explain contract conditions in unanimous juridical terms at the expense of comprehensibility.

Enablers

- **Information intensive nature of the insurance business**: Since the insurance business is largely based on information, ICTs have a large field for potential application and will have a huge impact on the sector in the long run. ICTs offer opportunities to rearrange all stages of the insurance value chain: product development, marketing, sales, administration, asset management and claims management.
- **Diversification of channels for new marketing strategies**: Insurance companies are seeking for new channels to reach customers. Multi-channel distribution including the Internet has become a standard, particularly in large insurance firms. Insurance enterprises are developing their capabilities and infrastructure related to demand analysis, product design, assembling of meaningful product bundles, competence in marketing communication and ICT sophistication.
- **Using ICT for internal e-business applications**: The insurance sector is particularly suited to make use of ICT for streamlining internal business processes. For example, no other sector surveyed by the *e-Business W@tch* has a higher share of enterprises supporting the human resources management by e-business and using ICT to track working hours and production time.

Barriers

- **The dramatic situation on the investment markets** has forced the insurance companies to use up reserves and to adopt new business models. Customers are also affected, because life insurance returns decrease. In recent months, the difficulties of life insurers to meet return objectives has been a frequent subject in the media.
- **Insurance policies as "low-interest" products**: The importance of the Internet as a distribution channel (B2C) is questioned mainly because insurance policies are so-called "low-interest products", i.e. individuals usually do not normally think about informing about insurance and concluding insurance contracts, let alone actively searching for insurance information on the Internet.
- **Conservative corporate culture**: Insurance companies tend to be characterised by highly traditional, hierarchical structures. Internal conflicts in companies over rationalisation consequences of e-business, for instance organizational changes, can be impediments for the implementation.
- **Typical internet user is not typical customer**: The young generation that is most frequently using the WWW is not the main target group of insurers. The situation may change, though, as the demography of internet users changes.

8.6 Real estate services

Sector profile

The real estate sector in the EU comprises around 755,000 companies. In recent years the number has increased in almost all countries for which time series data are available. Around 1.7 million people work in the EU real estate sector, which is 1% of total employment in the EU. The share of real estate employees is particularly high in Sweden, Denmark and the UK. The EU real estate sector is characterised by a high share of small companies: around three-quarters of them are run by a self-employed person with no employees. Labour productivity is highest in the Netherlands, Sweden and Denmark.

NACE Rev.1		Activity
division	group	
70		Real estate activities
70.1		Real estate activities with own property
	70.11	Development and selling of real estate
	70.12	Buying and selling of own real estate
70.2		Letting of own property
70.3		Real estate activities on a fee or contract basis
	70.31	Real estate agencies
	70.32	Management of real estate on a fee or contract basis

Electronic business in the sector in 2002/03 – key trends at a glance

The real estate market is characterised by a particular lack of transparency. Information about the supply of properties is often poorly structured and would-be purchasers and tenants have difficulty finding the information they need about properties in which they are interested. One reason for this situation is that the goods offered – houses, flats and offices – are largely non-standardised and have yet to meet individual needs and requirements to be sold or let. Thus, the real estate market could benefit strongly from a more widespread use of ICT.

A simple but powerful application is providing information on the Internet. This does not mean that the whole business process must be conducted online. The Internet can serve as an additional means of communication, being beneficial to offline real estate business in numerous ways, for instance for acquiring new customers who are prone to use the Internet and for reducing costs in the forms of money, time and effort because customers can collect basic information themselves without contacting agents.

Real estate development can also benefit from e-business applications. Platforms with calls for tenders can define standardised forms and processes for a construction endeavour. Collaboration tools for project management may enable all partners involved, e.g., housing companies, architects, artisans and construction companies, to communicate through the Internet. The partners may share a common databank with information on the project such as plans and current state of realisation.

Some real estate firms use the Internet not only for information provision, but for comprehensive brokerage and service. Web-based brokers are trying to attract real estate companies by promising to supply them with contacts to individuals looking for housing. These websites offer property in several EU states or even outside Europe. However, the share of objects sold through the Internet is still very small; in Germany it is estimated to be less than 5%.

Another important application area for ICT is facility management, that is the management of real estate and related services including commercial, technical and infrastructure-related issues, which can be supported online. E-business applications internal to the housing company can support tasks such as client data administration and bookkeeping. Service applications can support maintenance, cleaning and remote control of facilities. Such services can be integrated into an Internet-based customer care centre beneficial for both the administrators and the tenants.

Ambient intelligence in the home of the future: In the future, all home facilities – from the TV set to the central heating – may be linked to a computer network, allowing instant adjustment to the tenants' or proprietors' needs as well as remote services. An automatic presence registration module can steer heating and light as soon as someone enters the home. Home service providers such as security services can use this module when the proprietors are on vacation. Lights, door locking and ovens may be activated remotely from the car.

Still, real estate does not really play a forerunner role, but is taking up innovations rather late compared to other sectors, because products are quite heterogeneous, transaction volumes are high, and innovation cycles are long. Beside these macro-level impediments, real estate businesses report about impediments at the firm level.

Real Estate Services (NACE Rev. 1 K 70)		**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	45	84	94	53	67
	Have access to the internet	92	97	100	93	91
	Internet access with >2 Mbit/s bandwidth	11	22	48	16	24
	Remote access to company network	16	36	66	23	40
	Use an intranet	28	54	78	34	51
E-Commerce	Use EDI	13	17	22	15	23
	Use an extranet	10	13	26	11	19
	Sell online	15	10	9	13	17
	Make >10% of their sales online	7	3	9	6	5
	Purchase online	35	40	43	36	43
	Make >10% of their purchases online	9	4	10	9	13
	Trade on B2B e-marketplaces	2	3	10	3	7
E-Integration	Online tools for tracking working hrs. / prod. time	8	18	24	10	26
	Use e-learning applications	11	12	12	12	19
	Use CRM software	4	5	17	6	17
	Use SCM software	2	2	8	3	7
	Online collaborative product design	8	12	16	9	20
	Online management of capacity / inventory	7	5	10	7	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	32	25	25	31	33
	• customer relationship	31	20	18	28	27
	• relationship to suppliers	25	21	24	24	26
	• offer of products / services	21	14	11	19	21
	E-business constitutes significant / some part of how company operates today	52	50	48	52	55

Base: EU-4, 15 sectors, all enterprises (N=403 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.

Source: *e-Business W@tch* (2002/03)

Real estate services: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• There can be enormous potential for accelerated use of e-business techniques in the real-estate sector, particularly to improve the transparency of the market, support fluidity in transactions between tenants, housing providers and their suppliers, and improve service for tenants and owners. The Internet can facilitate the identification of suitable properties by providing detailed information on basic object characteristics and the environment, as well as through visualisation. The Internet can also provide additional information such as price comparisons, financial services links, removal information, legal assistance and checklists. • E-business offers particular opportunities for small and medium-sized enterprises. Since size is not apparent on the Internet, SMEs can potentially compete on a level footing with firms of any size. Companies can deliver information-rich content to a much wider audience at marginal cost, thus expanding their potential client base.	• The Internet endangers the traditional domain of SMEs. Small companies typically survive through practices in geographic or specialist niches. The aspatial nature of the Internet facilitates greater competition in these niche areas. Furthermore large firms might gain more importance in real estate by using their financial power. • Investing in e-business technologies can be very expensive, putting SMEs at a disadvantage.

Enablers	Barriers
• Since the real estate sector is characterised by a large share of small companies, entry barriers are relatively low. New companies with special e-business practices may challenge the traditional market. The increasing number of real estate firms in the EU points in this direction. • E-business holds the potential to accelerate the delivery of massive benefits in cost efficiency throughout the business cycle – specifically in the attraction and retention of clients • Potential clients will be able to identify and contract to property more easily and get a better service as an occupier. • Suppliers will benefit from better communication. • Potential employees will be able to identify positions more easily and get better communication when they have joined. • Owners will benefit from the reduced costs and greater efficiency apparent in an integrated e-business model.	• Key aspects of traditional business communication can possibly never be completely substituted by ICT. It is not possible today and difficult to imagine for the future how most prospective purchasers could manage without visiting the property in question before purchase. Furthermore, legal requirements such as concluding a building transaction by a notary can hardly be fulfilled through the Internet. • Real estate activities may be considered as a typical sector in which – due to the nature of the products and services offered – particular parts of the ideal e-business sequence are of limited practical importance, e.g., online sales and online payment. Verification of information and high level security would be needed to prevent fraudulent acts. Though digital signature laws have been enacted in EU Member States, it will take time before such electronic signatures become common enough to encourage more real estate transactions online. The large size of commercial property transactions (e.g., for shopping centres and office buildings) but also for private homes may act as an inhibitor to online transactions. • In general, the sector is taking up innovations rather late, because products are quite heterogeneous, transaction volumes are high, and innovation cycles are long. Impediments at the firm level are a lack of personal capacities within the companies, lack of Internet access among buyers and tenants, security issues regarding the Internet, clerical staff lacking PC know-how, and lack of compatibility of downstream systems.

8.7 Business services

Sector profile

The business services sector (NACE 74.1 – 74.8) covers a wide range of activities ranging from legal and business consulting over architectural and engineering activities to advertising and industrial cleaning. What most sub-sectors have in common is a strong dominance of small enterprises with less than 50 employees. They make up 99% of all enterprises, produce 60% of the sector's turnover, and employ more than half the people working in the sector. Over half of the total turnover and of the value added in the sector is generated in knowledge-intensive sub-sectors characterised by high intensity of value creation. As a result, the most important use of ICT and e-business in the sector is for accessing and exchanging information.

NACE Rev.1		Activity
division	group	
74		Business services
	74.1	Legal, accounting, book-keeping and auditing activities; tax consultancy; market research an public opinion polling; business and management consultancy; holdings
	74.2	Architectural and engineering activities and related technical consultancy
	74.3	Technical testing and analysis
	74.4	Advertising
	74.5	Labour recruitment an provision of personnel
	74.6	Investigation and security activities
	74.7	Industrial cleaning
	74.8	Miscellaneous business activities not else classified (for example: photographic activities, packaging activities, secretarial and translation activities)

Electronic business in the sector in 2002/03 – key trends at a glance

ICT and e-business play an above average role for business services companies: 55% see a significant or some role of e-business for their company, compared to 48% on average (2002). However, still more than 40% of all enterprises do not ascribe any role to e-business. Over half of the respondents said in 2002 that e-business did not and would not play in the future an important role for the way their company operates. This shows that initial expectations on the effects and importance of e-business might have been overstated.

Nevertheless, companies in the business services sector are generally very well equipped with basic IT infrastructure. For example, more than 90% of all employees are working in companies with Internet, e-mail and WWW access. What distinguishes business services from many other sectors is that not only large companies have a good IT infrastructure. Even for small companies the respective percentages are at 90% or higher.

One of the most important effects of ICT and e-business usage is an increased efficiency of internal work processes. Since collaboration is a central element in producing business services, increased efficiencies already result from using basic technologies, such as e-mail, to share documents and to perform collaborative work. Further possibilities of optimising internal processes range from simple project and human resource management tools for knowledge management to very complex PSA (professional services automation) systems. While the potential benefits of such applications might have been exaggerated during the e-business hype, they have found their way into the daily work routine in many companies.

The co-ordination and management of third-party relationships, for example with suppliers, sub-contractors or end-users, is an important part of business services, for example in the advertising industry or architectural services. ICT and e-business applications today play a major role in managing these often rather complex relationships and enhancing efficiencies in the communication process. As the costs of exchanging documents and information fall and at the same time software and tools help to manage larger and more distributed projects and relationships, the costs associated with co-

operating with others decrease. Thus, co-operation between business services companies is significantly facilitated.

In many sub-sectors of business services, the services provided change by being provided digitally or by having digital components added to them. Such changes in the nature of the service provided or the service delivery process can, first, imply cost savings for the service companies' customers, second, lead to a higher value of the service and, third, increase the experienced quality of the service. As a result, a strong link between ICT innovativeness and competitiveness exists in the business services sector.

Public opinion polling companies, for example, have developed Internet-surveys as a new service to their clients (see box). Security firms have created online video surveillance systems, which offer clients a significantly higher quality of service. Companies from the exhibition and conference sector are offering a large set of online services in addition to their offline business such as online directories, the download of conference material or virtual exhibitions. These new services are not only intended to increase profitability by lowering costs and/or rise the product value and thus prices. They can also serve as a tool to intensify customer relationships by tying the customer more closely to the services company

Business Services (NACE Rev. 1 K 74)		**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	54	82	81	68	67
	Have access to the internet	92	96	100	96	91
	Internet access with >2 Mbit/s bandwidth	15	30	39	26	24
	Remote access to company network	29	45	68	45	40
	Use an intranet	38	53	70	51	51
E-Commerce	Use EDI	9	19	32	20	23
	Use an extranet	14	25	37	24	19
	Sell online	10	12	17	12	17
	Make >10% of their sales online	1	5	2	2	5
	Purchase online	47	54	46	48	43
	Make >10% of their purchases online	22	19	18	20	13
	Trade on B2B e-marketplaces	5	3	3	5	7
E-Integration	Online tools for tracking working hrs. / prod. time	15	31	51	30	26
	Use e-learning applications	17	13	25	19	19
	Use CRM software	6	13	35	17	17
	Use SCM software	<1	1	9	4	7
	Online collaborative product design	16	24	20	19	20
	Online management of capacity / inventory	7	8	23	13	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	32	27	45	36	33
	• customer relationship	28	32	23	26	27
	• relationship to suppliers	29	33	32	30	26
	• offer of products / services	21	28	25	22	21
	E-business constitutes significant / some part of how company operates today	55	55	58	58	55

Base: EU-4, 15 sectors, all enterprises (N=411 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.

Source: *e-Business W@tch* (2002/03)

Business services: E-business opportunities, risks, enablers and barriers

Opportunities	Risks
• **Improved project management**: The management of complex (and international) projects can be considerably enhanced through the use of ICT and e-business applications. This applies to the management of internal processes as well as to the management of third-party-relationships, e.g. with sub-contractors, specialised suppliers and freelancers. • **Information access**: The Internet considerably facilitates the search for and access to information. This helps business services companies to respond to changing customer needs and supports the process of finding skilled experts or cheap labour. • **Cost reductions**: ICT and e-business systems can help to reduce cost for recurring, standardised business processes. This helps companies to deal with intense (price) competition. • **Facilitate outsourcing processes**: E-business applications enable companies to outsource an increasing number of tasks to external parties. This allows business services companies to specialise in their core capabilities and use ICTs to collaborate with a network of partners to deliver a complex set of services.	• **Lack of appropriate solutions for small firms**: Different sub-sectors of business services as well as companies of different size have to follow different "optimal" e-business strategies. When implementing new e-business solutions, companies have to keep in mind that solutions that are profitable for a large company might not make economical sense for a small firm. • **E-business skills development**: Implementing software and the technical infrastructure is only a first step towards more efficient processes in the business services sector. Ensuring the consistent use of new e-business solutions by all employees is a much more important issue that touches the organisational and cultural structures of the enterprise.
Enablers	**Barriers**
• **Corporate culture**: What distinguishes business services from many other sectors is that the IT infrastructure is well developed not only in large but also in small companies. This is a major prerequisite for fast e-business adoption. At the same time, corporate culture in the sector seems to be more favourable to e-business adoption than in other sectors. • **New digital services**: Innovative companies in the sector have shown that even though many business services do not lend themselves to being sold online, e-commerce activities can be enabled in two ways: Firstly, by offering new services that can be ordered and/or delivered via the Internet (e.g., online video surveillance, Internet surveys). And secondly, by transforming services into standardised products that can be delivered in digital form (e.g., market research reports, photos in image databanks).	• **Many existing services not suitable**: Many services provided by this sector are not suitable for being sold online. While this can partly be changed by product innovation, a large share of business services will remain of a very individual nature and cannot be delivered online. • **Limited potential in sub-sectors**: The potential for enhancing internal efficiencies through e-business tools is limited in those parts of the business services sector where services are very customer-specific and the related processes do not follow fixed lines. However, individual business services also contain recurring work routines that can be standardised and accordingly streamlined with the help of IT tools. • **Face-to-face contacts are key**: Business services is a very personal area. Face-to-face contacts and informal networks are and will always remain a central element in this sector.

8.8 Health and social services

Sector profile

In section N "Health and social work" of NACE (Rev. 1; similar to ISIC Rev. 3) division 85 "Health and social work" comprises three groups: human health activities (85.1), veterinary activities (85.2) and social work activities (85.3). The *e-Business W@tch* health sector reports concentrate on those sub-sectors where networking with other health institutions is of particular importance and where ICT ("e-health") can be expected to play a relatively more important role. In particular, they focus on hospital activities (85.11), medical practice activities (85.12) and social work activities (85.3)

NACE Rev.1		Activity
division	group	
85		Health and social work
	85.1	Health activities
	85.3	Social work activities

In 1997 – the latest year for which comprehensive data were available - total expenditure in the EU healthcare sector was more than 620 billion Euro, representing more than 8% of GDP. The sector employs almost 10% of the active European labour force, i.e. it is a key sector of the labour market in the Union. In some northern countries the values are significantly higher, with 19% in Sweden and 17% in Denmark. Remarkable also is the high percentage – almost one-third – of professional employment in the sector.

Electronic business in the sector in 2002/03 – key trends at a glance

Concerning e-business applications, health and social services is a particularly interesting sector. On the one hand, it

- is a leading sector as far as economic impact, growth and employment relevance is concerned;
- has already been for quite some time under considerable cost containment pressure and is expected to come under even more pressure in coming years due to an ageing society with a projected negative impact on the economic basis of our society, on taxes and social security systems.

On the other hand, healthcare

- has the lowest penetration of ICT applications and Internet business solutions; but,
- is expected to provide the greatest cost savings potential from e-business applications of all service sectors; and,
- has been forecast to lead – due to its innovative power and (future) holistic applications for wellness and sustainability – the next (6th) Kondratieff wave of economic growth and prosperity.

In recent years the health sector has made considerable progress towards accessing more advanced, digital telecommunications networks via ISDN, DSL or fixed connections, and access to internet services has equally improved. Hospitals show usage rates of around 90% for both e-mail and WWW services, social work organisations reach values of 80% for e-mail and 72% for WWW access, and medical practices 74% and 65% respectively. The larger the number of employees of an organisation, the higher are these values. But in spite of this change, the health sector still lags behind most other European sectors. Implementation rates of LANs and WANs are also increasing considerably, with larger organisations and in particular hospitals (75% for LANs, 38% for WANS) leading the way. Social work institutions, probably due to their less localised activities, report considerably lower data.

Usually a website is the first step of an organisation towards customer-facing e-business solutions. With close to 50% the medical sector considerably lags behind all other sectors, and even the planned expansion by about 15% will not change this situation, as all other sectors with lower values boost similar growth rates. The main thrust will come from the smaller organisations which presently show much lower values than the large ones. In the medical and social work sector, more advanced e-

commerce activities in the sense of "selling" health will both for ethical reasons and rules of professional code of conduct remain limited to niche applications.

Unlike any other sector, human capital is the key input factor in the health field. Even in large, diversified hospitals, personnel costs reach values of between 60% and 65% of all costs, and in psychiatric institutions the value approaches 80%. In fact, human resources related ICT applications are – compared to other applications and in relation to other sectors – wider diffused in the sector, for example posting job vacancies on special internet boards, e-learning applications, or online-based human resources management systems.

Procurement of supply and services concerns the second largest cost factor. Online procurement has grown consistently and strongly in recent years. The health sector with 46% is close to the EU average of 50%. However, when looking at somewhat more sophisticated e-business techniques such as implementing online techniques for the management of capacities and/or inventories or access to the extranet of suppliers, the sector tends to lag behind most other sectors.

Health and Social Services (NACE Rev. 1 N 85.11+12, 85.3)		**0-49 empl.**	**50-249 empl.**	**250+ empl.**	**Sector total**	**All (15) sectors**
		% of enterprises			enterprises comprising …% of employment	
Infrastructure	Have a LAN (Local Area Network)	36	59	91	52	67
	Have access to the internet	79	83	100	82	91
	Internet access with >2 Mbit/s bandwidth	6	14	29	13	24
	Remote access to company network	8	19	54	20	40
	Use an intranet	20	36	69	34	51
E-Commerce	Use EDI	7	24	30	14	23
	Use an extranet	5	9	44	15	19
	Sell online	5	4	7	6	17
	Make >10% of their sales online	<1	2	0	<1	5
	Purchase online	29	36	54	37	43
	Make >10% of their purchases online	7	6	19	12	13
	Trade on B2B e-marketplaces	4	0	1	3	7
E-Integration	Online tools for tracking working hrs. / prod. time	8	18	41	18	26
	Use e-learning applications	8	12	35	16	19
	Use CRM software	4	2	8	4	17
	Use SCM software	1	2	4	2	7
	Online collaborative product design	7	7	23	10	20
	Online management of capacity / inventory	5	6	35	14	16
E-Impacts	E-business has significantly/somewhat changed …					
	• internal work processes	22	26	31	27	33
	• customer relationship	13	20	20	16	27
	• relationship to suppliers	13	22	28	18	26
	• offer of products / services	10	11	20	12	21
	E-business constitutes significant / some part of how company operates today	42	39	66	51	55

Base: EU-4, 15 sectors, all enterprises (N=414 for "sector total"; N=5917 for "all sectors"). EU-4 includes D, F, I, UK.
Reporting period: June/July 2002.

Source: *e-Business W@tch* (2002/03)

Health and social services: E-business opportunities, risks, enablers and barriers

E-business opportunities

- **Bringing dynamism to the health sector**: E-business developments can help to overcome the static structure of national health systems and stimulate the evolution of a European health market. As e-business can lead to more transparency and more competition, a widening of the markets served and easier communications across national borders, it could - together with changes in the regulation of national healthcare markets - contribute towards the development of a truly European healthcare services market. Initially, stimulating market development from the side of supplies needed by healthcare providers may be the most promising route.

