



Electronic business in Western Europe

# Hook up for net gains!

March 24, 2009



**Western European companies make insufficient use of e-business applications.** Generally, most of them use simple applications that necessitate only limited adjustments to business processes. Nearly half the companies in the 15 EU countries analysed here use the internet for procurement, but less than 20% offer products online.

**Most European companies waste the opportunities to boost productivity** that could be generated by combining networked applications and an organisational revamp. Sophisticated, internal ICT-based processes are used in only 20-25% of all companies. For most companies, networking with external partners is also still a pipe dream.

**The Nordic countries and Germany are leaders** in the implementation of e-business solutions. Across Europe, penetration varies substantially: companies not only from large EU countries such as Italy and Spain, but also Greece and Portugal, bring up the rear in the ranking of 15 EU countries. This is partly due to the comparatively large significance of the traditional services sector in these countries.

**SMEs have been very slow to embrace e-business.** Small and medium-sized enterprises are relatively far behind large companies in implementing e-business solutions, for example in terms of sophisticated, networked applications. This has implications for productivity growth in Western Europe since small and medium-sized companies there generate 50-70% of gross value added.

**Positive outlook!** New technologies such as RFID or concepts such as service-oriented architecture may help boost companies' process efficiency substantially in future. IT utility services will give rise to opportunities for small and medium-sized companies in particular.

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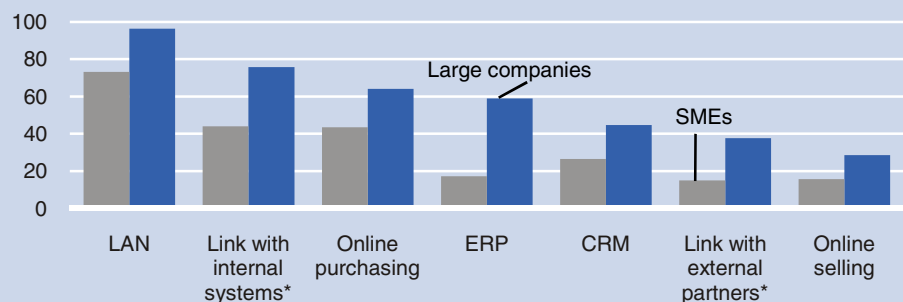
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### Considerable gap between large companies and SMEs

% of companies using the following application, EU-15, 2007



\* Companies whose order processing uses IT systems linked to other internal systems or the external systems of suppliers

Source: Eurostat

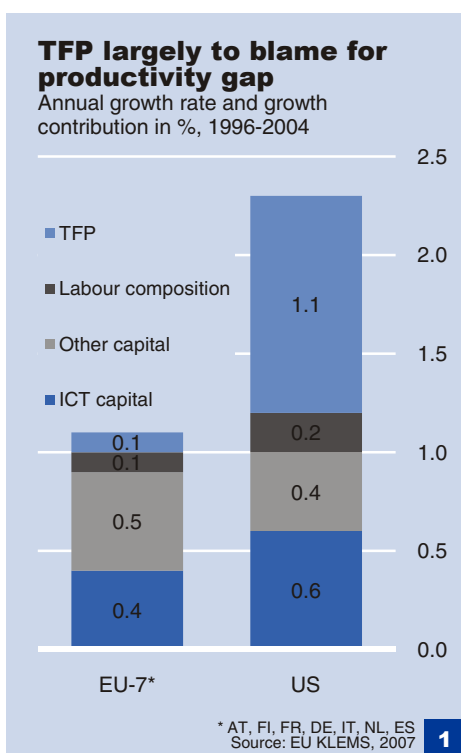
Europe does not have much time left to reach the Lisbon target to be the most competitive and dynamic knowledge-based economy in the world. The authors of the EU's Lisbon agenda envisioned this objective being met by the year 2010. Europe still has a long way to go. The goal is to boost the competitiveness and the innovative strength of the European economy. The number of measures that could be taken is huge. Since the 1990s, scientists and politicians have focused particularly on information and communication technologies (ICT) as key driving forces behind the productivity and innovative strength of an economy. Over the past few years numerous analyses have concentrated on the issue of how ICT is used in business and what influence this has on productivity growth in companies, industries and the economy as a whole. This report assesses the use of ICT in European companies and its impact on how business is organised.