E-business risks

- **Unequal benefits from cost-savings**: Savings from introducing e-business solutions on a national scale do not necessarily imply a win-win solution for all. Doctors and hospitals will have to heavily invest in new equipment, training and organisational re-engineering, while immediate savings are, for example, expected for insurance funds. This requires a fair sharing of costs and benefits, and a vision of a citizen-centred healthcare paradigm that engages physicians and supports them in retooling medicine and its reimbursement mechanisms.
- **The medial divide**: A pressing issue, which already at this stage needs policy attention, is what can be termed the “medical divide”. Quite a considerable share of the population, particularly older, disabled and frail people, but also those with no or little education and/or on low income, are threatened to be left out of these developments and cannot or will not participate in the benefits which customer-facing e-health applications offer.

Enablers

- The trend towards **Integrated Healthcare Communications Systems (IHCS)** by providing the much needed healthcare system (inter-)connectivity could become a key driver for e-business developments in the health sector and, at the same time, will provide a new challenge to European ICT providers. Against this background it becomes mandatory for European suppliers to meet this competitive challenge, to take advantage of this window of opportunity, and to offer similarly advanced applications to their clients in Europe and abroad.
- **Cost pressure on health systems**: All national health systems suffer from increasing costs and political pressures to constrain these. In this context, internet and e-business solutions are highly relevant because they represent the single most important technology of this generation for health system players to cut costs, improve cooperation and service, deliver seamless, patient-focused care and improve medical outcomes. However, The impacts, benefits and costs of e-business implementations in their various contexts need convincing evidence and “proof of concept”.
- The greatest cost drivers in the health sector are **medico-technical advances**, which rely increasingly on the integration of ICT technologies. The further development of medical interventions, the introduction of disease management programmes, improved home care for chronically ill patients will all further push the implementation of e-business applications.

Barriers

- **Technical infrastructure issues** are currently key hurdles for advanced applications in the health sector: Legacy medical and task-specific information systems, stand-alone systems for various administrative tasks, or investments in EDI, and mainframe computers rather than client-server platforms.
- **Conservative attitude**: From user requirements and innovation diffusion studies in the medical arena it is well known that this sector is a very conservative one. Although new e-health technologies and e-business solutions will only develop their full potential when work flow and care processes have been "re-engineered" to take full advantage of the new possibilities, initially it is mandatory to take fully into account existing institutional and organisational frameworks in order to avoid user rejection and organisational resistance.
- **Fragmentation and dominance of micro-organisations**: In spite of the fact that the same basic e-business models such as B2B e-commerce systems used in other sectors are applicable to many facets of the health sector, applications and implementation planning is lagging. Clearly, the fragmented structure of the sector, the dominance of micro organisations and the complexity of interaction relationships are major hindrances to the wider diffusion.
- A **shortage of investment capital** in the public sector as well as with physicians in private office contributes to this.

Part C: Contributions

C.1 Measuring e-business readiness: Challenges for statistics and research

by Simon Robinson, empirica GmbH

Benchmarking the eEurope 2005 Action Plan

The eEurope 2005 Action Plan (COM(2002)263 final) endorsed by the Seville European Council in June 2002 calls for the benchmarking of its main targets. One of these targets is that "by 2005, Europe should have (…) a dynamic e-business environment". In the first list of eEurope 2005 benchmarking indicators, prepared during 2002, a single entry related to the target of creating a dynamic e-business environment, namely the indicator "Percentage of companies that buy and sell over the Internet", subsequently modified to "Percentage of enterprises' total turnover from e-commerce".

The eEurope 2005 Action Plan specifies that "e-business comprises both e-commerce (buying and selling online) and restructuring of business processes to make best use of digital technologies". It was, therefore, clear that the initially proposed indicator did not cover the required breadth of activity. Consequently, DG Enterprise proposed the additional inclusion of an 'e-Business Index', to capture more of the complexity of the dynamic e-business environment and, in collaboration with Eurostat, drew up an initial design for this index. Following subsequent discussions at the statistical experts' Task Force and at the Council's Working Group, an updated definition of the e-Business Index was included in the Council Resolution on the implementation of the eEurope 2005 Action Plan.

This policy indicator, aiming to assess the readiness of European enterprises to conduct business electronically, is subject to a pilot exercise conducted by Eurostat in consultation with the Member States[1]. The *e-Business W@tch* reviewed aspects of the proposed definition with the aim of contributing to the pilot exercise, and this article presents some of the results of this work.

The definition of the e-Business Index

A key decision in the construction of the indicator for e-business readiness was, with reference to conceptual analysis by the OECD, that e-business readiness at the enterprise level should be conceived as having two dimensions. On the one hand, readiness refers to the technological capabilities at hand in an enterprise, on the other the indicator should reflect the fact that organisational change and preparation is required to make use of these technologies. These two dimensions were each to be reflected in an independently constructed sub-indicator, one for infrastructure / technology enablers, summarised as "the adoption of ICT by business" the other reflecting organisational and business factors ("use of ICT by business").

Each of the sub-indicators were themselves to be built as aggregates of a number of relevant component variables. The infrastructural / technological readiness dimension was to cover the extent to which enterprises are equipped with e-business enabling technologies. The component variables considered were:

- penetration rates for computers, internet access, web sites, LANs, intra- and extranets, and data transmission speed capabilities.
- security facilities used
- staff access.

[1] Council Resolution 5197/03 (OR.en), Brussels 28.01.2003

The second, organisational dimension was to be built from component variables relating to the use of ICT, such as:

- actual e-business supply chain integration and businesses' external processes,
- e-business integration of business internal processes
- training and skills available in companies.

The actual choice of component variables was influenced by another key decision, that on the preferred source of data for constructing the indicator. An important requirement was to ensure the availability, the comparability and the quality of the data used for indicator measurement. One consequence was the decision to source all relevant data from the same survey vehicle, avoiding problems faced by some previous composite indicators which had been based on variables drawn from different statistical sources and whose results had been found difficult to interpret.

Thus the decision was taken to select component variables from the Eurostat 2003 Community enterprise surveys on e-commerce and ICT usage, with a preference towards inclusion of those also covered in the 2001 enterprise survey. The result of this process was the selection of the following set of component variables:

A. Adoption of ICT by business		B. Use of ICT by business	
a1.	Percentage of enterprises that use Internet	b1.	Percentage of enterprises that have purchased products / services via the internet, EDI or any other computer mediated network where these are >1% of total purchases
a2.	Percentage of enterprises that have a web site/home page	b2.	Percentage of enterprises that have received orders via the internet, EDI or any other computer mediated network where these are >1% of total turnover
a3.	Percentage of enterprises that use at least two security facilities at the time of the survey	b3.	Percentage of enterprises whose IT systems for managing orders or purchases are linked automatically with other internal IT systems
a4.	Percentage of total number of persons employed using computers in their normal work routine (at least once a week)	b4.	Percentage enterprises whose IT systems are linked automatically to IT systems of suppliers or customers outside their enterprise group
a5.	Percentage of enterprises having a broadband connection to the Internet	b5.	Percentage of enterprises with Internet access using the internet for banking and financial services
a6.	Percentage of enterprises with a LAN and using an Intranet or Extranet	b6.	Percentage of enterprises that have sold products to other enterprises via a presence on specialised internet market places

To derive the value of the overall index, a multi-step calculation scheme was defined. The first step involved the re-scaling of the 12 component variables based on a procedure proposed by the UK Office of National Statistics. The variables were to be rescaled linearly between their maximum and minimum values, set at 0 and 10 respectively. Weights were then to be set for each component variable and a weighted average calculated for the "A" and "B" subsets, yielding values for each of the two sub-indicators. Finally, a simple average of the two sub-indicators was to yield the overall enterprise e-Business Index.

Testing the indicator

Avoidance of moving targets

Work on the properties of calculation scheme defined for the e-Business Index quickly unearthed some problems associated with the proposed calculation technique and, in particular, the undesirable property of potentially moving targets.

The proposed rescaling of component variables between their maximum and minimum values had been proposed by the UK Office of National Statistics (ONS) as superior to the use of raw values – in the context of comparative benchmarking at a single point in time (Clayton, 2002). However, in the context of the eEurope 2005 Action Plan, in line with the Open Method of Coordination, policy is to be monitored at regular intervals over time. Allowing the parameters for re-scaling of component variables to be determined by each sample drawn would effectively created a moving target for eEurope policy. "Goalposts", would shift on each measurement; apparent increases or decreases in e-business

readiness would be at least partially artefactual, i.e. not reflect the underlying real successes (and/or failures) of policy.

Further analysis showed that even for static comparison, the method had some potentially serious implications, in that the ability to compare sectors, regions or other subsets of European enterprise would be compromised. For example, suppose that bounds were set by the lowest and highest penetration in a EU15 Member State, then analysis was extended to include other countries – for example candidate countries, Russia, USA, Japan and Korea. If the minima and maxima were not reset on extending the analysis to other countries, negative values of e-business readiness might result as countries were included where penetration lagged behind the most laggardly EU15 country. Values in excess of the intended maximum (typically 100) might also occur, causing equal difficulties in interpretation and hence loss of transparency.

For the long-term assessment of stable policy targets, stable measures should be used. It follows that the "goalposts", the upper and lower bounds for re-scaling of component variables, should be fixed independently of a particular data set. The additional consideration of categorisation led to the drafting of quality criteria which perhaps all eEurope indicators should conform to, including:

- indicator values should be impervious to arbitrary (dis)aggregation operations (for instance moving from NACE Division to NACE Section, from EU15 to EU15+Candidate States)
- indicator values should be valid in the sense that movement over time should reliably reflect real movement in the underlying construct (here: e-business readiness).

Re-scaling for the pilot application

The issue of rescaling was further explored using data from the *e-Business W@tch* to approximate the e-Business Index. For this pilot application of the index, rescaling of each component variable and weighting was applied and tested in a sectoral approach.

It was decided to fix the upper bound or "target" at a level which was likely to be above the maximum achieved (in any sector as a whole) before 2005, but in many cases below 100%. This seemed particularly appropriate in cases where the level of penetration was very low and was also expected to stay quite low for the foreseeable future.

It was decided to fix the lower bound at zero in all but two cases – access to the internet and use of online banking – where the component variable had long left the zero penetration level and was in several cases approaching saturation, as shown in the following table.

Exhibit 1-1: Compound variables and their upper and lower bounds

Var. No.	Component Variable	average	lower bound	upper bound
A1	Percentage of enterprises that have access to the internet	84	50	54
A2	Percentage of enterprises that have a website	54	0	100
A3	(not available in 2002)			
A4	% of persons employed using computers in their normal work routine	56	0	100
A5	Percentage of enterprises having a connection to the internet with >2Mbit/s bandwidth	11	0	50
A6	Percentage of enterprises using an intranet	30	0	75
B1	Percentage of enterprises that have purchased products online	36	0	75
B2	Percentage of enterprises that have received orders online	12	0	75
B3	% of enterprises whose IT system for managing orders is linked with the back-end system	1	0	25
B4	% of enterprises having access to the extranet of a business partner	18	0	75
B5	Percentage of enterprises using online banking	48	25	100
B6	% of enterprises trading on special B2B electronic marketplaces	5	0	25

The score S_v for component variable V prior to weighting was then calculated using the formula: $S_v = 10*[(X_v - X_{base}) / (X_{target} – X_{base})]$.

Weighting considerations

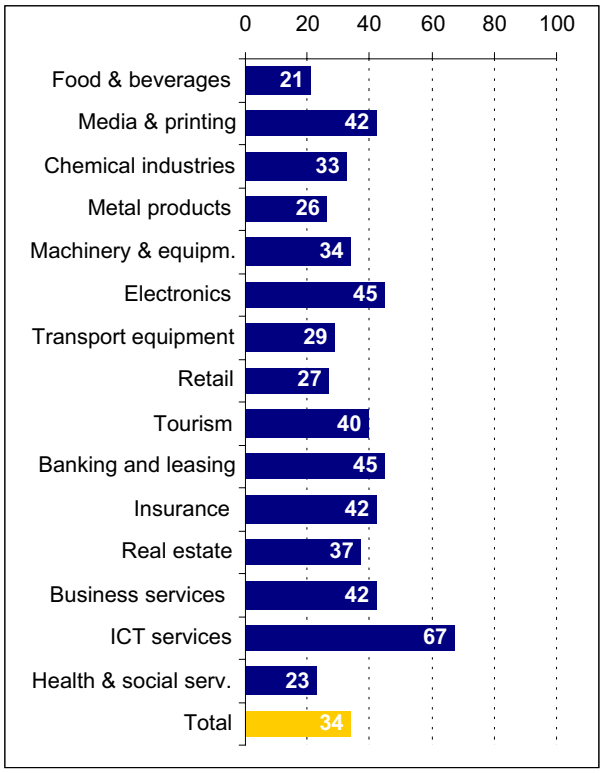
In early work on the index it was clear that weighting, as rescaling, should not be derived from empirical values, nor was sensitivity analysis expected to yield appropriate weights. The topic of weighting goes to the root of the meaning of the index. It was recommended that weighting should be pursued through expert assessment, where independently of empirical evidence on penetration, experts were to review the relative contribution of component variables to the competitiveness of enterprises, regions and national economies. Such expert assessment would have to take account of statistical properties of intercorrelation or "double counting", of interaction effects such as complementarity and the impact of any boundary-setting on the effective weight of a component variable.

Since expert input had not yet been elicited, other methods for achieving a preliminary weighting had to be chosen. Without further analysis and on the simplest of assumptions - that the component variables can be seen as independent and with equal importance in their impact on enterprise competitiveness – equal weights were seen as most appropriate. This view was modified slightly in the initial pilot of the indicator, to take account of opinion that usage of e-commerce (B1 and B2) were to be seen as at least marginally more important than other areas of e-business readiness and activity. Thus all B variables were weighted at 7.5, except for B1 and B2 each given a weight of 10 with a sum of weights of 100. All A variables were equally weighted with the sum of weights again 100.

An initial result

Exhibit 1-2: The E-Business Index (2002)

The chart shows the result of calculation of the e-Business Index for each of 15 sectors. The result was found to mirror well expectations as to the relative e-business readiness of these sectors.



Testing assumptions

Several arguments emerged during the pilot tests which fundamentally called into question any rescaling, in particular any setting of a lower bound for recalibration, even a fixed lower bound.

The argument is based on the validity requirement, the requirement that the value of e-business readiness indicator should progressively rise over time as, hopefully, e-business readiness and competitiveness increases in response to eEurope policy. However, should the lower bound for any component variable be increased at some future time, this would reduce the value of the indicator independently of real e-business readiness. Potentially the indicator would show a fall in e-business readiness masking an underlying improvement. It follows that new lower bounds should not be introduced in future. The same argument then calls into question the advisability of having set lower

bounds other than zero in the past or setting such now. Any such lower bounds relate to a particular period of time, and distort or invalidate comparison of today's e-business readiness with that in previous years, if not with future years. Without being able to present a clear interpretation of the lower bound, the usage of such reduces the transparency, the ease of understanding, of the overall indicator. It is concluded that no lower bound should be set. There remained a concern that in this case, key information from some component variables – particularly A1 – will be removed from the indicator and distort results. This impact is tested below by investigating the sensitivity of key comparison results to removal of the lower bound.

Somewhat different considerations apply to the upper bound. It may well be that a certain level of penetration will never be exceeded and represents an upper bound of permanence. However, there is as yet unease at the poverty of evidence in support of any specific upper bounds which may be set. A theoretical basis for a non-empiricist setting of the upper bound has not yet been achieved, though some work on a competitiveness-productivity interpretation of the indicator had shown a way forward. An alternative might be, as in the case of weighting, to elicit the help of experts in the field and try to define a consensual value. This consensus would not, as in other fields, have the purpose of enhancing the acceptability of the indicator in relation to controversial policy targets, but should be guided by the best of understanding of the impact of e-business readiness on enterprise competitiveness.

The pragmatic approach adopted here is to test the sensitivity of key results to the value of the upper bound by removing re-scaling and the impact of the upper bound altogether. Correspondingly, in the following test, all upper bounds were set to 100 and all lower bounds to 0. In addition, all variables were given equal weight in their contribution to the two subindices (technology and organisation), which were again equally weighted in the final aggregation. The first chart shows the ranked index values before adjustment, the second after adjustment.

Exhibit 1-3: Ranked index values before equalisation of weighting

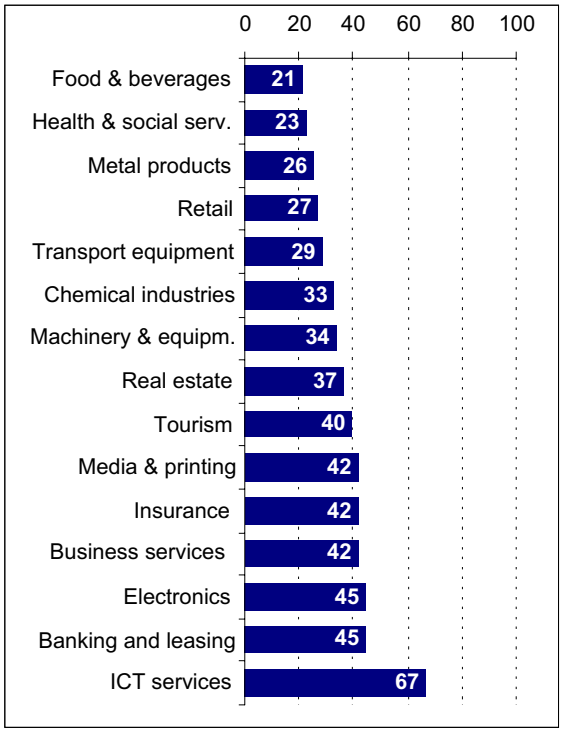
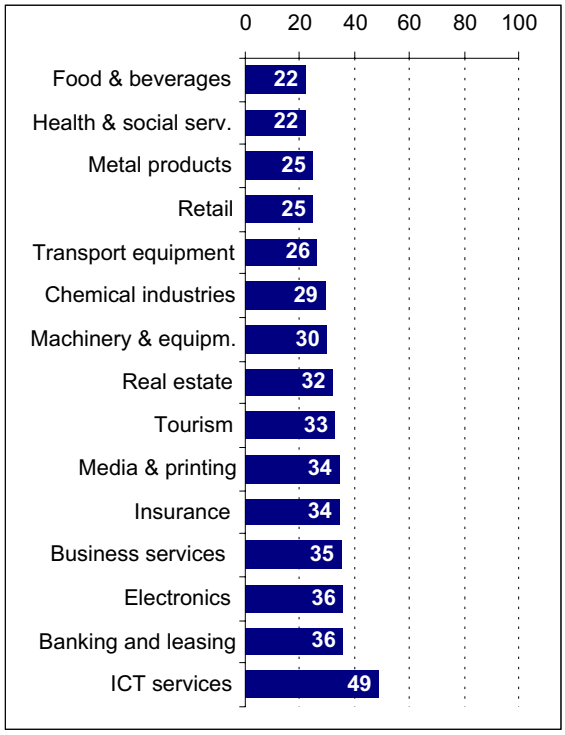


Exhibit 1-4: Ranked index values after equalisation of weighting



It can be seen that the rank order of sectors has remained virtually unchanged. In this presentation transparency has improved. It is clear that 0 means that none of the component variables shows any penetration of the technology or usage. This implies as well that values measured several years ago could be located on the same scale. It is also clear that 100 means that all enterprises in Europe have

available to them or are utilising all the components included in the indicator. The ability to make this simple interpretation is seen as a contribution to transparency and to ease of interpretation.

Pointers to future work

The analysis of the assumptions made on re-scaling and weighting revealed that the index, at least in terms of cross-sectoral pan-European ranking, is apparently insensitive to these. Possible reasons for the stability of the ranking emerged from initial correlational analysis where quite highly correlation between component variables across sectors were found.

Signs of high intercorrelation, if upheld in further work, have great significance for the further development of the enterprise e-Business Index. It may well be that a large proportion of variance is shared across the component variables. Factor analysis has yet to be carried out, but it seems likely that a strong main factor will be found. One implication of this structure is the prospect of being able to measure the index in a more cost-effective way: one or more component variables could be dispensed with very little loss in accuracy. In a similar manner, examination of the relationship to other indicators in the eEurope list could lead to a significant focussing of the indicator component set, thereby increasing its transparency and cost-effectiveness.

The prospect of reducing the component variable set to two or three raises the question, in anticipation of the result, as to whether the indicator would then properly cover the field intended. It must be said that unless there is some consideration of the causal processes leading to correlation on the surface, it will remain entirely unclear whether patterns found today will hold in future. Further work is therefore recommended both to explore the coverage of the index compared to that implied by "e-Business readiness", and to explore some of the causal roots of empirical interrelationships found between components judged a priori to be part of the concept.

The issue of how to construct adequate indicators and indices for monitoring e-readiness and e-impact developments was also discussed with e-business experts at the *e-Business W@tch Workshop* in Brussels, 26th November 2002. Some of the considerations presented in this paper reflect lessons and conclusions from this event.

References

Clayton, Tony and Kathryn Waldron (2002). New Economy Measurement and the Impact of e-Commerce. Paper presented at the Royal Economic Society Conference, March 2002. UK Office for National Statistics (ONS).

Council of the European Union (2002). Council Resolution on the implementation of the eEurope 2005 Action Plan. Brussels, 28 January 2003. 5197/03

European Commission (2002). eEurope 2005 Action Plan. COM(2002)263 final

European Commission (2000). eEurope 2002 Action Plan, prepared by the Council and the European Commission for the Feira European Council, 19-20 June 2000.

C.2 Internet connection is not enough: The new challenges for SMEs in the knowledge economy

by Elena Gaboardi, Databank Consulting

Introduction

It is commonly assumed that infrastructure is no longer a significant barrier to e-business uptake in Europe and that, generally speaking, there are no major gaps between larger and smaller enterprises.

The latest survey conducted by *e-Business W@tch* indicates that these statements are undoubtedly true for medium-sized and large enterprises, but the picture is somewhat different among smaller businesses. Small enterprises are not homogeneous in terms of penetration of IT and e-business, and medium-sized enterprises have more in common with large ones than with small (often micro) enterprises.

The statistical picture from *e-Business W@tch* confirms that SMEs in general have taken their first step to go digital, but there exist countries and sectors where they are lagging behind. They are also still far from digitally integrating their business processes: the "e" part of their business processes tends to be a front-end, customer-faced activity. More advanced e-business solutions are used mainly by larger enterprises and this could have economic implications in the long run.

While there is still need for stimulating the use of ICT by small businesses, the main policy challenge is now the effective and productive integration of ICT into SMEs' business processes. This is clearly reflected by the eEurope 2005 Action Plan that sets the objective of creating a favourable environment for e-business, defining e-business as comprising both e-commerce and restructuring of business processes with the aim of increasing European competitiveness and raising productivity and growth.

In order to achieve this objective measures have to be undertaken for assisting SMEs in the process of business transformation. These, as stated in the Communication from the Commission "Adapting e-business policies in a changing environment" (March 2003)[2], should include: to improve the managerial understanding of e-business; to improve the availability of e-skills in the labour market; to improve the availability of e-business solutions, to promote networking and co-operation initiatives.

The initiatives will have to be focused on companies' needs and are like to be more successful if they take into account specific sector and national features.

Infrastructure and e-business uptake among SMEs: mapping sectors and countries

Almost 90% of small enterprises use computers in their work, but about one in four has no Internet access (a significant portion of these could be referred to as "Internet refusers") and one in three does not use e-mail for communication. On the other hand, medium and large enterprises have nearly the same percentages of use in these areas.

Exhibit 2-1: Penetration of ICT infrastructures – Comparison of small, medium-sized and large enterprises in five EU countries

	Use computers	Use the Internet	Use e-mail
Small enterprises (0-49 employees)	87	76	67
Medium-sized enterprises (50-249 employees)	100	98	96
Large enterprises (250+ employees)	100	97	97

Source: *e-Business W@tch* (2003)

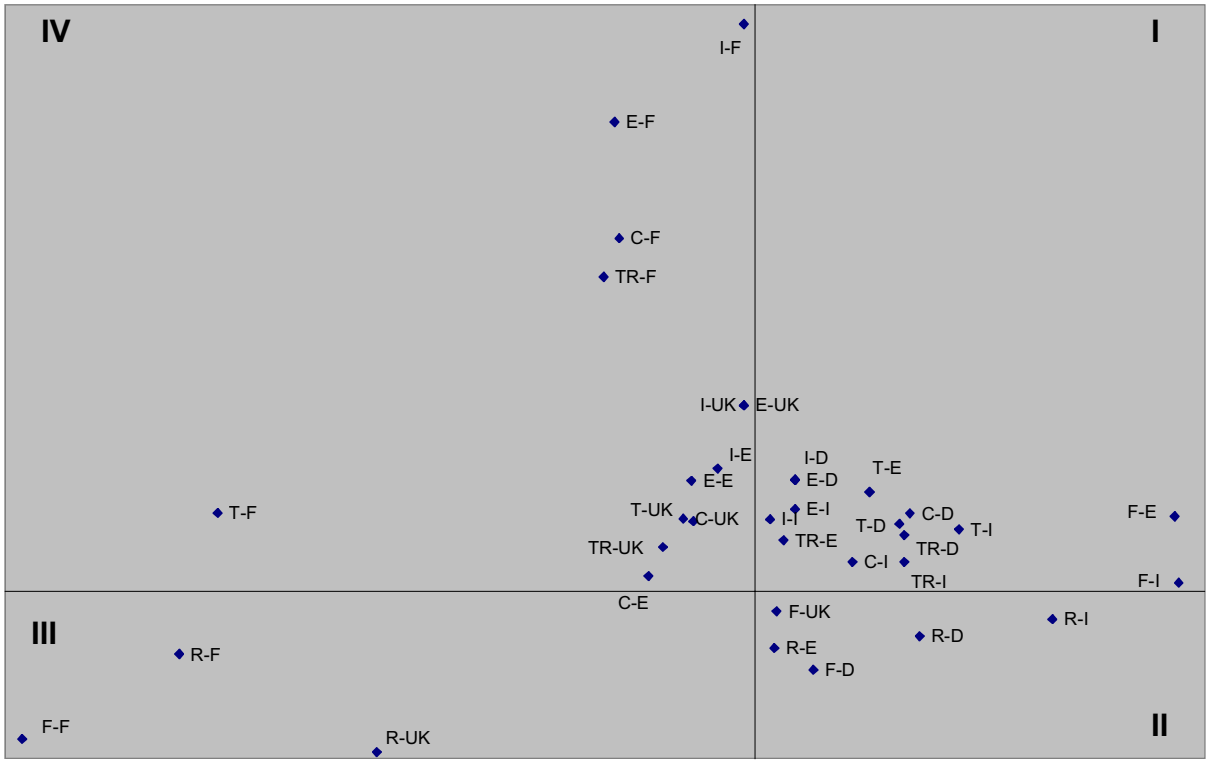
The fact that a significant number of small enterprises is still excluded from the new technologies leads us to ask whether this exclusion is uniform in different geographic areas and sectors.

[2] COM(2003) 148 final

If we compare figures on use of the Internet by sector and by country with the average value of this variable at the aggregate level, we find that sector has a greater impact than geographic location (in the first case the indicator measuring deviation from the average value varies within a range of 0.7-2; in the second case, 0.5-1.3). Assessment of the infrastructures of different countries is therefore less important than assessment of specific sectors.

The map reveals that, when it comes to small enterprises, the sectors which lag behind the farthest in terms of infrastructures are Food and Retail (and these two sectors have a heavy impact on the aggregate figure summing up various sectors).

Exhibit 2-2: Comparison of Internet access by country and by sector *



X axis: deviation of the level of Internet access in the sector in different countries (range of variation: 0.5 and 1.3)
Y axis: deviation of the level of Internet access in different sectors within a country (range of variation: 0.7 and 2.0)
The axes are drawn along the average level of Internet access by sector and by country, in aggregate terms, and are therefore weighted on the basis of their significance.

* legend: the first part of the Code identifies the sector, the second the country

Sector	ICT	Retail	Food	Tourism	Transport	Chemicals	Electronics
Code	I	R	F	T	TR	C	E

In the first case (Food), the sector varies considerably, in that some countries (Spain and Italy) have a high level of penetration of Internet access, putting them at the top of the chart with the sectors traditionally most advanced in terms of Internet use.

In the second case (Retail), the situation varies considerably with geography (as is evident from the horizontal axis), but there are structural elements which help us understand the delay in obtaining Internet connection with respect to other sectors: fragmentation of the sector (due to the large number of micro businesses) and, in part, organisation of a significant number of small enterprises in associations (cooperatives, buying associations) which, while retaining the identity of the company, concentrate organisational and operative aspects of the business.

Continuing our comparison of different sectors, we find that those with the best position in terms of Internet access are, as one would guess, ICT and Electronics. In these cases, due to the very nature of the business conducted by the enterprises, and the high degree of IT knowledge and experience

that naturally exists in these sectors, Internet access has been permanently acquired in businesses of all sizes.

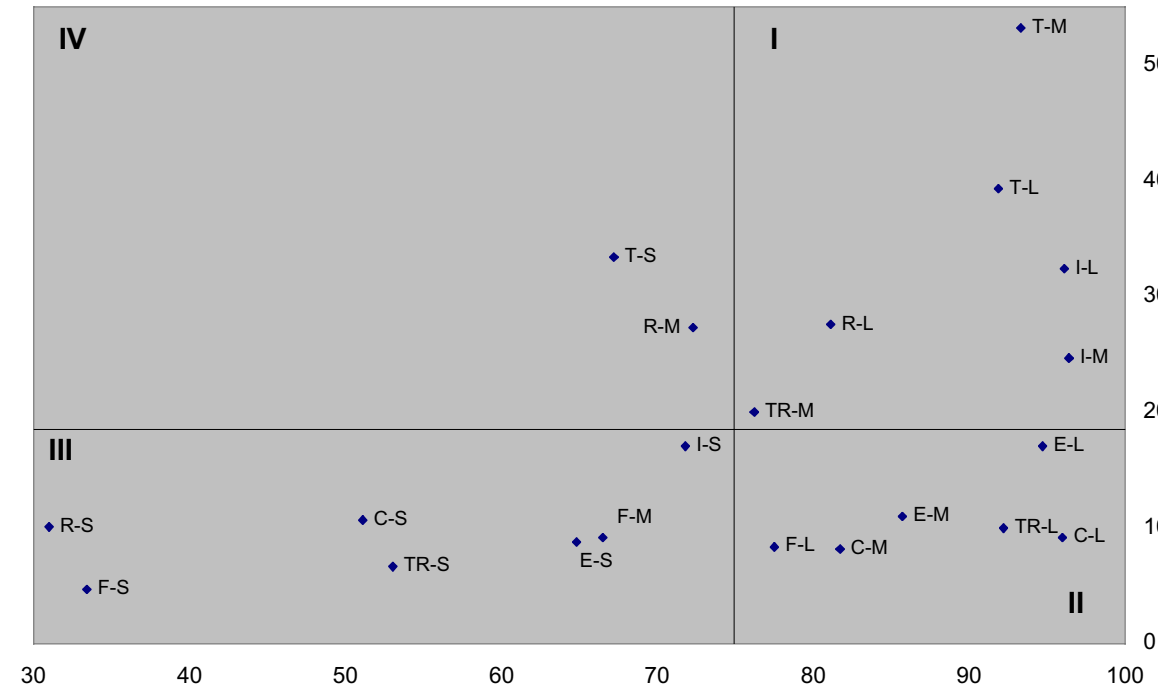
Tourism, Chemicals and Transport are in an intermediate position and contribute to the crowding around the central values. In general, in these sectors too, a kind of "digital divide" persists between large and medium-sized firms on the one hand and small firms on the other.

This element is more accentuated when it comes to the most advanced ICTs, required to integrate company processes and, ultimately, to integrate e-business as a part of a business's overall activity.

About one quarter of small enterprises, and 15% of medium-sized enterprises, still access the Internet with an analogue modem; approximately two thirds (of both small and medium enterprises) have a connection with a speed of less than 2 Mbps; this percentage drops to 44% among large enterprises. The differences in networking infrastructures available to enterprises is even more marked, though this is partly justified by the fact that a smaller business naturally has reduced requirements for horizontal exchange of information. Once again there is a marked difference between small and medium-sized enterprises: only one small enterprise out of five has a LAN; more than one enterprise out of two in the intermediate category, and three out of four in the large category.

Diffusion of websites once again reproduces the distinction between small enterprises on the one hand and medium to large ones on the other, divided by a significant percentage of penetration in most cases. Significantly, despite the markedly different positions of different sectors (from 31% in Retail to 72% in ICT), small enterprises are all located on the left side of the chart, associated with lower penetration of online activity.

Exhibit 2-3: Penetration of websites and selling online *



X axis: penetration of websites by class of enterprise/sector
Y axis: penetration of selling online by class of enterprise/sector
The axes are drawn along the average value (not weighted) of the variables

* legend: the first part of the Code identifies the sector, the second part size class

Sector	ICT	Retail	Food	Tourism	Transport	Chemicals	Electronics
Code	I	R	F	T	TR	C	E

With the exception of Tourism, generally the most advanced sector in terms of selling online, small enterprises are actually located in the third quadrant, associated with the least propensity toward visibility on the web and selling online. These two activities are not necessarily connected (if not by the

obvious fact that selling online normally requires an Internet site), as demonstrated by the positioning of classes of enterprises and sectors in the second quadrant: selling online is often modest despite high visibility on the web, and does not account for more than 10% of all sales.

Propensity for selling online seems to be unrelated to company size: only in ICT and Electronics does dissemination of sites permitting selling online proportionately follow size class, while it is often medium-sized companies that demonstrate a propensity for selling online greater than or substantially aligned with the largest companies (this is the case of Tourism, Transport, Food and Retail). In the case of Chemicals, though absolute values are objectively low, small enterprises are the most dynamic in terms of selling online.

IT skills and e-business activities

The situation appears to be more problematic for small enterprises when it comes to organisation of IT based activities and implementation of e-business tools: just over half of small enterprises provide support for IT and Networking skills, unlike medium to large enterprises (which almost always conduct training activities). Even searching for IT specialists is rarer (under 10% of small enterprises), a fact which is justified by the decreased specialisation of functions normally characterising personnel in small enterprises. In any case, the significance of this figure increases if it is viewed in relation to internal training activities and the difficulties small enterprises experience locating IT specialists (the skill gap affects 48% of these businesses). In fact, despite the fact that upgrading of skills is essential for IT development and that it may be achieved either through upgrading of internal resources or through recourse to specialists from outside the company, almost half of small enterprises do not solve the problem of upgrading IT skills (because they cannot or, more significantly, do not attempt to).

This situation is confirmed by the degree of implementation of e-business activities: orders placed online, for instance, are fully integrated in in-house organisation in less than 10% of all cases (the percentage rises to 25% in medium enterprises and 58% in large ones). Online selling activities performed internally are limited to simply typing in order notification (e-mail).

Other tools requiring overall involvement of company organisation in e-business management are also clearly differentiated between small enterprises and larger ones:

- 30% of large enterprises have adopted or are planning to adopt an electronic Customer Relationship Management system; the percentage drops to 25% of medium-sized enterprises and 9% of small enterprises.
- 19% of large enterprises have adopted or plan to adopt an electronic Supply Chain Management (SCM) system, as compared to 11% of medium-sized companies and 6% of small ones.

Some of these solutions are probably excessively sophisticated for companies with a small number of customers and relationships and limited financial resources.

The parties involved undoubtedly have a more practical approach, especially small enterprises, which always work with tighter financial constraints and limitations on assessment of investment opportunities.

Procuring online, for example, is to a certain degree established even among small enterprises (33%), though in this case, unlike selling, the size element is once again of essential importance in determining the degree of penetration: about 50% of medium-sized enterprises and 58% of large ones use information technology tools for procurement.

It is interesting to compare the degree of adoption of selling and procuring online by different classes and sectors directly, so as to identify specific features of sectors and compare the information with a synthetic evaluation of the impact of e-business. This makes it possible to evaluate the relevance of new technologies for companies' overall activities. The most immediate consideration arising out of comparison of the penetration of selling and of procuring online is that the latter is practically twice as commonly used, and that the difference increases in smaller companies (in larger companies the ratio is 1:3). At a general level, the differences may be attributed to:

- the nature of the players involved in these relationships (in the case of procuring they are, obviously, B2B) and their type; they tend to be more highly structured in B2B, and in some cases with a greater degree of standardisation;
- the maturity of experience based on use of digital technologies in transactions (EDI has traditionally been well-established in certain sectors);
- penetration of information technology infrastructures (in some countries it is only in recent years that information technology equipment and Internet access has reached acceptable levels among consumers).

Analysis of positioning in the chart reveals a positive correlation between the two variables of selling and procuring online, but the correlation is not so close as to prevent well-defined positioning in all four quadrants.

There are a number of strong sectoral differences: Tourism, for instance, has a high propensity for selling, especially among medium-sized enterprises. This may show that in this sector the introduction of online sales does not require large investment, but rather flexible organisational structures that are found in medium-sized firms rather than in large firms. The result is favoured by the results achieved in two major markets: Germany, where over half of all enterprises sell online, and the UK, which, according to a study by Marcussen in 2003, has the biggest share of online sales in Europe with 38% of the transaction volume. The two markets together represent 50% of the total.

Another well-defined position is that of the ICT sector, which has a good predisposition for selling, but is decidedly differentiated when it comes to procuring, with an average propensity which, at the sectoral level (that is, disregarding size class), exceeds three quarters of the total. In this case it is precisely the small enterprises that display the greatest propensity for procuring online, although the significant importance of online purchasing in this sector cannot necessarily be interpreted as the existence of large, sophisticated procurement systems.

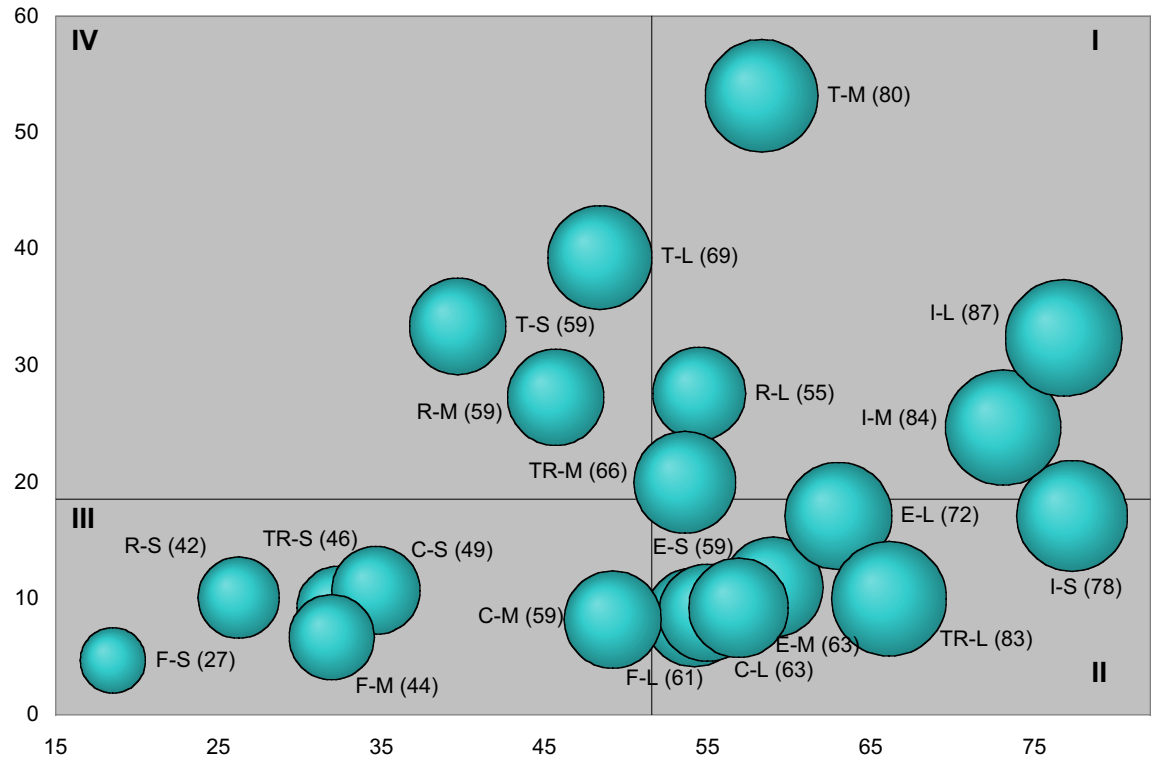
In this case procuring is favoured by the fact that many inputs necessary for the provision of ICT services (software, hosting services, Internet and telecommunication services, office supplies, books, database content, research, etc.) can easily be bought on the Internet and by the familiarity of ICT service companies with the possibilities of the Internet. Procuring activity is significant here in terms of quantity as well, in that one company out of four in this sector makes over half of all its purchases online.

In general, the size variable has an impact on selling and procuring activities, as demonstrated by the concentration of small enterprises in the third quadrant. While in Retail the explanation lies in the high degree of fragmentation of the sector and the concentration of important activities in both purchasing and sales in the hands of cooperatives and buying associations, in other cases the reasons lie in the characteristics of the goods dealt in and in differences among countries, which can be highly significant.

The conclusive element, and probably the most important factor for interpretation of the results and forecasting of future lines of action, is that adoption of e-business tools assumes considerable importance for a company's overall activity. This is primarily due to two reasons:

- Even with limited penetration of e-business tools (such as in the enterprises in the third quadrant), a large percentage of enterprises consider e-business significant, or in some part important, for their business.
- Recognition of the importance of e-business is directly proportionate to the degree of penetration of the principal activities depending on it: once the initial resistance to use of e-business tools and, where possible, to implementation in the company is overcome, digital technologies can, as the companies themselves admit, represent an important opportunity to improve their business and a competitive edge.

Exhibit 2-4: Penetration of selling and procuring online and general impact of e-business by sector/class of enterprise



X axis: penetration of procuring online by class of enterprise/sector

Y axis: penetration of selling online by class of enterprise/sector

The size of the bubble represents the overall importance of e-business for enterprises in given size categories/sectors (significant or some part).