### ICT boosts productivity and competition

In recent years productivity growth has been sluggish in Europe, lagging far behind that of the United States. Particularly the growth of total factor productivity (TFP)<sup>1</sup> in the EU countries had for a long time fallen seriously short of the US reading (see chart 1). Various authors presume that, among other things, this suggests a structural weakness in the implementation of innovations and the integration of ICT in companies' value chains. They also say that organisational innovations and management best-practice models are not executed often enough.<sup>2</sup>

Empirical studies at the sector and company levels generally confirm the role of ICT in company productivity. For one thing, companies can boost their productivity by raising their operating cost efficiency. For another, innovative strategies which companies pursue to differentiate themselves from their competitors may contribute to increasing productivity. In both cases, information technology can play a key role.

However, this is linked with a particular corporate challenge. Over the past few years ICT has become a "normal" factor of production in most sectors. Modern technologies are an essential part of numerous products and processes, e.g. in the auto industry and in the financial services industry. The use of information technology *alone* serves less and less as a competitive advantage.<sup>3</sup> "Firms do not simply plug in computers or telecommunications equipment and achieve service quality or efficiency gains. Instead they go through a process of organizational redesign and make substantial changes to their product and service mix."<sup>4</sup> User companies must therefore decide *how* they want to use ICT in order to achieve singularly recognisable strategic positions.



<sup>1</sup> Productivity growth breaks down into changes in labour and capital inputs as well as changes in residuals, TFP.

The ECB confirms these results for the aggregate of the EMU member countries. See ECB (2008). Monthly Bulletin. January 2008, p. 48f.

<sup>2</sup> See Koszerek, D., K. Havik, K. McMorrow, W. Röger and F. Schönborn (2007). An overview of the EU KLEMS Growth and Productivity Accounts. European Economy. Economic Papers. No. 290, Oct. 2007, p. 79. ECB (2008), p. 49.

<sup>3</sup> See Carr, Nicholas G. (2003). Does IT Matter? An HBR Debate. Reply from Nicholas G. Carr. In Harvard Business Review. June 2003, p. 17. Carr, Nicholas G. (2004). Does IT Matter? Information Technology and the Corrosion of Competitive Advantage. Boston.

<sup>4</sup> Bresnahan, T.F., E. Brynjolfsson and L.M. Hitt (2002). Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence. February, Quarterly Journal of Economics 117(1), pp. 339-376, here p. 340f.

### ICT helps drive innovation

Electronic-business indicators across various countries and sectors only partly reflect the use of ICT in companies. Their primary focus is on process efficiency in e-business. However, the impact of information technology is much more important for companies than reflected by these indicators. The degree of IT-driven automation in production has a decisive impact on the productivity of a company. Besides, ICT has the role of a catalyst in product innovations and other process innovations.

A survey by E-Business Watch in eight European countries (2006) shows that ICT played a major role at 50% of the companies which introduced product innovations during the 12 months before the survey took place.\* The significance of ICT-based product innovations emerges clearly in the case of the auto industry: so-called embedded systems are deployed today on a large scale e.g. for the areas of safety, navigation and entertainment. It is estimated that up to 70% of the research and development costs were spent on electronics and software in 2007; this means that 90% of all innovations were driven by electronics and software.\*\* With process innovations ICT plays an even greater role on average in fact: in the E-Business Watch survey 75% of the respondents from innovative companies said that ICT enabled the implementation of the process innovation.

\* See EITO (2007), p. 150.

\*\* See BITKOM, Roland Berger Strategy Consultants (2007), *Zukunft digitale Wirtschaft*, Berlin, p. 46.