The axes are drawn along the average value (not weighted) of the variables

** legend: the first part of the Code identifies the sector, the second the size class

Sector	ICT	Retail	Food	Tourism	Transport	Chemicals	Electronics
Code	I	R	F	T	TR	C	E

Given these assumptions, the principal hurdles for development of e-business, especially for small enterprises, in the years to come will most likely be:

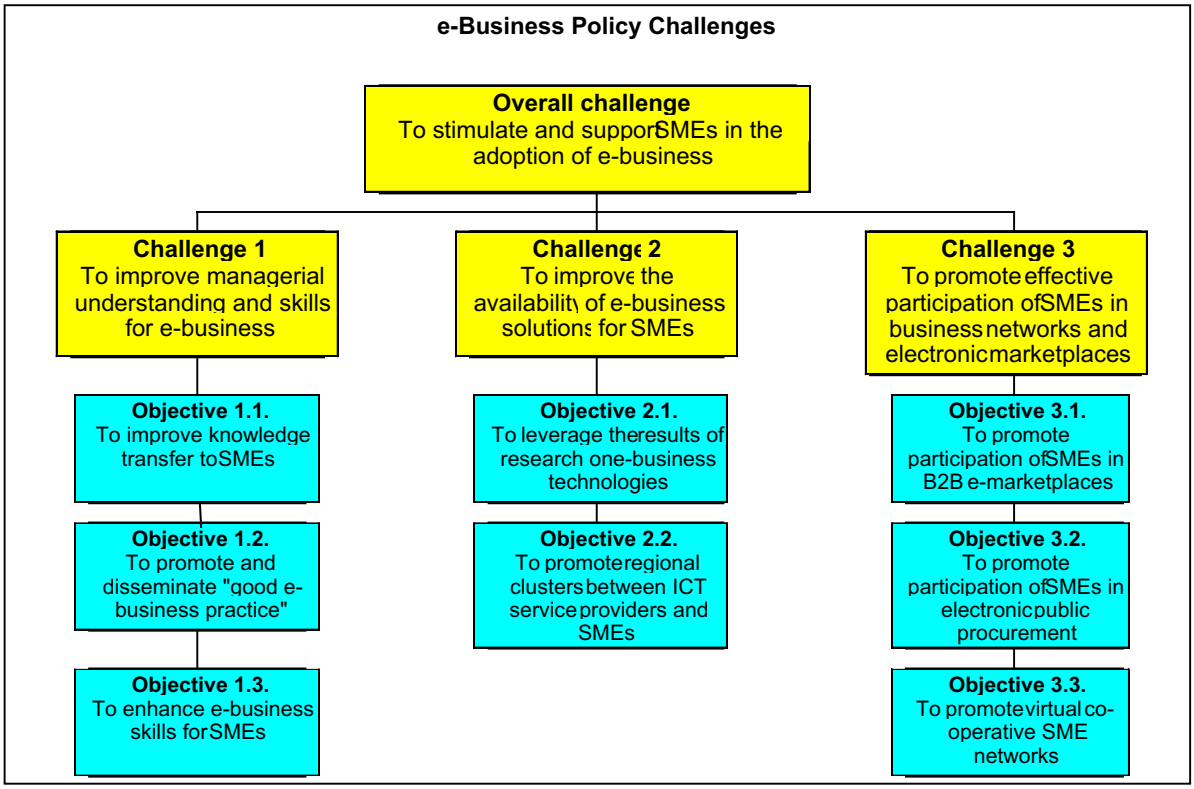
- acceleration of the experience curve leading to diffusion of new technologies even among the least innovative players, on the assumption that, just like any other product or technology, e-business is characterised by an adoption dynamic in which it is initially more likely to be adopted by certain players only but will gradually extend to a broader base.
- achievement of a critical threshold in diffusion, which often determines success in network economies and products.
- removal of cultural barriers and lack of know how which, added to low availability of funds, sometimes discourages investment in new technologies.
- clear definition of the goals that can be achieved with the new technologies, supporting differences in sectors and sizes which in fact determine the success of ICT services.

Innovative e-business policies for SMEs

The goals of improving competitiveness and productivity, compared with the statistical evidence for the uptake of e-business – and related barriers – in SMEs in Europe as depicted in *e-Business W@tch*, gives evidence of the need for a reorientation of policy initiatives towards the facilitation of structural changes. This new approach towards better adapted and more innovative e-business

policies has been recently presented in the Communication from the Commission to the Council and the European Parliament "Adapting e-business policies in a changing environment" (issued March 2003) where a policy framework has been established to ensure a favourable e-business environment. There is a strong case for promoting specific SMEs' policies aimed at fostering the use of ICT and e-business and accelerating their integration in business processes.

Exhibit 2-5: Framework for e-business policies: challenges and objectives



Source: Communication from the Commission to the Council and the European Parliament (2003)

As a support and integration to the analysis of possible targets for e-business policy carried out in the above Communication, the *e-Business W@tch* results indicate the EU policy promoting adoption of e-business among medium and, in particular, small enterprises which are now suffering the biggest lag, should be essentially aimed at:

Promoting awareness of the importance and the possibility for actual return of investment in e-business in achieving an enterprise's overall goals.

A major hurdle to adoption of e-business tools and technologies within small enterprises is cultural, and arises out of the fact that relatively recent experience with the new technologies has not yet generated sufficient literature and experience for businesses to assess precisely the impact of investment; this element is often accompanied by a lack of managerial skills in the field, especially among smaller businesses.

The direct return on IT investments is in fact hard to assess, because once these systems are integrated into a company's organisation they have an impact on various different aspects of the business which cannot always be isolated. Their impact on overall profitability is partly the result of interaction with other players and decisions taken by them in terms of use of technology; the sharing of good practices is also a critical issue as adopters prefer to keep their experience confidential in order to prolong the competitive edge derived from these technologies. Moreover, available existing e-business examples and case studies are mainly from larger companies

Monitoring of the profitability of clusters of small companies identified on the basis of adoption of IT infrastructures and implementation of e-business tools could represent a new solution for collecting

and analysing experiences about usefulness of e-business in achieving companies' goals. Though such a monitoring programme would of course be affected by other variables not necessarily related to e-business (such as, for instance, an enterprise's overall propensity for innovation), it would open the door to a form of communication better aligned with the recipients' sensibilities, even in a scenario such as the current one in which short term assessments prevail.

On the other hand in a number of sectors, such as food, the dominant culture is still rather conservative, and enterprises, especially smaller ones, lack confidence in the potential and benefit of new technologies for their business, and instead underline the common concerns about security and the cultural reluctance to any change in established procedure.

Supporting enterprises' commitment to training of human resources in ICT

E-business activities underscore the need for a more multi-skilled workforce. Small enterprises normally display a low propensity for improvement of computer skills by their personnel, and are also the category experiencing the greatest difficulty recruiting specialists in situations where they are needed.

In the Electronics and Electrical Machinery sector, the principal difficulty facing companies in this regard is a result of the need to train users every time their work routines are changed and new software packages are implemented. In Transport, on the other hand, the problem is that most firms will only invest in training if they can be sure to benefit from the results, while at the same time hopes for greater flexibility in the workforce have negative consequences for companies' willingness to invest in skill development (especially for small enterprises which clearly neglect skill development). The task of continuous re-qualification ("lifelong learning") is an essential characteristic of a knowledge-based economy. However, due to resource shortage and short-term focus, the upgrading of workforce skills and digital literacy should not be left only to enterprises. The challenge includes other stakeholders such as unions, colleges and universities and government. There is still scope for greater collaboration across industrial communities.

Supporting dissemination of standardised systems rather than proprietary solutions.

Uptake of e-business, especially among small enterprises, is strongly encouraged by the diffusion of standards shared by a broad base of users, as this favours creation of network economies, facilitating transition of human resources and experience from one sector/corporate culture to another and making access to technologies more affordable. This need is felt in all sectors, but particularly in Tourism – where proprietary networks are very common – and in Retail, a sector with the potential for a true revolution in overall supply chain organisation.

Reducing the barriers to adoption of e-business by smaller businesses for reasons related to the sustainability and scale of investment.

The rapid pace of technological innovation and economic trends encouraging short term assessment of investments is worsening the natural scepticism in relation to e-business deriving from the scale of the investment required in proportion to the overall size of the enterprise.

In this regard, a number of solutions could encourage penetration of e-business even among a number of smaller enterprises resistant to the use of new technologies. Firstly, the marketplace, which requires no special investment on the part of enterprises and can provide smaller enterprises with access to highly evolved forms of commercial partnership among various parties in the value chain; secondly, conveying supplies for the public sector through the electronic channel; and finally, promotion of collaboration among enterprises at the local and sectorial levels, in terms of both infrastructure organisation and administration of the most complex activities (for instance, by sharing IT specialists such as network administrators).

In all three areas, monitoring of competition in the sectors involved appears to be a particularly critical area: the great selectivity of marketplace activity could result in a degree of concentration which, paradoxically, does not make the tool more competitive. At the same time, organisation of public sector invitations for tender over the online channel tends to result in larger supply lots, inevitably resulting in selection of the dealers involved over the long term.

C.3 From e-markets to Internet trading platforms

by Thorsten Wichmann, Berlecon Research

When the idea of B2B electronic marketplaces came up in the late 1990s, they were regarded as being something revolutionary and distinctly different – as every new idea was in the dotcom era. It was said that e-markets differed in a variety of aspects from other forms of business-to-business e-commerce: unlike the classical e-commerce sites of individual companies (sell-side solutions), virtual marketplaces feature several suppliers, not just one. And unlike the procurement networks run by some large corporations (often called extranets or buy-side solutions), they bring together several buyers. Furthermore, B2B marketplaces differ from simple information directories and industry networks in their transaction focus. Marketplaces lead to actual transactions and usually offer facilities for the direct settlement of such trades. These three characteristics – many buyers, many sellers and transaction focus – were subsequently used as the main elements in any definition of e-markets.

In the public debate about e-markets in the media the perception of e-markets as a B2B equivalent of well-known B2C sites such as Amazon and eBay was very popular. The idea was that companies could go onto e-market sites, search for cheap supplies and new suppliers, participate in a price negotiation and fix the contract. This resembles very much the behaviour of an individual buying a book at Amazon or buying a camera in an eBay online auction.

Companies, however, are not individuals, and their behaviour differs greatly from individuals in many ways. This fact was often overlooked in the beginning and was responsible for the poor acceptance of many e-markets. In addition many ideas that looked compelling as a concept turned out to be difficult to implement. Ideas such as online collaboration or even a sophisticated integration of a company's backend system into electronic markets turned out to be well ahead of the actual capabilities of most enterprises. And finally, many of the functionalities offered on public e-markets, such as running a procurement auction, could as well be offered in private online trading rooms – so-called private marketplaces – which can be integrated into a company's website. In addition, many of these functionalities were also integrated in ERP (enterprise resource planning) software, which companies use anyway.

Taking into account these factors, it does not come as a surprise that the current 2003 landscape of Internet trading platforms differs substantially from that envisaged in 1999. As the *e-Business W@tch* results show, enterprises do use the Internet for online trading. However, they do so in many different ways. They initiate or participate in online auctions, but these are mostly used for negotiating framework contracts for future supply, not so much for buying or selling individual shipments of products. They order many products from online catalogues, but these may be catalogues in internal procurement systems, aggregated catalogues on specific Internet platforms and catalogues of individual companies or resellers as well. They also integrate their ERP systems with those of suppliers or buyers, be it on bilateral terms or via specific platforms. Finally, enterprises also look for new leads or new suppliers on industry portals or in online supplier catalogues.

Enterprises are using the Internet and special Internet trading platforms in many different ways. And what used to be known as electronic marketplaces has morphed into a colourful mosaic of many different specialised platforms serving different purposes, markets and people. A platform providing tools for electronic negotiations, for example, addresses the people responsible for strategic sourcing in an enterprise. This is a different activity, taking place at a different point in time than the actual ordering of products within an already existing framework contract.

These platforms can also take on many different forms. Some are still independent and open platforms targeted at bringing together several suppliers and buyers. But others are serving the procurement or sales needs of single companies. They are therefore not e-marketplaces in the original sense of the word. Some platforms are indeed transaction-focused, but others provide only information (for example, leads) that may lead to transactions. These are not e-marketplaces in the strict sense of the definition either, but are nevertheless very important for conducting business over the Net; they also constitute (partial) substitutes to e-marketplaces.

It therefore makes sense to move away from the strict definition of e-marketplaces and look rather at the development of a broader set of Internet trading platforms. Many companies have already made this step quite some time ago. As the *e-Business W@tch* survey showed, about a third of those claiming to use e-marketplaces stated that they use e-marketplaces operated by a single buyer or seller. Like most companies, we will use the terms "e-marketplace" and "internet trading platform" interchangeably in this paper and understand both in a rather broad sense.

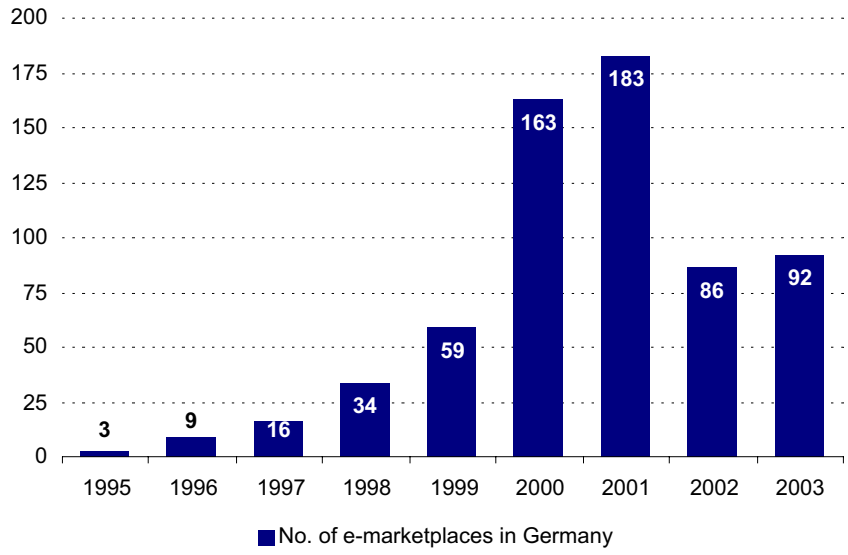
The supply of e-markets

During the dotcom boom of 1999-2001 the number of B2B marketplaces increased considerably all over the world.[3] The vast majority of the e-markets that were established in the late 1990s were start-ups funded by venture capital. The increasing number of active e-marketplaces during that time was thus seen as a sign of success for both, the marketplace model and the venture capital model.

Exhibit 3-1: E-Marketplaces in Germany

Note: Numbers for different years are from different sources and might not be perfectly comparable.

Source: Berlecon Research (1995-2001), BME (2002), eMarket Services (2003)



The exhibit shows for Germany, for which time series data is available, the rise and fall of e-markets during recent years. The boom in 1999-2001 was followed by a crash in 2001-2002. Currently the number of sites is roughly stable. A very similar picture can be found for Europe as a whole. The number of e-markets has fallen only slightly from 2002-03. In North America, however, consolidation was stronger, but on the other hand there also existed more marketplaces than in Europe. Compared to the United States the establishment boom on this side of the Atlantic started 1-2 years late, and many marketplace projects in Europe ran right into the bursting dotcom bubble. Many planned or even announced e-markets in Europe did not materialise therefore in the end, which also implied a lower rate of closures.

Exhibit 3-2: Estimated number of active e-markets by region

Active in	*4/2002*	*6/2003*
World	1189	1008
North America	619	447
Europe	540	516

Note: The regional information denotes activity within the respective region, not necessarily the headquarters.

Source: B2B marketplace database from eMarket Services (www.emarketservices.com), checked in April 2002 and June 2003.

[3] See Berlecon Research (1999): Virtual Intermediaries – B2B Marketplaces on the Internet; Berlecon Research (2000): B2B Marketplaces in Germany – Status quo, Opportunities, Challenges; Berlecon Research (2001): Vom Vermittler zum Dienstleister: B2B-Marktplätze in Deutschland 2001.

In June 2003 there were around 1000 public e-markets in the traditional definition left worldwide, with around 500 of these active in Europe. Although many more private marketplaces or information sites exist in addition, the numbers have to be taken with a grain of salt. The number of active marketplaces is difficult to assess, mainly for three reasons.

- Firstly, many marketplaces changed their business model during 2001 and became software companies, portals or marketplace service providers for private marketplaces. They might have kept their marketplace as showcase, although it need not be of any direct economic relevance.
- Secondly, due to the worldwide economic slowdown since 2002, many start-ups closed shop for good and many old-economy companies closed down loss-making subsidiaries. This process is not yet finished and cannot always be identified accurately, as websites might remain intact even months after a closure. Both effects lead to an exaggeration of the number of active marketplaces.
- Finally, marketplaces are industry-specific and are typically only announced within the industry, especially if they are smaller. This leads to the effect that marketplace directories typically do not have information about all the existing marketplaces.

Overall, the first two effects probably dominate currently, so that the number of active B2B marketplaces has to be put somewhat lower than in the table.

E-markets are not equally distributed over all industries. There are many sites without a specific industry orientation, either explicitly as multiple industry e-markets or due to their product (for example, industrial equipment and services).

Exhibit 3-3: Estimated numbers of active B2B marketplaces in Europe by industry

Industry	No.	Industry	No.	Industry	No.
Multiple Industry e-markets	90	Services	19	Geographical Focus	10
Industrial Equipment & Services	63	Government and Public Sector	17	Maritime products and services	10
Building & Construction	44	Other Industries	17	Advertising & Media	9
Transportation & Logistics	41	Retail & Consumer Goods	17	Manufacturing	8
Agriculture	39	Plastics & Rubber	16	Packaging	7
Food & Beverage	36	Chemicals	15	Printing	7
IT Products & Services	34	Office Equipment	15	Aviation	6
Textiles & Leather	27	Automotive	13	Education & Training	6
Finance & Insurance	20	Paper & Pulp	12	Pre-owned / Second-hand goods	4
Metal & Mining	20	Science & Engineering	12	Arts & Entertainment	3
Telecom & Bandwidth	20	Excess Inventory & Barter	11	Defence	3
Electronics, electrical products	19	Hospitality & Leisure	11	Real Estate	3
Energy & Fuels	19	Environment	10		
Healthcare & Pharmaceutical	19	Forestry & Wood	10	**All e-markets**	**516**

Source: B2B marketplace database from eMarket Services (www.emarketservices.com), checked in June 2003.

The most important groups for vertical marketplaces are building and construction, logistics and agriculture. There are different reasons, why marketplaces can be useful in these industries. In logistics, for example, the problem of unused capacity is very important. Even years before e-markets came up, IT-supported services had been set up to match shipments to empty lorries. In agriculture, B2B marketplaces help to overcome very segmented regional markets. And in building and construction process support is a major added value by marketplaces.

For many occasional observers the story ends with the crash in the number of e-markets. Most consider e-marketplaces as being as dead as the much-hyped New Economy. However, although the consolidation process indeed still goes on, a closer look at what takes place at existing Internet trading platforms often shows a more encouraging picture. Many of these show an increasing number of users or transactions. It seems that several operators have found a business model – often including selling software and solutions – that has increased their chances of survival, albeit that the size of these companies is typically much smaller than during boom times.

Usage of Internet trading platforms

Most of the available numbers about e-markets and related forms of Internet trading platforms provide information on the supply side of these platforms. However, since last year the *e-Business W@tch* also reports figures showing the importance of e-marketplaces from the user point of view. In mid-2002 as well as in early 2003 the companies have been asked whether they participate in e-marketplaces.

Although the numbers for 2002 and 2003 are not strictly comparable due to different sets of industries and countries investigated, they paint a picture of an relatively stable overall use of e-markets. Roughly 5% of enterprises are currently using e-markets and a further 3-4% are planning to do so in the near future. Thus, the participation in e-markets is still relatively low and there are no signs for this to change dramatically in the foreseeable future.

However, there do exist differences by industry. In ICT services, for instance, e-markets are used about twice as much as on average. The tourism industry also shows an above-average usage of e-markets.[4] Both industries are very active in other e-business and e-commerce activities, for example in selling online.

Exhibit 3-4: Participation in B2B marketplaces by industry 2002-2003

Industries	Participating in e-marketplaces		Planning to participate in e-marketplaces within 12 months	
	6/2002	3/2003	6/2002	3/2003
Food, beverages and tobacco	0.7	0.6	2.7	1.1
Publishing, printing & AV services	4.7	-	3.9	-
Chemical industries	4.3	2.9	2.7	4.4
Metal products	0.8	-	2.4	-
Machinery and equipment	3.0	-	2.7	-
Electrical machinery and electronics	4.6	4.0	3.8	4.7
Transport equipment manufacturing	4.1	3.6	3.2	4.1
Retail	6.6	4.9	2.0	4.3
Tourism	8.6	5.5	5.0	4.2
Financial sector	3.7	-	1.6	-
Insurance and pension funding	4.2	-	5.0	-
Real estate activities	2.5	-	1.3	-
Business services	5.0	-	5.1	-
ICT services	11.9	7.2	9.0	5.7
Health and social services	3.8	-	2.3	-
Total	5.3	4.9	3.4	4.2

Regional coverage: EU-4 (Germany, France, Italy, UK). Note that the sector composition of the EU-4 is a different one in 2003 (7 sectors, N=2815) than in 2002 (15 sectors, N=5917).

Source: *e-Business W@tch* (2002/2003)

Apart from industry differences there exist differences between different size classes. Depending on the exact number of countries and sectors taken into account, in 2002 between 9-10% of the large enterprises with 250 or more employees were using e-markets, while only around 5% of smaller enterprises did. The 2003 numbers show a slightly less pronounced headstart of large companies. These numbers are consistent with anecdotal evidence showing large companies to be very early and important users for a variety of well-known e-markets. Obviously, the business case for large companies to participate in e-markets was more convincing in the beginning.

Large enterprises are also in addition using such trading platforms in a different way than smaller ones. Typically, they are more active and are more often taking the initiative, as is shown by the larger percentages of enterprises offering initiating calls for tenders. In addition, they are more frequently

[4] Changes between the two observation periods within single industries should not be overemphasized as the number of observations is comparatively small and the statistical confidence intervals become rather large. There are only very few statistically significant differences between the values for these observation periods.

using online catalogues, both for selling as well as for buying. Large enterprises are also above-average users of consortia marketplaces, which are operated by a group of companies.

Exhibit 3-5: Activities on B2B e-marketplaces by size class

Activity	All enterprises		0-49 empl.		50-249 empl.		250+ empl.	
	2002	2003	2002	2003	2002	2003	2002	2003
Catalogue-based offering on e-marketplaces	41	39	41	39	46	49	46	53
Catalogue-based purchasing on e-marketplaces	36	29	36	29	48	46	42	59
Auctions on e-marketplaces: selling	16	13	16	13	14	14	27	13
Auctions on e-marketplaces: bidding	18	27	18	27	14	21	24	25
Launching calls for tender on e-marketplaces	15	3	15	2	17	10	24	28
Answering calls for tender on e-marketplaces	24	20	24	20	42	45	22	25
Online-marketplaces operated by a single buyer/seller	36	-	36	-	31	-	23	-
Online-marketplaces operated by an industry consortium of buyers/sellers	14	-	14	-	31	-	45	-
Online-marketplaces operated by an independent third party	31	-	31	-	38	-	33	-
Online-marketplaces operated by others	17	-	17	-	5	-	6	-

Regional coverage: EU-4 (Germany, France, Italy, UK). Note that the sector composition of the EU-4 is a different one in 2003 (7 sectors, N=2815) than in 2002 (15 sectors, N=5917).

Base: Enterprises trading on e-marketplaces. Figures for 2002: N=290 for all enterprises, N= 154 enterprises with 0-49 empl., N=87 enterprises with 50-249 empl., N=49 enterprises with 250 or more). Figures for 2003: N=128 for all enterprises, N=68 enterprises with 0-49 empl., N=39 enterprises with 50-249 empl., N=21 enterprises with 250 or more).

Source: *e-Business W@tch* (2002/2003)

As already set out above, B2B Internet trading platforms differ considerably with respect to their functionality, ranging from electronic tendering to full business integration. The most important types of transaction from the point of view of users are "simple" catalogue-based offering (41% in 2002) and purchasing (36%), while participation in auctions is less important, notably for SMEs. Of those enterprises using e-marketplaces, only 16 made use of electronic auctions as sellers in 2002 and, respectively, 18% as bidders. Less than a quarter of all companies indicate that they answer calls for tenders placed at e-marketplaces, but it is interesting to note that this percentage is significantly higher among medium-sized enterprises.

In summary, B2B Internet trading platforms are, contrary to public perception, still alive and being used. In general, larger enterprises are still stronger users of B2B Internet trading platforms than SMEs and more in favour of e-marketplaces operated by an industry consortium of buyers or sellers. This may well indicate different economic interests between larger enterprises and SMEs.

Issues and open questions

The use of Internet trading platforms as a new way to conduct business is not without problems. An issue that features prominently in many discussions is the use of electronic auctions and related online negotiations. Many companies, especially smaller ones, seem to fear unfair competition by the initiators of auctions, often the buyers of products. But standards and the variety of these are also often discussed as potential obstacles to making the best possible use of e-marketplaces.

The strong role of auctions in such discussions is interesting, as the *e-Business W@tch* results have shown them to be not overly important. However, some auctions may take place outside of e-marketplaces and are therefore not included in the data shown above. In addition the existence of problems does not necessarily have to correlate with the usage intensity. In any case, many companies, and especially smaller ones, seem to feel uncomfortable with participating in auctions.[5] They seem to fear unfair behaviour by stronger parties, although it is unclear how often such behaviour can actually be observed in reality.

[5] This issue has been extensively discussed in an expert group on B2B electronic markets established at DG enterprise as well as at a related workshop in June 2003 in Brussels. See http://europa.eu.int/comm/enterprise/ict/policy/b2b/.

Such unfair behaviour can take on different forms. One often stated issue is so-called fake or proxy bidding, where the initiator of a procurement auction either provides bids himself or via proxy participants to keep the auction going and drive the price down. A second way to use electronic auctions in an unfair way can be the setting of unrealistically low target prices. Within the tense atmosphere created by online auctions enterprises might accept these prices even if they are below their own costs. Finally, the notion of unfair use of electronic auctions seems to have a more subtle meaning for others – there are indications that participants feel they are treated with less respect in an impersonal online auction than they ought to be. While this is a much less precise notion of unfairness, it might nevertheless have a significant influence on a company's opinion towards Internet trading platforms.

While these objections against online auctions are often heard, their empirical relevance is not yet clear. Nevertheless their existence does influence the behaviour of companies. This might change over time as enterprises get used to this new tool and learn how to behave in online auctions. Its impact might also be softened by trust-building measures such as codes of conduct that stipulate which kind of behaviour is tolerated on an electronic market and which not.

Standards and the confusion and reluctance caused by their inherently technical nature as well as their sheer number are other issues of importance for the use of Internet trading platforms. The familiarity with these, especially in smaller companies, is rather small, as is expertise in their actual application. While this does not constitute a problem for the use of simple web-enabled e-business solutions such as web-based electronic markets, it keeps companies in the medium run from fully integrating their IT systems with those of suppliers and customers, be it via Internet trading platforms or bilaterally. Without doing so they cannot achieve costs savings and process accelerations associated with this integration and might in the long run even become excluded from certain supply chains. Here education and support for the integration of different standards can prove valuable, especially for smaller companies.[6]

Reference: Expert Group on B2B Internet Trading Platforms

Several of these issues and open questions have been discussed intensively in an "Expert Group on B2B Internet Trading Platforms". The European Commission, DG Enterprise, had set up this group in 2002 with the participation of business and industrial associations as well as e-marketplace operators and independent experts, to discuss actual and potential barriers to the usage of such platforms and to propose possible actions for SMEs. The final report of this group has been presented in May 2003 and is available on the Commission's web site:

http://europa.eu.int/comm/enterprise/ict/policy/b2b/

[6] This topic is discussed in detail in Berlecon Research (2003): E-Business-Standards in Germany – Assessment, Problems, Perspectives.

C.4 Patterns of ICT usage and e-business success among European online sellers

by Tobias Hüsing and Stefan Lilischkis, empirica GmbH

The aim of this exercise is to explore what types of ICT software and network applications are used by online selling businesses and which business processes are supported by these and to analyse whether the use of specific ICTs can statistically be related to successful e-business. Analyses presented here leave the project's sectoral approach behind and concentrate mainly on a cross-sectoral subgroup of the survey sample: enterprises selling online, either via the worldwide web, via Electronic Data Interchange or via a dedicated extranet. We elaborate on the extent and patterns of ICT use by these enterprises. The emerging patterns are condensed into ICT use dimensions and then related to several indicators of e-commerce and e-business success.[7] The analysis is based on 1,346 interviews from the first wave of the *e-Business W@tch*. The detailed sectoral distribution is displayed in the following exhibit.

Exhibit 4-1: Population coverage of the e-Business Survey and population of this analysis

Sector Name	Original sample size	Online selling	% within sector	% of sub-sample
Manufacture of food products, beverages and tobacco	798	68	8.5	5.1
Publishing, printing, reprod. of rec. media, audiovisual services	657	134	20.4	10.0
Manufacture of chemicals and chemical products	538	48	8.9	3.6
Manufacture of metal products	580	34	5.9	2.5
Manufacture of machinery and equipment	593	49	8.3	3.6
Manufacture of Electrical machinery and electronics	517	68	13.2	5.1
Manufacture of transport equipment	509	44	8.6	3.3
Retail	744	98	13.2	7.3
Tourism	699	260	37.2	19.3
Credit institutions, investment firms and leasing enterprises	641	111	17.3	8.2
Insurance and pension funding services	426	78	18.3	5.8
Real estate activities	668	85	12.7	6.3
Business services	692	91	13.2	6.8
Telecommunications and computer-related services	567	145	25.6	10.8
Health and social services	635	33	5.2	2.5
Total	9264	1346	14.58	100

Source: *e-Business W@tch* (2003)

Theoretical considerations

Interpreting relations between the use of ICT and the support of business processes on the one hand and e-business and e-commerce success indicators on the other can be based on arguments about learning curves inside companies, transaction costs, and economies of scale.

Learning and synergy effects

Becoming familiar and gaining experience with ICTs as well as e-business and e-work processes are processes that need time. Moreover, employees may learn from one another, a process that is described as knowledge spill-over or synergy. In recent years, the term "organisational learning" has been used. Benefiting from learning and synergy effects, the input-output relation of a company is likely to decrease over time. Companies with a comprehensive and long experience of ICT and e-business application might have greater opportunities than newcomers and small companies. There

[7] The aim of this paper is to investigate the overall statistical association between ICT readiness and intensity on the one hand and (self-reported) impacts on business objectives at the micro (firm) level on the other hand. All results are based on unweighted data to avoid unwanted distorting effects of weighting and are therefore not representing population estimates.

[8] For comparison: Weighted estimation results in 13% (enterprise-weighted) and 17% (employment-weighted).

might be a particular scope and intensity of e-business that allows these learning effects to lead to a firm's success.

Transaction cost economics

Transaction costs, defined as the costs of creating and implementing contracts, can be divided into search and information costs, negotiation costs and costs of conducting and controlling contract fulfilment. As described by Ronald Coase, companies exist because they can reduce the transaction costs of the market system. Inside companies transaction costs arise, too (albeit through mainly informal and implicit contracts), so that a company needs to define clearly what goods it produces within its own organisation and what goods it receives from other companies via market transactions – the so-called “make-or-buy” decision. The most important transaction cost implication for this study is that ICTs influence the cost level and cost structure of a firm. Searching and information costs may decrease by using ICTs and applying e-business. Consequently, a reasonable assumption is that establishments using ICTs and applying e-business practices will report more effects of online selling.

Economies of scale

The economies of scale argument is that increasing company size is associated with decreasing average unit costs of enterprises. The causes of scale economies may consist in, for instance, specialisation from labour division, cost savings due to increasing utilisation of production factors, experience curve effects, standardization, and centralised reserves. There may be a particular firm size and intensity of conducting e-business that allows the largest benefits of selling and procuring online to be achieved by firms.

Patterns of ICT uptake

Online selling businesses can be assumed to be among the spearhead of Internet-technology users. As compared to enterprises not selling online, significant deviations in technology uptake appear (cf. Exhibit 4-2). For all items surveyed, non-online sellers reveal a penetration rate lower than online sellers; and except for computer and internet usage this amounts to between 89% (e-mail) of online sellers' and 14% (e-marketplaces) of online sellers’ figures. 25 of the 35 items presented in Exhibit 4-2 reveal a penetration of less than three quarters of online sellers.

The most apparent difference is found in the utilisation of advanced business software such as supply chain management, customer relations management and knowledge management as well as using services of an Application Service Provider (ASP). Online sellers also show a much greater propensity to make use of cross-company or cross-establishment networks such as extranet, WAN and EDI and to co-operate across establishment borders as regards crucial support functions such as product designing, market forecasting and inventory management. Other very marked deviations refer to e-learning, remote access to the computer system, broadband access and procuring online.

The *e-Business W@tch* data deliver a variety of information about the ICT uptake in European enterprises. Data cover information from basic computer equipment to the implementation of sophisticated business software electronically to support business processes and workflow. In order to condense this ample complexity and avoid an "information overload" a factor analysis[9] of technology uptake variables was computed. It can be seen that uptake can be described as consisting of eight distinct dimensions[10]:

Networking of computers within and across boundaries of the company for employees as well as for business partners (Networks)

The first factor correlates highly with several computer networking indicators such as LAN, WAN, extra- and intranet, employees' remote access to the company's computer system as well as with broadband internet access. It is hence called the "networks" factor. Other variables loading somewhat

[9] The factor analysis is a statistical procedure examining the association between many variables and thereby reducing the number of variables to some (latent) factors which (in our case) are orthogonal, i.e. mutually statistically independent.

[10] The number of dimensions (factors) here is determined by the rule that eigenvalues have to be larger than 1. All variables are dummy coded. Variables with relative frequencies below 10% or above 90% are excluded.

weaker on this factor are also quite plausibly related to network applications, such as extranet selling, collaboration in internal online environments and online order backend integration.

Usage of online technologies for human resources, the administration of personnel and employee collaboration (Internal online collaboration)

The second factor has high loadings from the variables that describe company internal use of online solutions for ends such as tracking of working hours, travel re-imbursement, support of the human resource management, e-learning and employees' online collaboration. It will thus be called the 'internal online collaboration' factor.

Exhibit 4-2: ICTs in online selling and other enterprises

Variable	Online Sellers	Non-online sellers	Difference (%-points)
Computer Usage	100.0	96.2	3.8
Internet access	99.0	90.3	8.7
Broadband internet access	30.0	17.0	13.0
Using e-mail	98.3	87.3	11.0
Using WWW	94.7	80.8	13.9
Intranet	61.7	41.9	19.8
Extranet	32.5	14.0	18.5
LAN	73.6	60.2	13.4
WAN	36.9	20.9	16.0
Using EDI	27.9	16.9	11.0
Remote access	50.4	30.9	19.5
Remote access wireless	19.0	9.5	9.5
Employee majority internal e-mail	78.3	60.8	17.5
Employee majority external e-mail	88.0	71.4	16.6
Employee majority www	81.6	62.8	18.8
Employee majority intranet	55.9	34.9	21.0
Web site	93.6	62.2	31.4
Procure online	64.0	36.9	27.1
Online external business processes: product designing	27.2	15.6	11.6
Online external business processes: market forecast	23.9	11.6	12.3
Online external business processes: inventory management	20.6	11.3	9.3
Online external business processes: doc exchange with suppliers	55.6	44.3	11.3
Online external business processes: doc exchange with customers	54.5	43.3	11.2
Online external business processes: contract negotiations	26.6	15.6	11.0
Trade on e-marketplaces	20.5	2.8	17.7
Use SCM	8.4	3.1	5.3
Use CRM	25.4	9.8	15.6
Use KM	15.7	7.0	8.7
Use ASP	23.3	9.2	14.1
Use ERP	20.0	13.7	6.3
Online internal business processes: collaboration	56.9	38.9	18.0
Online internal business processes: travel re-imbursement	15.2	7.4	7.8
Online internal business processes: working hours tracking	26.7	19.2	7.5
Online internal business processes: HRM support	27.3	16.6	10.7
Online internal business processes: e-learning	27.7	13.2	14.5
Share of large enterprises (250+ employees)	19.8	9.8	10.0
Share of medium sized enterprises (50-249)	28.3	27.5	0.8

All differences significant with _<.01. Unweighted data. Relative frequencies are not population estimates.

Source: *e-Business W@tch* (2003)

Cross company collaboration via online technologies at a basic level (Basic external online collaboration)

Thirdly, a "basic external online collaboration" factor consists of the variables that indicate rather basic online cross-company collaboration, such as the exchange of documents and contract negotiations (which probably pretty much consist in "paper" exchange).

E-business solutions

The fourth factor represents the dimension of usage of advanced business software solutions. These are knowledge management solutions, CRM and ERP systems and also the use of applications provided by an external ASP (application service provider).

Cross-company collaboration via online technologies at an extended level (Extended external online collaboration)

This dimension combines external online collaboration with business partners and joint business processes as regards the support functions (joint) product design, (joint) market forecasting and (joint) inventory management.

Exhibit 4-3: Factor analysis of ICT implementation in enterprises

Factor / Rotated Matrix / Variable	Networks	Internal online collaboration	Basic external online collaboration	E-business solutions	Extended external online collaboration	EDI and extranet	E-sales integration	Website selling	Communality
LAN	.670	.134	.063	.015	-.034	.027	.090	-.098	.490
Intranet	.648	.162	.119	.111	.041	.055	.122	.070	.497
Broadband internet access	.573	.045	-.031	.153	.044	.000	.165	-.166	.412
WAN	.573	.258	-.012	.103	.147	.229	.049	.100	.492
Extranet	.558	.032	.066	.204	.127	.308	.092	.287	.560
Remote access to company network/computer	.514	.174	.087	.236	.197	.094	-.023	.016	.406
Online tracking of working hours	.240	.693	.008	.153	.062	.154	-.072	-.091	.603
Online travel re-imbursement	.044	.666	-.050	.112	.153	.091	.075	.083	.505
Online HRM support	.241	.661	.116	.236	.038	.066	.081	-.036	.578
Online e-learning	.036	.562	.125	.040	.111	.080	.162	.087	.387
Online internal collaboration	.337	.546	.293	.061	.039	-.042	.055	-.012	.508
Online external document exchange with customers	.086	.096	.813	.037	.129	.104	.003	.028	.707
Online external document exchange with suppliers	.094	.051	.753	-.012	.222	.123	.017	-.006	.644
Online external contract negotiations	-.003	.098	.634	.147	.182	.002	.029	-.001	.468
KM software solution	.050	.193	.027	.655	.176	.156	.007	.008	.525
CRM system	.264	.172	.073	.627	.057	.171	-.005	.082	.537
Use of ASP	.208	.066	.197	.613	.002	-.178	.223	.040	.545
ERP system	.279	.170	-.070	.499	.153	.250	.031	-.099	.458
Online external product design	.117	.084	.249	.061	.747	.027	.095	.030	.655
Online external market forecast	.049	.101	.285	.086	.742	.105	.047	.011	.665
Online external inventory management	.114	.176	.088	.150	.655	.055	.075	-.105	.523
Selling via EDI	.042	.120	.076	.137	.070	.796	.127	-.092	.703
Using EDI	.179	.129	.159	.056	.028	.752	.075	-.062	.652
Selling via extranet	.358	.119	.001	.172	.178	.475	.153	.283	.533
Online order trigger electronically driven business processes	.207	.175	.048	.075	.148	.090	.739	.068	.662
Online order back-end integrated	.320	.077	-.052	.015	.075	.161	.712	.056	.653
Selling via e-marketplace	-.227	.032	.156	.305	-.007	.114	.430	-.353	.493
Selling via website	-.069	.052	.036	.043	-.073	-.062	.054	.833	.717
Cumulated explained variance	23.3	30.8	35.7	40.4	44.5	48.4	52.0	55.6	
After rotation	10.5	19.0	26.3	33.0	39.8	46.5	51.7	55.6	

Rotation: Varimax with Kaiser Normalisation, inclusion if eigenvalue >1. Unweighted data. Factor loadings and communalities are not population estimates.

Source: *e-Business W@tch* (2003).

Well established and electronically supported supply chain relations (EDI and extranet)

The implementation of EDI as well as its usage for sales and selling via an extranet account for this factor. Both EDI and extranet selling point towards the assumption that enterprises with high factor scores in this dimension are situated in stable buyer-seller relationship that are electronically supported. It can be presumed that this is most likely the fact for suppliers with a relatively stable sales market, i.e. who deliver a large share of their products to few purchasers within well-established value chains.

Advanced electronic management of incoming orders (E-sales integration)

This factor mainly consists of the implementation of electronically driven business processes being triggered by incoming online orders and their back-end integration. Additionally, selling via e-marketplace also loads on this factor. It may hence be assumed that selling via marketplaces is often accompanied by back-end integration and electronic process support. Some e-marketplaces provide added value such that process support is already included. This may not be true for all marketplaces but the results of the factor analysis supports the assumption that e-sales integration may be crucial for many e-marketplace players.

Website selling

Selling online via a website constitutes a single factor. This could hint at the fact that e-shops based on company websites, in contrary to e-marketplaces, are individually adjusted to the needs of the respective company. As added variance explained is quite low, we do not bother to interpret this factor at length.

E-business success

It has been shown that e-commerce sellers are on average larger and better equipped in terms of several ICTs. Nevertheless companies selling online fare differently in their success of e-business goals. While 13% state very and 36% fairly positive effects of online selling on the volume of sales, 38% see no and 6% even negative effects[11]. Most satisfied are decision-makers with the effects of online selling on customer service: more than two in three report positive experience in this regard.

As regards the intensity of online selling, the results reveal a heterogeneous picture of online sellers. 14% can be regarded as quite strongly dependent on e-sales: they derive more than a quarter of their selling revenues from e-sales. At the other end of the continuum e-sales revenues account for less than 5% for 41% of enterprises. Regarding e-business in general, 26% of online sellers report that e-business plays a significant part in the way their company operates today, 15% see no part of e-business at all as yet. Another important indicator is the effect of online selling on the overall volume of sales. The variables in Exhibit 4-4 serve as indicators of e-commerce and e-business success in the following analysis.[12]

[11] Here and in the following all figures refer to totals including enterprises who did not specify the effects. In this case these "don't knows" account for 7% of the sample.

[12] see Annex 3: Methodology of the Surveys, Specific note 9

Exhibit 4-4: Online selling volumes, effects of selling online and effects of e-business

Share of online sales in total sales		**%**
less than 5%		41,5
5 up to 10%		19,8
11 up to 25%		11.1
26 up to 50%		7.4
more than 50%		6.8
not specified		13.4
Assessment of effect of selling online on…	**Very positive**	**Fairly positive**
the quality of your customer service?	18.6	39.2
the number of customers?	13.7	36.6
the volume of your sales?	13.2	36.3
the efficiency of your internal business processes?	17.8	34.5
your sales area?	17.2	34.4
the costs of logistics and inventory?	10.3	22.7
Assessment of part of e-business in company's operations		**%**
e-business constitutes *significant* part		25.6
e-business constitutes *some* part		58.6
Assessment of effects of e-business on …	**Significant change (%)**	**Some change (%)**
internal work processes	17.5	36.9
company's offer of products and services	16.6	28.1
customer relationship	15.8	36.3
the organisational structure of company	13.3	31.4
relationship to suppliers	10.6	29.3
Overall assessment effects of e-business on business conduct	17.3	47.8

Unweighted data, n=1346. Relative frequencies are not population estimates.

Source: *e-Business W@tch* (2003)

Technology uptake and E-business success

How are technology uptake and e-business success related to each other? To analyse this relationship simple Pearson's correlations are calculated. Exhibit 4-5 displays correlation coefficients for both. It turns out that all associations can be termed rather weak. The explained variance in either success variable by technology dimensions does not exceed 10%. Nevertheless there are considerable differences when comparing the different technology use dimensions. Three dimension may be neglected as to their influence on e-business success: networks, EDI and extranet, and website selling. This must not be misunderstood as stating that enterprises using these networks or EDI or sell via websites are not likely to be as or more successful than those who do not, but since these are statistically independent latent variables their success or failure can be statistically explained by other ICTs these enterprises use or do not use. However, the analysis of correlation reveals four arguments:

ICTs used by successful actors – a hint towards learning effects

If one assumes the effect on the volume of sales as the most appropriate indication of success, e-sales integration and extended external online collaboration exert the highest effects measured followed by the e-business solutions factor. Enterprises having implemented these rather advanced ICTs obviously fare best as regards sales. Unfortunately no time series data about ICT usage are available from our database. Nevertheless it can be assumed that implementation follows a path from simple towards sophisticated application. Thus an assumption of users of advanced technologies being experienced users supports the hypothesis of learning effects on e-business success.

E-sales integration and extended external online collaboration are also significantly correlated with all other success and effects measures. This includes the overall e-business satisfaction, improvement of internal business (and work) processes and customer relationship, lowering costs of logistics and inventory, increasing the number of customers and the sales area. Users of e-sales integration and extended external online collaboration also significantly more frequently report that e-business has changed their way of doing business.

Transaction costs

Changing the perspective, it can be seen that among the success variables the effects of e-business or selling online on internal business or work processes exhibit the highest positive association with a

variety of ICTs implemented. The conclusion can be tentatively drawn that e-business is currently not deemed a selling factor as much as it is a factor streamlining processes and thereby lowering costs. This is in line with our transaction cost argument if applied to firms' internal transaction costs. Firms having implemented many ICT solutions report significant improvements of internal business processes which presumably make up a considerable share of intra-firm transaction costs.