Demands are constantly being made on companies to review their business models and upgrade their processes with IT-based innovations. For since the mid-1990s there has been an increase in competitive dynamics in the IT-intensive industries. As an empirical study on the relationship between IT and the competitiveness of US companies shows, the market share of the largest companies in all sectors has risen, but this has happened to a greater degree in IT-intensive industries than in non-IT-intensive industries. At the same time, in the IT-intensive industries the gap between the gross profit margins of companies in the first quartile widened vis-à-vis those in the fourth quartile, and frequently there was more “turbulence” in the rankings of the industry leaders. During the past decade, companies were obviously better able to establish a superior business model and position themselves as market leader by introducing innovative IT-based processes. However, the findings also show that in the ICT age competitors are quickly able to challenge the market leader’s prominent strategic position. Peers imitate ICT-based best-practice models or launch IT-enabled innovations themselves. IT researchers McAfee and Brynjolfsson say that in this way competition becomes faster, more intensive and more dynamic.<sup>5</sup>

### Not only IT is important – organisation is too

So what are the key factors determining whether a company can differentiate itself from the competition by using information technology? As a number of studies show, the statistically measurable effect of IT on the productivity of a company varies significantly. It is shaped to a critical degree by the general conditions within the company: companies achieve higher productivity gains if they combine the use of IT with a *strategic reorganisation of their activities*. Also, the productivity gain hinges on the *degree of decentralisation* in a company and on the *quality of the management*.<sup>6</sup> A report by Erik Brynjolfsson and Lorin M. Hitt (2002) shows furthermore, however, that the annualised productivity gain achieved through the use of IT is five times higher after five to seven years than it is one year after the IT investment. The authors attribute this phenomenon to the need for considerable time-intensive investment in complementary inputs, especially for making adjustments to the firm’s organisational design.<sup>7</sup> The significance of organisational adjustments is underscored by a study conducted by Bloom et al. (2005). It finds that a doubling of the IT capital stock in an internationally operating US company leads to a productivity boost of 5.4%, but only 4.5% in a company that does not come from the US.<sup>8</sup> According to Bloom et al. this IT-driven productivity gain arises because US companies tend to have a decentralised form of organisation and can adjust their business structures faster.

<sup>5</sup> See McAfee, A. and E. Brynjolfsson (2008). *Wie IT zum strategischen Vorteil wird*. Harvard Business Manager, October 2008, pp. 24-36, here p. 30.

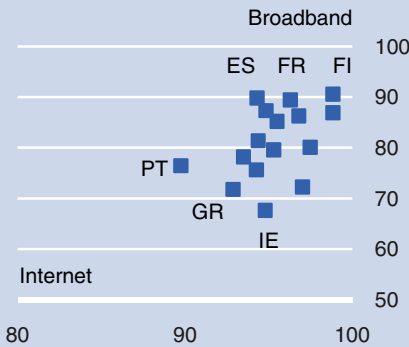
<sup>6</sup> See Van Reenen, J. and R. Sadun (2006). *Information Technology and Productivity, or “It ain’t what you do, it’s the way that you do I.T.”* The Global Information Technology Report, pp. 55-60 and the studies cited there.

<sup>7</sup> See Brynjolfsson, Erik and Lorin M. Hitt (2002). *Computing Productivity: Firm-Level Evidence*, MIT Sloan Working Paper No. 4210-01. Similarly: Bloom et al. (2007), p. 19. In their examination of company takeovers by US multinational enterprises the authors find that productivity gains from the increased use of IT are not to be observed until 2-3 years after the takeover.

<sup>8</sup> See Bloom, N, R. Sadun and J. Van Reenen (2007). *Americans do I.T. better: US multinationals and the productivity miracle*. CEP Discussion Paper No. 788, April 2007, here p. 12. The authors can only document this for industries making heavy use of IT.