Exhibit 4-5: The relation between ICT usage dimensions and e-commerce and e-business success

Success variable / Factor	Operationalisation: No. of categories	Networks	Internal online collaboration	Basic external online collaboration	E-business solutions	Extended external online collaboration	EDI and extranet	E-sales integration	Website selling	Multiple Correlation (R)
Share of online in total sales	(5)	-.034	.011	**.059**	**.089**	**.151**	.012	**.161**	.052	**.254**
Overall e-business satisfaction	(4)	.013	**.072**	**.100**	.055	**.121**	.025	**.135**	.019	**.229**
Effects of online selling (5-fold very negative – very positive)										
Volume of sales	(5)	-.043	.055	.052	**.076**	**.122**	-.004	**.150**	**.056**	**.232**
Number of customers	(5)	-.056	.024	**.079**	**.124**	**.123**	**-.061**	**.142**	.015	**.254**
Sales area	(5)	-.043	**.062**	**.109**	**.112**	**.122**	-.049	**.144**	.007	**.261**
Quality of customer service	(5)	.026	.043	.048	**.058**	**.150**	.021	**.139**	.013	**.225**
Efficiency of internal business processes	(5)	**.068**	**.088**	**.106**	**.123**	**.128**	.049	**.200**	-.004	**.313**
Costs of logistics and inventory	(5)	-.037	**.091**	**.072**	**.118**	**.167**	.039	**.159**	-.054	**.294**
Effects of e-business overall (5-fold very negative – very positive)										
Organisational structure	(5)	.029	.051	**.107**	**.084**	**.115**	.039	**.123**	.027	**.229**
Internal work processes	(5)	**.057**	**.102**	**.111**	**.132**	**.113**	**.063**	**.131**	.039	**.281**
Customer relationship	(5)	.009	**.102**	**.118**	**.093**	**.149**	.045	**.134**	.040	**.277**
Supplier relations	(5)	.040	**.130**	**.146**	**.109**	**.172**	.039	**.064**	-.005	**.295**
Range of products	(5)	.038	**.056**	**.134**	**.105**	**.128**	-.020	**.098**	.052	**.251**
(Self-)Assessment of e-business intensity										
Part e-business constitutes in company's operations	(3)	.014	.053	**.117**	**.106**	**.081**	.019	**.144**	.037	**.239**
Extent e-business changed company's conduct of business	(3)	.020	**.055**	**.141**	**.127**	**.143**	.031	**.125**	.031	**.278**
Background variables										
Number of employees		**.088**	**.124**	-.008	**.060**	**.070**	**.135**	.050	.000	**.230**
Selling online to consumers	dummy	**-.121**	-.013	-.012	-.038	-.027	**-.073**	**.079**	**.076**	**.186**
Selling online to businesses	dummy	**.122**	**.066**	**.092**	**.129**	.033	**.088**	.035	.049	**.238**
Selling online to the public sector	dummy	-.028	**.064**	**.082**	**.104**	.008	-.002	.021	.032	**.154**

Pearson correlation. Bold font indicates _<.05. Unweighted data. Coefficients are not population estimates.

Source: *e-Business W@tch* (2003).

Economies of scale

Exhibit 4-5 reveals a weak relation between technology deployment of online selling enterprises and the size of the enterprises in terms of employment. This relation is strongest as regards the EDI and extranet factor. Additionally, it has been shown before that online selling companies are larger in size than non online sellers. Exhibit 4-6, however, shows that there is hardly any relationship between size and reported success – none of the correlations is significant at _<.05. Data hence point to a weak relation between firm size and ICT implementation but no relation between size and e-business success. That means that there may well be economies of scale in implementing e-sales solutions. But there is no effect of size when analysing the subgroup's success in selling online.

Other findings

Exhibit 4-6 suggests that sales success also depends on the target customers. All three customer variables (B2C, B2B, B2G) show significant positive correlation with the volumes of sales variable. It is obvious that B2B and B2G sellers report a larger share of online in total sales, positive effects on logistics and inventory costs and on internal business process efficiency. B2C sellers report an increasing number of customers and at the same time better customer service as a result of selling online.

Exhibit 4-6: The relation between background data and e-commerce and e-business success

Background data / Success variable	No. of categories	Number of empl.	Selling online to consumers	Selling online to businesses	Selling online to the public sector
Share of online in total sales	(5)	-.018	.032	**.186**	**.144**
Overall e-business satisfaction	(4)	-.002	.052	.029	**.086**
Effects of online selling (5-fold very negative – very positive)					
Volume of sales	(5)	-.007	**.122**	**.072**	**.119**
Number of customers	(5)	-.012	**.139**	**.078**	**.083**
Sales area	(5)	.022	**.103**	**.076**	**.105**
Quality of customer service	(5)	.009	**.095**	.027	**.067**
Efficiency of internal business processes	(5)	.040	.044	**.075**	**.097**
Costs of logistics and inventory	(5)	.022	.031	**.109**	**.128**
Effects of e-business overall (5-fold very negative – very positive)					
Organisational structure	(5)	.015	.038	.016	.004
Internal work processes	(5)	.038	.017	.020	.023
Customer relationship	(5)	.019	.026	.049	.031
Supplier relations	(5)	.024	-.029	.080	.027
Range of products	(5)	.015	.023	.053	**.061**
(Self-)Assessment of e-business intensity					
Part e-business constitutes in company's operations	(3)	.008	.038	**.145**	**.103**
Extent e-business has changed company's conduct of business	(3)	.028	.004	**.073**	**.058**

Pearson correlation. Bold font indicates _<.05. Unweighted data. Coefficients are not population estimates.

Source: *e-Business W@tch* (2003).

Discussion

It has been shown that e-business and e-commerce success among online sellers is significantly associated with ICT implementation in enterprises. The fact that the correlation between the two concepts turns out to be rather low is not too surprising, for e-business success, as business success cannot be reduced to a quasi-mechanical technology-success relation. If this was actually so, legions of executives should get sacked tomorrow and armies of MBA students turn toward applied computer sciences. Of course economic success largely hinges on variables that are non-technological. This includes the appropriate relations with customers, suppliers, and employees, the innovative and adaptive potential, the skills and experience base as well as the appropriate competition strategy. Having said this, the appraisal of coefficients being comparatively low is to some extent being qualified, the more so as these are mutually uncorrelated factors.

It turns out that four factors of ICT implementation in businesses in particular are statistically co-varying with success. These are:

- cross-company tele-cooperation such as basic document exchange, as well as
- joint operating of more complex business processes and functions,
- the deployment of specialised e-business software packages and
- an advanced electronic management of incoming orders: e-sales integration.

Since correlation is not causality per se, it remains to be decided whether this syndrome, the conjoint occurrence of e-business success and augmented deployment of e-technology, can be sorted out in a way that cause and effect each are ascribed to either, or a circular determination be assumed or that an effect of third variables, which have not been observed or included in the analysis, can be stated on both concepts. The effects measured here are perceived effects: respondents state that e-business or ICT have affected business conduct in the dimensions described. Having said this, there is an effect of technology – albeit a small effect, it is highly significant. Technological advancement is therefore a piece of mosaic in the overall picture of e-business success that must not be neglected. Enterprises that make heavy use of cross-company online collaboration and those having invested heavily in business software and electronic sales process integration fare significantly better than all other businesses.

C.5 The dynamics of turnover and e-business development – a virtuous circle?

by Philipp Köllinger, DIW Berlin

Does e-business really help firms to be more successful? And if so, how come that some companies are already very advanced in terms of e-business usage, and others are not? Is there a reason why not all companies invest equally in the new technologies, if they really offer advantages? These are intriguing questions that are, in fact, not only e-business specific. The interrelation of technological innovations, firm performance, growth, and market structure have long been an issue in economic research (see, for example, Kamien and Schwartz [1982], or David [1975]). In this chapter, we try to illuminate some of these issues by drawing on statistical evidence from the *e-Business W@tch*.

E-business tools are interrelated innovations based on a joint paradigm – the Internet

Electronic business can be defined as a set of related technological innovations that are jointly based on one unifying paradigm – the Internet. Each of these innovations serves the purpose of supporting specific activities within an enterprise and/or between the enterprise and its environment. E-business technologies are a product innovation for the ICT producing industries that opens up new business opportunities and markets. But they are also enabling technologies for conducting process and product innovation in the user sectors. So, whether we classify e-business as a product or process innovation is basically a matter of perspective. In all cases, e-business tools are innovations in the sense that they give rise to new products or services and means of production and delivery.

Innovations influence market structure, growth, and economic welfare through altering the methods of production (process innovations) and creation of new markets (product innovations). Process innovations have the purpose of making a firm more efficient, i.e. more productive. This could be achieved by simplifying and speeding up routine procedures, or by making better decisions based on more accurate and timely information. Efficiency is essential for firms since an optimal relation of monetary inputs and outputs ultimately decides their success or failure. A firm that is more efficient than its competitors will be able to produce the same product or service at a lower cost and will thus have a competitive advantage.

Innovations influence market structures and economic growth

Product innovations, on the other hand, have the purpose of opening up new business opportunities that have not been exploited before by competitors. It could also mean changing an existing product or service offer or its mode of delivery such that customer preferences are better met. In either case, the purpose of innovative products or services is to differentiate offers and to explore new market opportunities. Ultimately, both product and process innovations serve companies as means to increase their profitability.

Innovations are risky, yet necessary

The opportunity for higher profits comes at a price. In addition to the investments needed to conduct the innovation, there is always the risk of failure. This is true for both product and process innovations. New products may turn out to be flops on the market (for example, online books), or they might even diminish the profits earned with related, traditional products (for example, file sharing and the music industry). New processes may turn out not to work in practice, or their implementation might prove a lot more difficult and expensive than originally planned. In fact, this is also a very common experience for many e-business based innovations. However, these risks serve as the market's "screening device". Only those that manage to handle these risks successfully will prosper, not those that try to avoid them. In the particular case of the Internet, there are already numerous examples where e-business technologies have been successfully used for product or service innovations, or the improvement of processes.

Innovations also benefit consumers and social welfare

However, innovation leads not only to higher productivity and profits; it usually also means that customers either get better products and services or the same ones at lower prices, which is why at least some of them switch to the supplier that has succeeded best in optimising processes and offering innovative products or services. Via this mechanism, customers usually also profit from innovations. Innovations such as e-business usually have a very positive effect therefore on economic development and social welfare.

To put it into more colourful language, the invention of a new technology such as e-business can be compared to a stone that is thrown into water. Once the stone touches the surface, it begins to send out a series of ripples. So does a new technology – once it is introduced in firms, it begins to impact on productivity, turnovers, profits, the success (or failure) of companies, market structures, product and service characteristics, consumer behaviour and so forth. And the more elementary and successful the new technology, the bigger the "ripples" and changes in the economy. e-business and the Internet create an impact because many believe that their very elementary new technology will send out big "ripples".

Against this backdrop, I want to use evidence from the *e-Business W@tch* to elaborate on two questions. (1) Can we find evidence in the data that investment into e-business technology is actually associated with the success of a company? (2) Is the investment into e-business technology neutral to the past performance of an enterprise? The first question can be seen as a crude measure for "how big the ripples are". The new technology can only have significant economic impact if it can be shown that its usage is in some way related to the individual success of a company. If there is such a connection, it will be interesting to explore who will benefit most from e-business – those who were already successful in the past, those who use the technology to "catch up", or all equally? This is what is involved in the second question – one of the consequences of the "ripples".

Are firms that invested into e-business more successful than others?

Let's start with the first question. Do we find evidence in the data that firms that already use e-business are more successful than the rest? Typically, success is measured as profit. However, turnover can also be considered as a measure of success. Turnover and profit are usually positively correlated. Increasing turnovers or profits suggest that a firm grows, which is generally viewed as desirable and as success. The disadvantage of turnover as a measure of success is that it does not explicitly take the input/output efficiency ratio into account. On the other hand, profits are not a perfect measure either. In reality, profits are subject to rather complicated financial reporting issues and can be distorted by tax optimising strategies of firms. In addition, neither profits nor turnover are the correct measure for the productivity of a firm – this would be "value added" (the difference between outputs and factor inputs at market prices), an indicator that is virtually impossible to be collected in a CATI survey such as the *e-Business W@tch*. Thus, in this analysis we do not explicitly consider the productivity of firms but only their overall success, approximated by their turnover development. However, when we talk about the success of a company, we implicitly assume that part of the story is productivity and the ability to innovate. This is the theoretic link between e-business usage (which is supposed to increase productivity and open up new business opportunities) and turnover (which is the result of the productivity of each individual firm and the market in which it operates). The *e-Business W@tch* survey contains information about turnover dynamics of firms – i.e. whether a firm's turnover has increased, decreased, or remained unchanged in the last year. This serves as a proxy for the success of a company.

We also have to take into account that technological innovations impact cost structures, productivity, product and service offers etc. not instantaneously but *over time*. We cannot expect that prior implementation of technology will mean the immediate realisation of all potentials. Time-consuming readjustments in organisational structures and processes are frequently required, as well as learning by using in order to realise all the benefits of the new way of doing business. Currently, the *e-Business W@tch* data only have a very limited time dimension. In the first survey, companies were asked how long they had been using online sales and purchasing online (less than one year, 1-2 years, or more than two years). We use these indicators as proxies for the e-business experience of a firm and analyse their relationship to the turnover development indicator. To analyse if these two applications

had any measurable effect on a company's turnover in the last year, we only tested for the influence of more than one year of e-business experience.

For the empirical test we use a stepwise logistic regression with "turnover last year has increased" as a dependent variable (see, for example, Greene [1997], pp. 871-888).[13] In addition to the variables indicating e-business experience we entered sector membership, country, and size-class as control variables to account for different market dynamics that could affect turnover development. The results of the test are presented in the following table.

Exhibit 5-1: Factors influencing "turnover last year has increased"

Variables in the model		
Variable	**Coefficient**	**Significance**
Country: France	.537	.000
Purchase online for more than two years	.491	.000
Purchase online for one to two years	.315	.000
Sector: Insurances and pension funds	.315	.011
Sector: ICT	.285	.009
Size class >250 employees	.277	.001
Sector: Food, beverages, tobacco	.237	.026
Country: UK	.173	.021
Country: Germany	- .236	.003
Sector: Health and social services	- .305	.006
Sector: Publishing, printing, reproduction of recorded media	- .310	.005
Constant	- .619	.000
Model Diagnostics		
N	5917	
N (turnover last year has increased = yes)	2480	
Nagelkerke R2	.043	
-2 Loglikelihood	7857	
Insignificant variables (at 90% confidence)		
Other sectors, other size classes, Italy, online sales experience		

Online purchasing has a positive effect

It turns out that online purchasing experience has indeed a significantly positive influence on increasing turnovers. Enterprises that use the Internet to purchase goods or services for one or more years experienced a disproportionate increase in turnover last year. From this simple test we cannot conclude that they experienced a better turnover *because* they purchased online. But we *do* know that the usage of e-procurement and increased turnover are positively and significantly correlated. In other words, whatever market dynamics and other factors affected the performance of these firms, using the Internet for purchases is part of the success story. Interestingly, the regression coefficient is much higher for firms with more than two years of online purchasing experience. This could be interpreted as a sign that a time lag exists between the adoption of a new technology/purchasing process, and the time where positive effects show up in the balance sheets.

Time gap between implementation and measurable positive effects

In addition to online purchasing experience, a number of the control variables turned out to be significant. We find that companies in France and the UK experienced better turnover development last year than in other countries, specifically Germany (which has a negative coefficient). Large companies also apparently grew faster than on average. In addition, four sectors entered the model with positive coefficients and two with a negative one, each indicating significant deviation of the particular sector to the average performance of all sectors.

[13] see Annex 3: Methodology of the Surveys, Specific note 10

Online sales without significant effect

Surprisingly, we find no significant influence of online sales experience on turnover development. Two explanations are possible. It could be that the advantages and disadvantages of the Internet as a sales channel equalise on average. Or, it could be that the magnitude of efficiency gains due to online sales are too small to show up in the balance sheets.

No negative effect of e-business measurable

Comfortingly, a similar test with "turnover last year has decreased" as dependent variable shows that neither the usage of online sales nor online purchases have an impact. This confirms that investments in e-commerce technologies did not systematically "harm" the enterprises.

Three lessons can be learnt from this. Firstly, not all e-business applications have the same effect on the success of a company. In other words, the "size of the ripples" is not equal for all e-business applications. The effects of purchasing online on the success of a company seem to be much more substantial than the effects of selling online. Secondly, the e-business experience coefficients are altogether positive. In other words, if there is any connection between turnover development and e-business usage, it's a positive one – that's encouraging news. Thirdly, there seems to be a time gap between technology adoption and return on investment. In summary, purchasing online can at least be associated with higher turnovers of the individual enterprise, which will affect market shares.

Do successful companies plan to invest more into e-business in the future?

Let us turn to the second question: is the investment into e-business technology neutral to the past performance of an enterprise? According to textbook economics, it should be. In a world where markets clear the past performance of an enterprise is irrelevant for its investment decisions. All that matters are the expected future cash flows that the investment opportunity offers. The company chooses the investment that offers the highest positive discounted cash-flow. This could be some e-business technology, such as e-procurement. Note that liquidity should not matter either – under the assumption that financial markets are efficient and no information asymmetries exist between the bank and the enterprise, it should be easily possible to raise external funds to undertake the investment opportunity. That is the standard theory – but the reality seems to tell an entirely different story.

We have again used a stepwise logistic regression to analyse this question – only this time with "e-business spending next year will increase" as dependent variables. Sector membership, size class, country, e-commerce experience, and turnover development last year were entered as independent variables (see table next page).

Almost linear relationship between past success and plans for future e-business investments

It can be seen that e-business investments are by no means neutral to the past performance of an enterprise. Companies that experienced an increase in turnover last year are much more likely to increase their e-business spending next year. To test the reverse case, we have also conducted a control regression with "e-business spending next year will *decrease*" as a dependent variable. Here it turned out that companies that experienced decreasing turnover last year are significantly more likely to reduce their e-business investments next year. This suggests an almost linear relationship between turnover last year and planned e-business spending for next year: The more successful a company was last year, the more likely it will increase its e-business investments and vice versa.

Exhibit 5-2: Factors influencing "e-business spending next year will increase"

Variables in the model		
Variable	**Coefficient**	**Significance**
Online sales for less than one year	.695	.000
Purchase online for one to two years	.657	.000
Purchase online for more than two years	.585	.000
Purchase online for less than one year	.545	.000
Online sales for one to two years	.539	.000
Sector: Insurances and pension funds	.383	.004
Turnover last year has increased	.369	.000
Online sales for more than two years	.328	.007
Sector: ICT	.294	.010
Sector: Monetary services	.285	.012
Sector: Tourism	.274	.018
Size class: 1-49 employees	-.255	.000
Sector: Transport equipment	- .265	.042
Country: UK	-.452	.000
Country: France	- .727	.000
Country: Germany	-1.246	.000
Constant	- .583	.000
Model Diagnostics		
N	5917	
N (e-business spending next year will increase = yes)	1891	
Nagelkerke R2	.104	
-2 Loglikelihood	6959	
Insignificant variables (at 90% confidence)		
Italy, other sectors, other size classes		

Firms with high e-business experience and turnover growth last year are more likely to increase their e-business spending next year

There are great differences between sectors and countries concerning their planned e-business spending. As a general trend, companies from sectors where e-business is already widely diffused tend to increase their planned investment and vice versa. Firms in the UK, France, and specifically in Germany are significantly less likely to increase their e-business spending (which implies in turn that Italy could catch up in terms of e-business usage). Small companies with less than 49 employees are also less likely to increase their e-business investments. On the other hand, firms that already have online sales or online purchasing experience are significantly more likely to increase their e-business spending in the near future.

A growing "digital divide" among firms?

These findings have a number of important implications. First of all, we clearly see that history matters and investment opportunities are not disconnected from the past performance of an enterprise.

Secondly, it suggests that something is wrong with the standard textbook theory about investments. A more realistic story could be that a decrease in turnover suggests that the internal funds of a company to invest into e-business also decrease. Obviously, enterprises cannot compensate for this by raising external funds from banks or stockholders as the theory suggests. On the contrary, in reality a negative turnover development signals problems to external financiers and often results in credit or equity rationing. But missing out on an attractive investment opportunity will have further negative consequences for the future performance of an enterprise. Vice versa, companies that performed well in the past will have less trouble in financing investment opportunities, both with internal and external funds. Consequently, they will be more likely to undertake the worthwhile investment and eventually perform better in the future as well. This more evolutionary view of market development is clearly at odds with the standard paradigm of static equilibrium.

Thirdly, we find evidence for a growing "digital divide" among firms. On the one side we find companies and entire sectors with a high degree of e-business usage and experience – those are the one's that plan to increase their investments in the near future. On the other side we have companies that already "lag behind" in terms of e-business experience – and they exhibit a significantly lower proportion that plans to increase e-business spending.

Doing e-business is already part of the success story of many companies

The simple tests presented here lead to some interesting conclusions. First of all, we find evidence that the usage of e-business technology, specifically online purchasing, is in fact a significant part of the success story of many companies. But we also find that not all firms explore these opportunities equally. In fact, it turns out that primarily those firms that already experienced above average turnover development in the past and those that are already experienced users of e-business tend to increase their e-business investments in the near future as well.

It pays to be innovative

This suggests a growing "digital divide" among firms and that Internet technologies (just like all major innovations) serve as a catalyst for market dynamics: The more successful companies have the necessary resources to experiment with the new technologies, and eventually turn this into competitive advantages. The less successful ones with restricted budgets, however, risk further falling behind, to the benefit of the more innovative companies. This may seem unfair, but it is exactly the evolutionary dynamic of innovation and markets that ultimately spurs economic development and growth. The message to the market is indeed a positive one: it pays to be innovative, and using e-business technologies is one way to become more efficient, to differentiate the company from competitors, and to gain competitive advantages.

References

David, A.P. (1975), "Technical choice innovation and economic growth", Cambridge University Press, Cambridge et. al.

Greene, W. H. (1997), "Econometric Analysis", 3rd edition, Prentice-Hall International, London et. al.

Kamien, M. I. and Schwartz, N.L. (1982), „Market structure and innovation", Cambridge University Press, Cambridge et. al.

Annex 1: Glossary

Term	Definition
Access	The ability to retrieve information and to communicate online through the use of digital information and communication technologies.
B2B	Business to Business. Electronic transactions between companies.
B2B e-marketplace	Electronic trading platforms on the Internet where companies can sell and/or buy goods or services to/from other companies. They can be operated by a single buyer or seller or by a third party. Many marketplaces are industry-specific. Some marketplaces require registration and membership fees from companies that want to conduct trade on them.
B2C	Business to Consumer. Electronic business processes between companies and consumers.
Bandwidth	The physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz), and in digital systems in binary bits per second. (Bit/s).
Broadband	High bandwidth internet access. Broadband is generally defined as the capacity to transfer data at rates of 2Mbit/s (megabits per second) or greater.
Channel	In communications, a physical or logical path allowing the transmission of information; the path connecting a data source and a receiver.
CRM	Customer Relationship Management. Software systems that promise the ability to synthesize data on customers' behaviour and needs and thus to provide a universal view of the customer.
Dial-up	The process of establishing a temporary connection (to the Internet) via the switched telephone network.
DSL	Digital Subscriber Line. A family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as "twisted copper pairs") into high-speed digital lines, capable of supporting advanced services. ADSL (Asymmetric Digital Subscriber Line), HDSL (High data rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL
E-business	Electronic business. The *e-Business W@tch* uses the term "e-business" in the broad sense, relating both to external and to company internal processes. This includes external communication and transaction functions, but also ICT supported flows of information within the company, for example, between departments, subsidiaries and branches.
E-commerce	Electronic commerce. As distinct from the broader concept of e-business, e-commerce refers to external transactions in goods and services between companies (B2B), between companies and consumers (B2C), or between companies and governments (B2G) and may therefore be seen as a subgroup or component of e-business activities.
EDI	Electronic Data Interchange. A way for unaffiliated companies to use networks to link their businesses by using a common technical standard for exchanging business data. While electronic mail between companies is common, electronic data interchange passes bigger bundles that replace large paper documents such as bills and contracts. Besides saving paper, computers could save time by taking over transactions such as regular purchase orders that now require human intervention.
E-readiness	Readiness for e-business is defined as the capability to engage in electronic transactions. This comprises appropriate network access (including sufficient bandwidth), internal hardware and software solutions as well as the procedural and managerial readiness to deal with online transactions from simple web presence through to fulfilment of customer orders and related after sales services.
ERP	Enterprise Resource Planning. A software system that helps to integrate and cover all major business activities within a company, including product planning, parts purchasing, inventory management, order tracking, human resources, projects management, and finance.

Extranet	A network using Internet protocols that allows external organisations (for example customers or suppliers) access to selected internal data. Essentially it is an Intranet which gives external users restricted access (often password protected) to information through the firewall.
ICT	Information and communication technology. ICT includes networks, computers, other data processing and transmitting equipment, and software. The application of ICT in business processes leads to e-business, if non-proprietary networks are used.
Information security	Measures taken to protect information systems against unauthorised use and attacks
Internet	The world's largest computer communication system, with an estimated 600 million users worldwide.[1] The Internet is a loose confederation of principally academic and research computer networks. It is not a network but rather the interconnection of thousands of separate networks using a common language.
Interoperability	The technical features of a group of interconnected systems (includes equipment owned and operated by the customer which is attached to the public telecommunication network) which ensure end-to-end provision of a given service in a consistent and predictable way.
Intranet	An internal Internet, that is an internal network running using TCP/IP, which makes information available within the company. Most intranets are connected to the Internet, and use firewalls to prevent unauthorised access.
ISDN	Integrated Services Digital Network. An international telecommunications standard for transmission of voice and data over dial-up lines running at 64 Kbit/s (kilobits per second). It allows sharing of multiple devices on a single line (for example, phone, computer, fax).
LAN	Local Area Network. The most common way of connecting computers in a small area (typically inside a building or organisation) for sharing databases and communication facilities. The two most common versions are Ethernet and Token Ring. Implementation is based on coaxial cables or plain wires. Speed achieved ranges from 10 Mbps to 100 Mbps.
Leased line	A private communication channel leased from the common carrier. It is usually a dedicated fixed-route link (e.g. point-to-point frame relay).
M-commerce	Mobile commerce. E-commerce that takes place using mobile connection devices and through data transmission via technical standards for mobile communication.
Micro enterprise	A company with less than 10 employees.
Modem	Modulator/Demodulator. A device that modulates outgoing digital signals from a computer or other digital device to analogue signals suitable to be transmitted through a conventional telephone line (copper twisted pair telephone). The reverse procedure takes place for incoming signals.
MRO goods	Maintenance, repair and operating goods. Supplies which companies need to maintain their operations, for example office supplies, in contrast to "direct production goods" which are components of the goods and services the company produces.
Processes	Business processes are operations that transform the state of an object or a person. This can, for example, be an order placed via the internet. Ordering an object or a service creates a liability for the supplier to deliver, and initiates the transfer of property rights from one entity to another. The electronic handling of processes is likely to speed them up and to introduce new processes in the realisation of the same transaction.
Remote access	The ability of a company computer network's transmission points to gain access to a computer at a different location.
SCM	Supply Chain Management. Software that helps businesses to match supply and demand through integrated and collaborative planning tools.
Sector	Sectors of the economy with comparable business activities. These constitute the main research unit of the *e-Business W@tch*. Aggregated information at the industry level is used to document the diffusion of activities within the industries as well as the overall importance of the observed phenomena for changes in the economy as a whole. The definition of sectors follows NACE Rev.1 classifications.

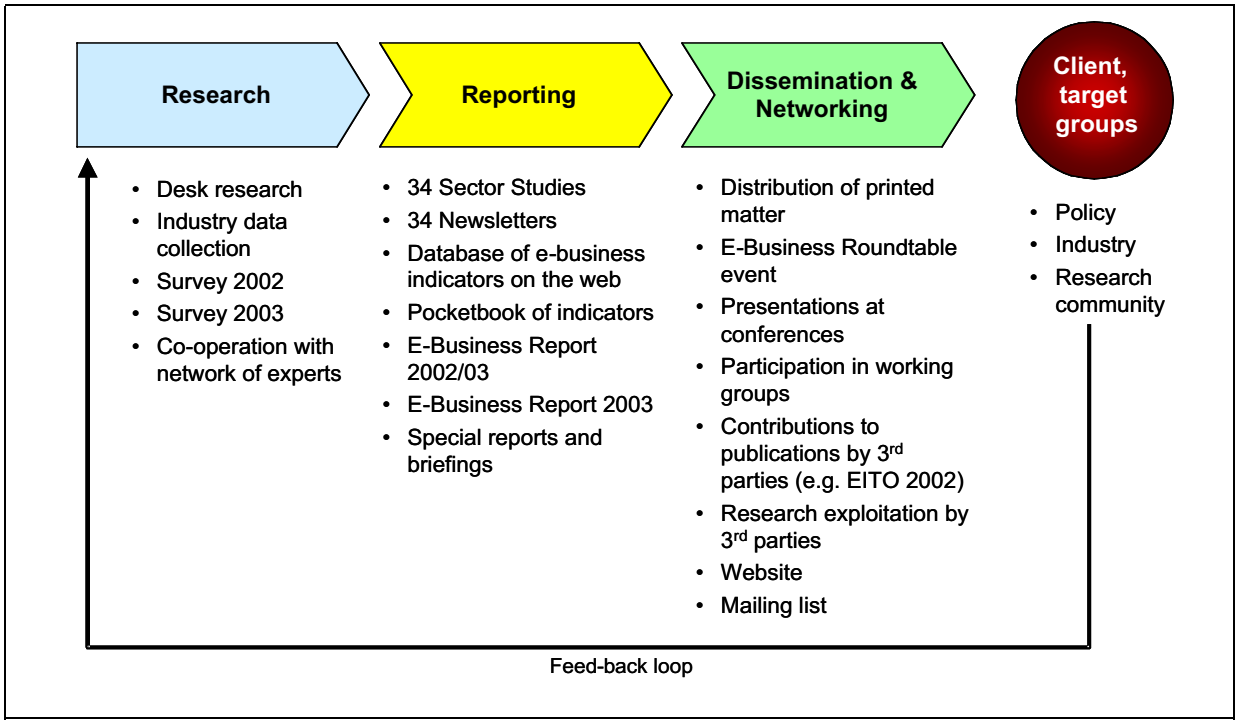
[1] cf. Nua Internet Surveys, How many online, June 2003 (http://www.nua.com/surveys/how_many_online/index.html).

SME	Small and medium-sized enterprises with 0-249 employees. To be classed as an SME, an enterprise has to satisfy the criteria for the number of employees and one of the two financial criteria, i.e. either the turnover total or the balance sheet total. In addition, it must be independent, which means less than 25% owned by one enterprise (or jointly by several enterprises) falling outside the definition of an SME or a micro-enterprise, whichever may apply. The thresholds for the turnover and the balance sheet total will be adjusted regularly, to take account of changing economic circumstances in Europe.
Transaction	Electronic transactions can be subdivided into several steps, each of which initiates a process. There are pre-sale (or -purchase) phases, sale and after-sale phases. Typically a transaction starts with information gathering, price and quality comparisons and possibly pre-sale negotiations. During the sale phase contracting and delivery are the core processes, and payment is the final stage of this phase. After-purchase transaction stages comprise customer service, the administration of credit payments and the handling of returns as well as marketing activities preparing for the next purchase.
Value added	Gross output minus intermediate inputs. It is valued at producers' prices and includes all indirect taxes but excludes VAT and subsidies.
WAN	Wide Area Network. A network allowing the interconnection and intercommunication of a group of computers over a long distance.
WAP	Wireless Application Protocol. A communication protocol for delivering data over mobile telephone systems, allowing cellular phone sets and other mobile hand-set systems to access WWW pages and other wireless services.
Website	A related collection of World Wide Web files that includes a beginning file called a home page.
Wi-Fi	Short for "wireless fidelity", popular term for a high-frequency wireless local area network (W-LAN). Wi-Fi technology is rapidly gaining acceptance as an alternative or complementary infrastructure to a wired LAN.
W-LAN	Wireless Local Area Network. An implementation of a LAN with no physical wires, using wireless transmitters and receivers. It allows a mobile user to connect to a LAN or WAN through a wireless (radio) connection. A standard, IEEE 802.11, specifies the technologies for wireless LANs.
WWW	World Wide Web. The collection of pages in html format which reside on web-servers. Although WWW and the internet are different, the terms are increasingly becoming interchangeably used.

Annex 2: The *e-Business W@tch* 2002/03 – main activities

This Annex summarises the activities of the *e-Business W@tch* during the time period covered by the respective contract between the European Commission, DG Enterprise, and empirica GmbH. Following a brief introduction, describing the context of the initiative, the annex is structured in three main parts. The first part summarises the research activities, particularly the primary research carried out in the form two e-business decision-maker surveys in June 2002 and in March 2003. The second part provides an overview of reports and documents produced by the *e-Business W@tch*. The third part describes the dissemination and exploitation activities carried out in order to communicate results to target groups.

Research, reporting, dissemination: Activities of the e-Business W@tch in 2002/03



1.1 The rationale of the *e-Business W@tch*

The European Commission launched in 2001 the Go Digital initiative, as part of the eEurope 2002 Action Plan, with the objective to help SMEs to better use the Internet as a business tool. At the time when the eEurope 2002 Action Plan was adopted, however, only little statistical information on e-commerce and ICT usage by European enterprises was available, in particular with respect to SMEs. For this reason, the Go Digital Action Plan[2] included a specific action concerning the measuring of the take-up of ICT and e-business. This action has resulted in the e-Business Market Watch Function (the '*e-Business W@tch*').

The objective of the *e-Business W@tch* is to monitor and analyse the pattern of e-business take-up by enterprises from different sectors across the EU Member States. In this way, the *e-Business W@tch* is helping to improve the understanding of e-business impact at macro- and micro-economic levels and, consequently, relevant policy formulation notably for SMEs. The *e-Business W@tch* is carrying out sectoral impact analyses, based on a common methodology and a consistent set of indicators (taking

[2] COM(2001)136 final, of 13.3.2001, Communication on "Helping SMEs to Go Digital", action 2: measuring of take-up of ICT and e-business

into account the statistical work of Eurostat and the OECD). Its main task is to provide regular cross-sector reports, based on primary field research, exploitation of secondary sources and case studies.

The first phase of operation, covering 15 different sectors has been completed in mid-summer 2003. The second phase, starting in July 2003, will continue on similar methodological lines, focusing on the ten most interesting sectors and increasing the dialogue with industry associations and e-business stakeholders across Europe. In this sense, the *e-Business W@tch* will facilitate a targeted dialogue between the different sectors and policy actors as regards the practical implementation of e-business.

1.2 Research activities

Most of the data presented in the reports of the *e-Business W@tch* are derived from two Decision Maker Surveys about the adoption of e-business among European enterprises in 2002 and 2003. These surveys constitute a cornerstone of the monitoring activities of the *e-Business W@tch*.

1.2.1 Primary research

The E-Business Survey 2002

The first survey was carried out in June and July 2002 and had a scope of 9,264 telephone interviews with decision-makers in European enterprises from all EU Member States. For the construction of the questionnaire and for underlying definitions, OECD recommendations were taken into account. The fieldwork of the survey was carried out by INRA Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch*. The survey used computer-aided telephone interview (CATI) technology. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, especially in small enterprises without a separate IT unit, the managing director or owner was interviewed.

The sample included enterprises from 15 sectors of the economy. Seven of these sectors are from manufacturing industries, two are financial services sectors and six from other service industries. The definition of these 15 sectors is based on NACE Rev. 1 divisions and groups. This aggregation into sectors constitutes the key unit of observation for the *e-Business W@tch*. The sample drawn was a random sample of companies from the respective sector population in each Member State where the respective sector was to be surveyed with the aim of fulfilling quota with respect to company size class. Target quota were to include a share of at least 10% of large companies (250+ employees) per country-sector cell and at least 30% of medium sized enterprises (50-249 employees).

The E-Business Survey 2003

The second survey was carried out between 24th February and 20th March 2003 and had a scope of 3515 telephone interviews with decision-makers in European enterprises from five EU Member States (Germany, Spain, France, Italy and the UK). The questionnaire was largely based on the questionnaire used in the 2002 e-Business Survey. As in 2002, the survey used computer-aided telephone interview (CATI) technology. Field work was carried out by INRA Germany and its partner organisations again. In 2003, the sample included enterprises from 7 sectors of the economy.

More detailed information about the methodology and the scope of the two e-Business Surveys is provided in Annex 3 of this report.

1.2.2 Secondary and desk research

An important secondary source was the Eurostat New Cronos Database. Eurostat was used as the main source of macroeconomic statistical data for the EU and the member countries, since it provides official data with a high degree of coherence, which are comparable between countries. The most comprehensive database relevant for the purpose of the *e-Business W@tch*, especially for the elaboration of sector profiles, was New Cronos. This data base contains macroeconomic and social data for the EU on country and sectoral (industry) levels. New Cronos is structured in nine parts, called “themes”. The *e-Business W@tch* focused on theme 2 “Economy and finance” and theme 4 “Industry, trade, and services”. In spite of all efforts to harmonise enterprise statistics there is a considerable amount of deviations from general

standards insofar as some countries maintain other threshold values of firm size incorporated in the statistics than defined in the collection ent_l_ms and enter_ms. In some cases the definition of variables deviates from the standard (cf. Panorama of European Enterprises). DIW Berlin, a partner of the *e-Business W@tch* core team, collected the relevant sets of data from New Cronos, filled gaps by own calculations and estimates and extrapolated data from time series in order to have more recent statistics.

The database of e-business indicators

The *e-Business W@tch* made available sectoral databases with a collection of statistical indicators on the diffusion of ICT and electronic business in the respective sectors. The databases are publicly accessible on the website and organised in two types of tables: overview tables, comparing sectors, size classes and countries with respect to key indicators, and special sector databases containing the full spectrum of indicators for a specific sector. In addition, firm-level data are made available on request, provided that the usage complies with a number of conditions specified by DG Enterprise for that purpose.

1.2.3 Co-operation with industry and topic experts

The *e-Business W@tch* co-operated with a network of international experts who possess excellent knowledge either of one of the 15 industry sectors covered (sector experts), or in a special area of electronic business (topic expert). Experts were charged with providing critical and constructive support and input in relation to the various tasks which the *e-Business W@tch* carried between January 2002 and July 2003.

Table: The network of experts of the e-Business W@tch

Name	Organisation	Area of expertise
Mr. Rob Bilderbeek Mr. Pim den Hertog	Dialogic (NL)	Business services
Mr. Dimitrios Buhalis	Director, Centre for eTourism Research (CeTR), School of Management Studies for the Service Sector, University of Surrey	Tourism
Mr. Enrico Colla	Member of the board of the International Research Centre for Retail and e-Commerce (CERIDICE) of the European School of Management, Paris; Negocia – Centre International de Formation à la Vente et à la Négociation Commerciale	Retail
Ms. Monique van Dusseldorp	CEO Van Dusseldorp & Partners European Internet Strategies	Media, printing
Prof. Umberto Filotto	Full Professor of Banking Management and Corporate Finance in Università di Roma "Tor Vergata"	Banking and leasing
Dr. Thomas Köhne	Executive Director, Institute for Insurance Sciences at the University of Leipzig (D).	Insurance and pension funding
Mr. Michael Nenninger	General Manager, Siemens Buyside Marketplace, click2procure; SPLS, Siemens Procurement and Logistics Services	Electronics, e-procurement
Mr. Robert Thompson	Director, RETRI Group	Real estate activities
Prof. Pascal Verhoest	Managing Director ENCIP (European Network for Communication and Information Perspectives), TNO-STB	Telecommunications, ICT
Dr. Ilias P. Vlachos	Agribusiness Management at the Agricultural University of Athens, Agribusiness Management Laboratory	Food, beverages and tobacco
Dr. Thorsten Wichmann	CEO Berlecon Research	B2B marketplaces
Prof. Peter Yellowlees	Director of the Centre for Online Health at the University of Queensland	Health and social services
Mr. Henry J. F. Ryan	Lios Geal Consultants (Irl)	Standardization

1.3 Reporting activities

The *e-Business W@tch* reported research findings in Quarterly Reports, each of which contained five to eight Sector Impact Studies. The main findings and key statistics of these studies were summarised in six-page newsletters (one newsletter edition for each Sector Study). In addition, the *e-Business W@tch* has published (and printed) a Pocketbook of e-Business Indicators and two Synthesis Reports ("The European E-Business Report") and provided a number of non-public special studies and briefings for DG Enterprise. The publications are briefly described in this chapter.

In total, the *e-Business W@tch* has published 34 e-Business Sector Reports and Newsletters covering 15 sectors of the economy. The publication schedule followed a quarterly reporting structure, with 5-8 reports being published each quarter starting in July 2002. While printed copies are available from all newsletters, the full sector reports were published electronically and can be downloaded (for free) from the *e-Business W@tch* website.

Table: Sector Impact Studies and Newsletters of the e-Business W@tch 2002/03

No.	Sector	Issue 1	Issue 2	Issue 3
1	Food, beverages and tobacco industry	July 2002	Feb 2003	July 2003
2	Chemical industries	July 2002	Feb 2003	July 2003
3	Transport equipment manufacturing	July 2002	Feb 2003	July 2003
4	Financial sector	July 2002	Feb 2003	
5	Insurance and pension funding services	July 2002	Feb 2003	
6	ICT services	July 2002	Feb 2003	July 2003
7	Health and social services	July 2002	Feb 2003	
8	Chemical industries	Oct. 2002	May 2003	
9	Metal products manufacturing	Oct. 2002	May 2003	
10	Machinery and equipment manufacturing	Oct. 2002	May 2003	
11	Electrical machinery and electronics	Oct. 2002	July 2003	
12	Retail	Oct. 2002	July 2003	
13	Tourism	Oct. 2002	July 2003	
14	Real estate sector	Oct. 2002	May 2003	
15	Business services	Oct. 2002	May 2003	

Other publications of the *e-Business W@tch*

Title	Description	Time
Pocketbook of e-Business Indicators	Statistical pocketbook summarising the main findings of the e-Business Survey 2002. The pocketbook was a response to the large demand for such booklets that provide key messages at a glance. The Pocketbook has 60 pages and was catalogued by the Publication Office of the European Union (OPOCE). ISBN 92-894-5117-3, 3000 copies printed.	April 2003
The European e-Business Report (2002/03 edition)	The European e-Business Report (2002/03 edition) was the first synthesis report of the *e-Business W@tch*. It was published in April 2003, has a volume of 230 pages and features summaries of the Sector Impact Studies from 15 sectors plus contributions from e-business and sector experts on specific issues. ISBN No. 92-894-5118-1, 1000 copies printed.	April 2003
The European e-Business Report (2003 edition)	Second synthesis report of the *e-Business W@tch*, printed in August 2003. ISBN No. 92-894-5119-X. 1000 copies printed.	August 2003

Special studies	In addition to the regular and publicly available Sector Reports and Newsletters, the *e-Business W@tch* provided a number of special studies and briefings to DG Enterprise: • The development of e-commerce in the European Union. A general assessment (later published as part of Quarterly Report No. 1). • B2B Electronic Marketplaces: Hype and reality – an assessment • Measuring e-Readiness. Comments on building an Index in the context of the eEurope 2005 Initiative • The e-Readiness of European enterprises: Policy challenges and targets	April 2002 – June 2003

1.4 Distribution and dissemination activities

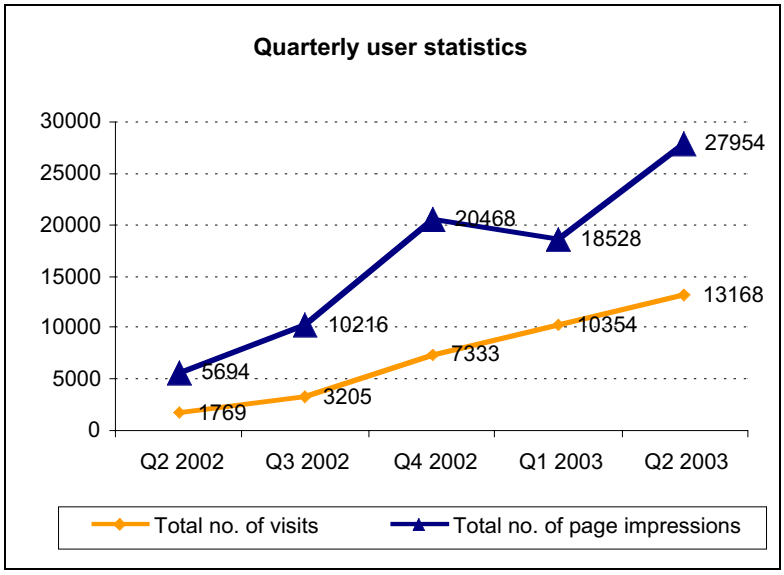
The *e-Business W@tch* website

The website of the *e-Business W@tch* (www.ebusiness-watch.org) serves as the main archive for making available resources to the target groups (documents, statistics, various related information). The site was activated on 3rd May 2002. In September 2002 the first series of Sector Reports as well as the survey results were published on the website which has continuously been updated since.