**Internet: Popular with companies**

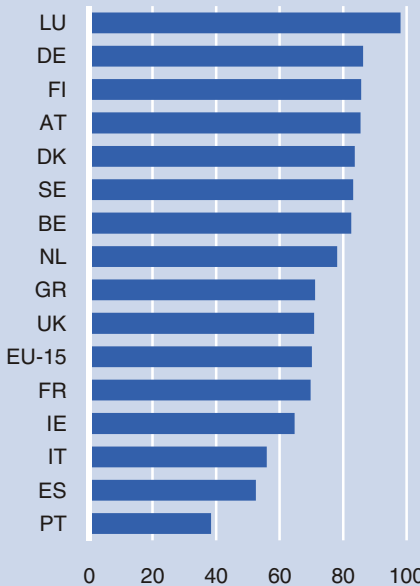
Use in %, 2007



Source: Eurostat **2**

**LAN: Very widespread**

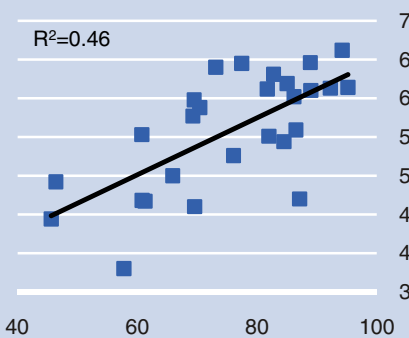
% of companies using computers and LAN, 2007



Source: Eurostat **3**

**Broadband & e-business go hand in hand**

Broadband use (%), x-axis  
NRI e-business index (y-axis)



Sources: WEF, OECD, Eurostat, DB Research **4**

The findings of the studies suggest that productivity effects only kick in with a slight time lag. Companies can achieve productivity gains with IT usage if they also make complementary investments in their organisational structures, tend to have a decentralised structure and have good management capacities. This seems to apply to internationally operating US companies more than others. The logical consequence is that companies in Europe have not yet fully tapped the potential inherent in the use of more sophisticated IT systems in connection with organisational redesign.

It was these findings that prompted us to analyse access to and the usage of information technology in Western European companies.<sup>9</sup> A rigorous analysis of the ICT environment in connection with organisational adjustments in the companies in a cross-section of the EU countries and sectors is virtually impossible, though, owing to the insufficient amount of data available. Therefore, as a proxy, we analyse the spread of electronic business (e-business) solutions<sup>10</sup> among European companies (for more on this topic see box on p. 3). Empirical analyses confirm that companies with automated business processes show higher labour productivity per employee.<sup>11</sup> In an analysis of e-business processes a particular point of interest is whether or not European companies tend to concentrate more on simple online transactions and not engage in more sophisticated e-business solutions that require an extensive organisational revamp. We assume that as the complexity of the e-business applications grows the necessity of adjusting the company's organisational structures increases. This means that the productivity potential of e-business applications is also likely to increase.

**E-readiness is not the problem**

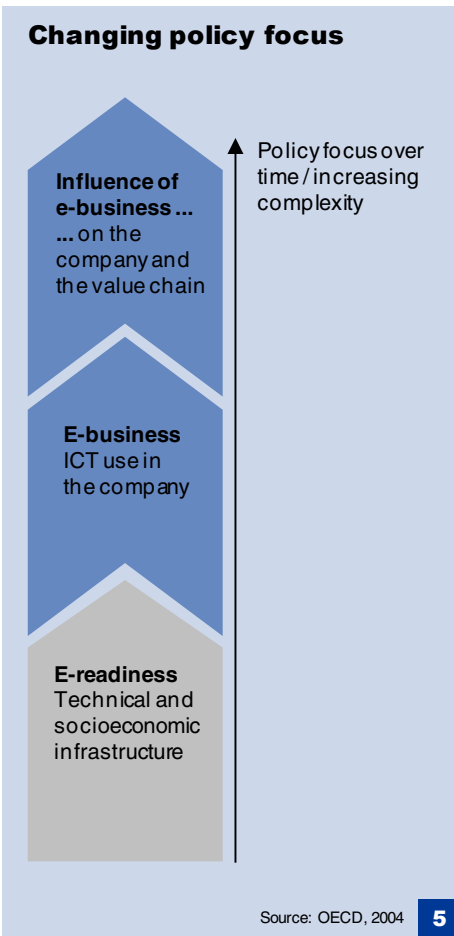
The first prerequisite for participating in e-business is known as *e-readiness*. E-readiness is a reflection of the technical and socio-economic infrastructure of a country (e.g. number of (networked) computers, internet connections and websites). Most of the companies in Western Europe are already equipped to participate in the information society. With the exception of Portugal, at least 93% of the companies with over 10 employees have internet access (see chart 2). In most countries, over 70% of the companies have broadband access. Thus, broadband has become established as the predominant method of access to the internet.