The *e-Business W@tch* website offers users the possibility to register with a mail list. Subscribers are informed in "bulletins" about the publication of new reports or other resources. By 31st June 2003, about 250 people had registered. The quality of the list is quite impressive. Many of the subscribers are directors, managers, executives, university professors, consultants, lawyers and researchers.

Exhibit: Increase of traffic on the e-Business W@tch website

The number of visits increased steadily from about 3,200 (in the third quarter 2002) to more than 10,000 in the first quarter 2003 and more than 13,000 in the 2nd quarter 2003. The number of pages which users have accessed has also increased, with peaks at the times when survey results were uploaded (1st Survey in 4th quarter 2002, 2nd Survey in 2nd quarter 2003).



Distribution of printed matter

The main "push" element of the dissemination activities is the distribution of the newsletters, whose main function is to create awareness for the *e-Business W@tch* and lead the interested audience to the website where all the other resources are available through "pull" mechanisms. The main target audience for the newsletters are decision makers in the industry sector itself and in closely related industry sectors, but also researchers, statisticians and policy makers. The *e-Business W@tch* printed between 1500 and 3000 copies of each newsletter and made them also available in electronic format on the *e-Business W@tch* website. Apart from direct mails to associations, a large number of newsletters was distributed at various events, including conferences, workshops and industry trade fairs.

The e-Business Event (26th Nov. 2002)

More than 60 selected representatives from industry, sector and/or business associations, the academic and research communities, national statistical institutions, consultancy firms, the World Bank and the Commission services attended the workshop organised by the *e-Business W@tch*, on 26th November 2002, in Brussels. The workshop focused on the results of the e-business survey and their analysis for the sectors covered by the *e-Business W@tch* and on methodological aspects (for example, statistical issues and impact measurement). Feedback from participants was very positive and their opinions were used to consolidate the results of the analysis and the policy recommendations that were presented in the first Synthesis Report of the *e-Business W@tch*.

Participation in working groups, research exploitation

As a follow-up of activity of a Special Report on **B2B Marketplaces** which the *e-Business W@tch* has prepared for DG Enterprise, Mr. Thorsten Wichmann from Berlecon Research, one of the appointed experts of the *e-Business W@tch*, participated in the working group which DG Enterprise has initiated on that issue in the context of its consultation process.

Members of the *e-Business W@tch* team have also frequently participated in various working groups on **information society statistics**, for example in those organised by the Eurostat Task Force.

The *e-Business W@tch* was several times invited to make a presentation at meetings of the **CEN/ISSS**, the Information Society Standardization System working group of the European Committee on Standardization. Standardization in electronic commerce and e-business are important working areas of CEN/ISSS (http://www.cenorm.be/isss/).

The *e-Business W@tch* has not only served policy and industry, but also the research community by providing basic statistics for further research. Research organisations and projects that have been using *e-Business W@tch* data include LSE London School of Economics, MIT Massachusetts Institute of Technology, DIW Berlin, ZEW Centre for European Economic Research, Mannheim (D), WIFO Austrian Institute of Economic Research, and projects in the IST Programme of the European Union.

Furthermore, the *e-Business W@tch* contributed a chapter to the **EITO Yearbook 2003** on the uptake of electronic business in selected sectors of the economy.

Annex 3: Methodology of the Surveys

Background

Most of the data presented in this report are derived from the two European e-Business Decision-maker Surveys in 2002 and 2003, which constituted cornerstones of the monitoring activities of the *e-Business W@tch.* The first survey consisted of 9,264 telephone interviews with decision-makers in European enterprises from all EU Member States and was carried out in June and July 2002. The second survey had a scope of 3,515 interviews with enterprises from five countries which were conducted between 24th February and 20th March 2003. The questionnaires used in the two surveys were largely the same. A few questions were omitted in the second survey in order to remain within the agreed interviewing time.

Field work

The field work of the surveys was carried out by INRA Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch:*

Country	Organisation	Country	Organisation
Austria	Spectra Marktforschung: Brucknerstr. 3-5/4, 4020 Linz	Italy	INRA Demoskopea S.p.A.,Via Rubicone 41, 00199 Roma
Belgium	INRA Belgium, Avenue de la Couronne 159-165, 1050 Brussels	Luxembourg	ILReS Market Research, 46, Rue de Cimentière, L-1338 Luxemburg
Denmark	Gallup TNS Denmark, Masnedogade 22-26, 2100 Copenhagen	Netherlands	Blauw Contactcenter, Conradstraat 18, 3013 AP Rotterdam
Germany	INRA Deutschland GmbH, Papenkamp 2-6, 23879 Mölln	Portugal	Metris GfK, Av. Eng. Arantes e Oliveira 3-2, 1900-221 Lisboa
Finland	Taloustutkimus Oy, Lemuntie 9, 00510 Helsinki	Spain	INRA España S.A., C. Alberto Aguilera, 7-5, 28015 Madrid
France	CSA TMO, 22 rue du 4 Septembre, 75065 Paris Cedex 02	Sweden	GfK Sverige, Box 401, 221 00 Lund
Greece	MEMRB – K.E.M.E, 24 Ippodamou St., 11635 Athens	UK	Continental Research, 132-140 Goswell Road, EC1V 7DY London
Ireland	Lansdowne Market Research, 49 St., Stephens Green, Dublin 2		

Interview method

The fieldwork was carried out in June and July 2002 using computer-aided telephone interview (CATI) technology. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, particularly in small enterprises without a separate IT unit, the managing director or owner was interviewed.

Population coverage and sampling

The highest level of the population for the e-Business Survey was the set of all enterprises which are active at the national territory of one of the EU Member States and which have their primary business activity in one of the sectors specified by NACE Rev. 1 codes (see table next page). The composition of sectors took into account their economic importance, homogeneity with respect to the analysis of e-business, and the relevance of e-business activities.

The most important viewpoints used for breakdown of the population in the survey were (i) the economic activity, (ii) the national territory of the enterprise and (iii) the size in terms of employees. The survey was carried out as an enterprise survey, i.e. data collection and reporting focuses on the enterprise (rather than on the establishment), defined as a business organisation of one or more establishments comprised as one legal unit.

In both surveys, the sample drawn was a random sample of companies from the respective sector population in each Member State where the respective sector was to be surveyed with the objective of fulfilling quota with respect to company size class. Target quota were to include a share of at least 10% of large companies (250+ employees) per country-sector cell and at least 30% of medium sized enterprises (50-249 employees). Samples were drawn locally by the INRA partner organisations based on the acknowledged business directories and databases (see table next page).

Scope	First survey (June/July 2002)	Second survey (March 2003)
No. of sectors covered	15 sectors	7 sectors
No. of EU Member States involved	15 countries	5 countries
No. of sector-country-cells	103	35
No. of interviews	9264	3515

Population coverage of the e-Business Survey (2002)

No.	NACE Rev. 1 Codes (Section – Division/Group)		Sector Name
01	D	15, 16	Manufacture of food products, beverages and tobacco
02	D / O	22, 92.1, 92.2	Publishing, printing, reproduction of recorded media, audiovisual services
03	D	24, 25	Manufacture of chemicals and chemical products
04	D	28	Manufacture of metal products
05	D	29 *(except 29.6, 29.7)*	Manufacture of machinery and equipment
06	D	30, 31 *(except 31.3 - 31.6),* 32	Manufacture of Electrical machinery and electronics
07	D	34, 35	Manufacture of transport equipment
08	G	52.11, 52.12, 52.4	Retail
09	H / I / O	55.1, 55.2, 62.1, 63.3, 92.33, 92.52, 92.53	Tourism
10	J	65.12, 65.2	Credit institutions, investment firms and leasing enterprises
11	J	66	Insurance and pension funding services
12	K	70	Real estate activities
13	K	74	Business services
14	I / K	64.2, 72	Telecommunications and computer-related services
15	N	85.11, 85.12, 85.3	Health and social services

Country	Directory / Database	Country	Directory / Database
Austria	Herold BUSINESS MARKETING database	Italy	Dun & Bradstreet
Belgium	SPECTRON database by Vicindo	Luxembourg	Rèpertoire des entreprises luxem-bourgeoises by STATEC (the official list of the National Statistic Administration).
Denmark	KOB (Købmandsstandens Oplysnings Bureau)	Netherlands	MarktSelect
Germany	Heins und Partner Business Pool	Portugal	Business directory by INE (the National Statistics Institute)
Finland	Blue Book - Salesleads database by the Helsinki Media Company Oy (Sanoma Magasines Finland)	Spain	Dun & Bradstreet
France	IDATA, based on "INSEE Siren file“ (the National Institute of Statistics) and other directories	Sweden	Swedish Post Adress Register (PAR)
Greece	ICAP directory (the major database for Greece)	UK	Dun & Bradstreet
Ireland	Bill Moss / Dun & Bradstreet		

Country	No. of interviews		Average length (min.)		Country	No. of interviews		Average length (min)	
	2002	2003	2002	2003		2002	2003	2002	2003
Austria	308	--	17.0	--	Italy	1517	709	22.5	15.3
Belgium	300	--	18.2	--	Luxembourg	102	--	17.4	--
Denmark	304	--	20.2	--	Netherlands	500	--	17.2	--
Germany	1500	701	18.8	12.1	Portugal	300	--	23.0	--
Finland	308	--	20.6	--	Spain	502	700	18.4	11.1
France	1362	701	17.2	12.4	Sweden	260	--	19.8	--
Greece	308	--	16.5	--	UK	1538	704	16.5	13.0
Ireland	155	--	20.1	--	**TOTAL**	**9264**	**3515**	**18.0**	**12.8**

Scope of the e-Business Survey 2002: No. of interviews per country and sector

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	Total
Food & beverages, tobacco		99	100		101	100		102		96		100			100	**798**
Publishing & printing			100	51	100	101		102		102					101	**657**
Chemical industries	101		100			50	36	100						51	100	**538**
Metal products			100	53		103		133	31				60		100	**580**
Machinery and equipment			100			100		129			105			54	105	**593**
Electronics			100			100		102					61	50	104	**517**
Transport equipment			100		100	50		104						53	102	**509**
Retail			100	52		101		105		84	102	100			100	**744**
Tourism			100	100	100	100		96			101				102	**699**
Banking and leasing	97		100		101	103		99	41						100	**641**
Insurance & pension funding			100	52		50		41	30					52	101	**426**
Real estate activities		104	100			101		101				100	61		101	**668**
Business services		101	100			103	63	103		117					105	**692**
ICT services			100			100		100		101			63		103	**567**
Health and social services	102		100			100	56	100					63		114	**635**
Total	**300**	**304**	**1500**	**308**	**502**	**1362**	**155**	**1517**	**102**	**500**	**308**	**300**	**308**	**260**	**1538**	**9264**

Scope of the e-Business Survey 2003: No. of interviews per country and sector

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	Total
Food & beverages, tobacco			100		100	100		102							100	**502**
Chemical industries			100		100	100		101							101	**502**
Electronics			100		100	100		101							101	**502**
Transport equipment			100		100	101		100							100	**501**
Retail			100		100	101		102							101	**504**
Tourism			101		100	99		102							100	**502**
ICT services			100		100	100		101							101	**502**
Total			**701**		**700**	**701**		**709**							**704**	**3515**

Problems encountered

No major problems were reported by the fieldwork organisations with respect to interviewing (e.g. comprehensibility of the questionnaire, logical structure). A statement from the institute that carried out the survey in Germany summarises this general assessment very well: "In total fieldwork ran smoothly and the questionnaire was easy to understand for most of respondents."

- Most problems stemmed from the difficulties of conducting research projects among ICT decision-makers in general rather than from any specific flaws in design of this project itself. Dedicated ICT professionals are heavily researched and therefore securing their participation can be difficult. This is a particular problem in larger companies.
- In some countries, it was not possible to accomplish the objective of including a share of 10% of large companies in a specific sector. These were then replaced by interviews with SMEs. In the first survey, the target mark of 100 interviews per country with companies from a given sector could not be accomplished in a few specific sector-country cells, particularly in the financial services sector in smaller countries where the total number of enterprises is comparably small.
- The Italian institute remarked that it was difficult to carry out the interviews within businesses/retailers not using or with a basic use of computers, because of the number of questions on related issues. Furthermore, it was reported that few respondents seemed to be aware of the existence of e-marketplaces and/or the meaning of this term.
- An issue – which was known in advance but is unavoidable in telephone interviews – is that it is not always easy to find the right target person. Fieldwork organisations reported that sometimes a data processing manager is not very aware of the consequences of e-business on the whole of the company, on the personnel level and on the financial level. On the other hand, the general manager may not always be aware of the implementation status and technical consequences.

Tabulations

Within the coverage specified above, and in line with the special task of the *e-Business W@tch*, results were compiled for mainly two sets of data:

1. An activity breakdown of the population of enterprises by sector. This breakdown was based on the aggregate of four countries (D, F, I, UK) in the first survey and five countries (D, E, F, I, UK) in the second survey. In order to facilitate comparisons between the two surveys, an additional breakdown by activity based on the EU-4 aggregate of D, F, I and the UK was computed for the second survey.
2. A size-class breakdown of the population of enterprises into three categories: small enterprises (including micro-enterprises, i.e. enterprises with 0-49 employees), medium sized enterprises (50-249 employees) and large enterprises (250+ employees).
3. A breakdown of the population by EU Member States, showing results for Germany, Spain (2nd survey only), France, Italy, and the UK.

In addition, the activity breakdown was cross-tabulated with the country as well as with the size-class breakdown. These cross-tabulations are offered in special sector databases. However, depending on the indicator and the filter questions, the number of observations can become very small in many cells of this cross-tabulation. It is therefore recommended to limit the breakdown of data to one dimension (in the case of pre-filtered questions) or two dimensions (if all enterprises were asked).

Weighting principles

Two weighting schemes have been applied: weighting by employment and by the number of enterprises. Data are presented in either way depending on the kind of the analysis to be made.

- Values that are reported as weighted by employment figures should be read as "enterprises comprising x% of employees". To give an example: The indicator "*percentage of companies selling online*" – if weighted by employment – is defined as "companies comprising x% *of employees sell online*". The reason for using employment weighting is that there are very many more micro enterprises than non-micro enterprises. The unweighted figure would effectively represent mainly the smallest sizes of firm.
- Values that are reported as enterprise-weighted figures are to be read as "x% of enterprises", reflecting the number of enterprises as legal entities but not their relative economic importance in terms of employment.

Weighting was based on the latest available universe figures by Eurostat. Missing or undisclosed universe data had to be imputed. The imputation procedures depended on auxiliary or proxy data availability, taking into account where available information about higher industry aggregations, nearest neighbour data, turnover-employment correlation and secondary sources other than Eurostat and allowing for the constraint of pre-determined ranges such that imputed data had to be contingent with published sectoral, national and European universe totals as well as for final plausibility checks for every single imputed data item. The weighting cells correspond to the data reporting pattern used as regards industries and employment size-classes. Uniform expansion factors are applied to enterprises within one of the three size-classes per industry per country. As for data that refer to a base other than the universe of all enterprises (e.g. indicators appropriately reported for online selling enterprises only), expansion factors are adjusted to the different shares of observations per cell that build the computation base.

Variables - indicators

The set of ICT and e-business indicators for which data were collected in this survey can be structured into five main modules:

- Module A: ICT infrastructure and e-skills development in the company
- Module B: E-commerce and e-business usage
- Module C: Barriers to e-commerce (note: available for 1st survey only)
- Module D: Impact of selling and procuring online
- Module E: Impact of and satisfaction with electronic business

The choice of indicators considers relevant statistical work by the OECD and includes a basic set of widely accepted measures for e-commerce and e-business (as used in related surveys on e-commerce and e-business, e.g. by Eurostat), but also introduces a few innovative indicators which have a pilot character and are not yet widely tested. The full list of variables which was the basis for preparing the questionnaires can be downloaded (as a spreadsheet) from the *e-Business W@tch* website at its "database" section (http://www.ebusiness-watch.org/marketwatch/database/survey_info.htm.

Specific notes

1. A comparison of survey results from 2003 and 2002 on ICT infrastructure diffusion (in the seven sectors covered in both surveys) seems to suggest that the general level of diffusion is lower in 2003. However, the main reason explaining this finding is the slightly different composition of samples within some of the sectors, for example in very heterogeneous sectors such as retail or tourism, and particularly among the small

companies (0-49 employees). As the sample structure with respect to sub-sectors differs in some cases between countries and/or between 2002 and 2003, direct comparisons between the two years as well as between countries have to be made with due care. Deviations in the sector composition which lead to apparently lower ICT adoption rates are particularly pronounced in the case of small enterprises from the retail and the food & beverages sectors in France. In contrast, in transport equipment manufacturing, a few very large companies in the 2003 sample cause employment-weighted figures on e-business activities to be considerably higher in 2003.

2. Both indices are pilots. They are presented for the first time in this report to stimulate discussion about innovative, adequate and useful indicators for measuring progress in ICT and e-business adoption.
3. Figures from the two surveys seem to suggest a negative trend for the diffusion of network applications from 6/2002 to 3/2003, and a lower level of IT training activities. However, as explained in Note 1, in some sectors and countries the composition of the sample with respect to sub-sectors differed in 2003, which has an impact on the overall propensity to e-business. Furthermore, differences are mostly within statistical confidence intervals.
4. It is difficult to say whether 2002 employment-weighted results or 2003 results are closer to the "real picture". While employment-weighted figures better represent the overall economic importance of activities, they are very sensitive to the (random) selection of large players that are surveyed. If one or several very large companies ("giants") are included in a sample, they can distort the sector average. The percentage of companies in the sector purchasing online (38%), however, seems realistic by any measure.
5. Most of the differences observed concerning the diffusion of CRM, SCM and ERP software are not pronounced enough to have sound statistical significance. The most striking trend is the increased diffusion among medium-sized companies.
6. Companies procuring more than 50% of their total purchases online are computed with a weight of 1, companies procuring 26-50% online with a weight of 0.75, 11-25% with a weight of 0.5 and less than 11% with a weight of 0.25. In order to adjust for the economically higher importance of large enterprises, the index computes both the employment-weighted and the enterprise-weighted values (according to the formula specified before) and calculates the mean. The index would take a (theoretical) maximum value of 100 if all companies from the class / sector / country for which the index is computed buy more than 50% of supply goods and services online.
7. Companies making more than 50% of their total sales online are computed with a weight of 1, companies selling 26-50% online with a weight of 0.75, 11-25% with a weight of 0.5 and less than 11% with a weight of 0.25. In order to adjust for the economically higher importance of large enterprises, the index computes both the employment-weighted and the enterprise-weighted values (according to the formula specified before) and calculates the mean. The index would take a (theoretical) maximum value of 100 if all companies from the class / sector / country for which the index is computed sell more than 50% of their goods and services online.
8. The percentage of companies saying that "e-business constitutes a significant part of the way they operate" is computed with a weight of 1, the percentage of companies saying that "e-business constitutes some part of the way they operate" with a weight of 0.5. The index would take a (theoretical) maximum value of 100 if all companies from the class / sector / country for which the index is computed say that e-business constitutes a significant part. In order to adjust for the economically higher importance of large enterprises, the index computes both the employment-weighted and the enterprise-weighted values (according to the formula specified before) and calculates the mean.
9. Obviously there are drawbacks of the indicators used which must not be neglected. It has to be stressed that these are assessments rather than hard facts. This is due to the survey method applied. As in telephone interviews one is restricted to merely one respondent per company (the IT executive in our case) responding at one moment (instead of looking up verified figures and carrying these over to the questionnaire) – unless one is able to bear disproportionately higher survey costs and presumably significantly lower response rates – the researcher has to allow for the level of detail that the interview situation and the responding person permit. This has implications for the instrument design. E.g., only a classification of the share of online sales as a rough approximation is feasible in CATI-surveys. Hard figures on total sales and online sales, preferably even as time series data would have been more appropriate – but this disregards the likely high shares of item non response. As it is always the case in business surveys with limited budget and voluntary participation the best proceeding feasible is not a satisfying one as regards a wish list of data needs. The level of involvement of enterprises' IT people permits quite detailed questions regarding technologies and solutions deployed – but it also implies a tendency of (psychological) commitment of the respondent to his or her projects. Respondents will in many cases be those who have decided about what hard- and software to purchase and what solutions to implement, and the success of which they are requested to appraise during the interview. This responsibility may bring about a positive assessment bias.
10. Results from the first survey round were used (June 2002). Only data for EU4 have been included in the test because only in these countries were all 15 sectors interviewed. In addition, all variables have been recoded as dummies (with No = 0 and Yes = 1).

NB-51-03-269-EN-C

ISBN 92-894-5119-X

Publications Office
Publications.eu.int

ISBN 92-894-5119-X