One prerequisite for the uncomplicated exchange of data, e-commerce and advanced e-business solutions is the networking of computers. Here, too, Europe is well positioned. In 2007, no less than 70% of all companies in the EU countries reviewed had linked their computers via a *local area network* (LAN). However, the picture is very mixed: while several Nordic countries, the Benelux, Germany and Austria post readings of over 80%, Southern European companies rank most poorly (see chart 3).

<sup>9</sup> We look at the EMU-12 countries, the United Kingdom, Denmark and Sweden (EU-15). Data is not always available for all indicators for the complete selection of countries, so sometimes a smaller number of countries is presented in the charts. Unless indicated otherwise, only companies with more than 10 employees are taken into account. For this reason, no other information is provided on company size.

<sup>10</sup> ICT-supported business processes (both intra- and inter-company processes) conducted over computer networks are referred to as e-business. See OECD (2004). Information Technology Outlook 2004, p. 107.

<sup>11</sup> See Goodridge, P. and T. Clayton (2004). E-business and labour productivity in manufacturing and services. Office for National Statistics, Economic Trends 609. August 2004, pp. 47-53.



Adequate infrastructure and how a company presents itself to the outside world are only the first steps in participating in networked e-business. E-readiness is the prerequisite for e-business. The close correlation between broadband access and the e-business index of the World Economic Forum, which reflects internet use for business processes, documents the statistical relationship between the two values (see chart 4). Accordingly, the focus of numerous international comparisons and political programmes has shifted from an emphasis on infrastructure towards the use of ICT infrastructure in companies, private households and public administrations (see chart 5).

### E-business: From simple to sophisticated

For our analysis, the primary focus is the pattern of ICT-based use in the companies surveyed. The OECD distinguishes between four theoretical steps in the integration of ICT into business processes. It says ICT may be used to:

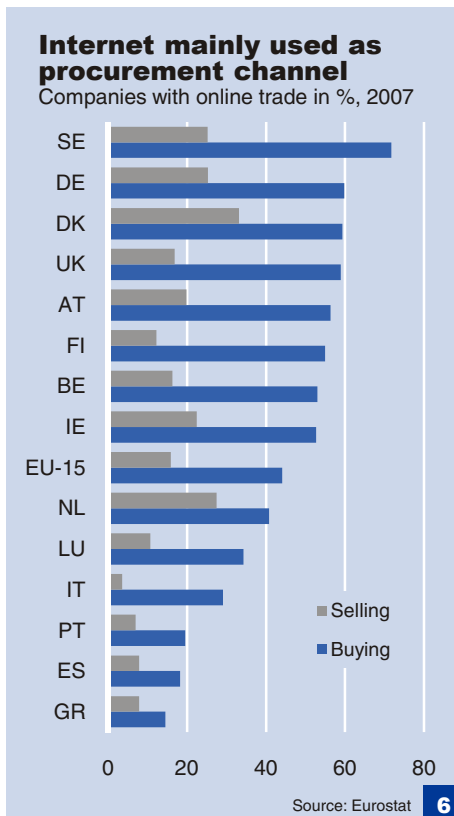
1. find information,
2. conduct transactions online,
3. integrate internal processes, and
4. integrate internal and external processes (see examples in the accompanying box).

#### Stages of ICT integration in companies

1. Find information.
2. Online transactions, e.g. e-commerce, electronic payments.
3. Integration of internal processes, e.g. integration of order-processing systems with other internal systems (procurement, bookkeeping, production, logistics and services), integration of e-commerce platforms with back-end processes, enterprise resource planning (ERP)\*, and customer relationship management systems (CRM)\*\*.
4. Integration of internal and external processes (referred to as extended enterprise), e.g. integration of order processing with suppliers or clients, dispatch of digital invoices, collaborative design tools.

\* An ERP system is a type of software system which serves to integrate all major corporate functions, for example product planning, procurement, inventories, ordering, human resources, project management, bookkeeping and controlling.

\*\* CRM systems support the documentation and administration of customer relations.



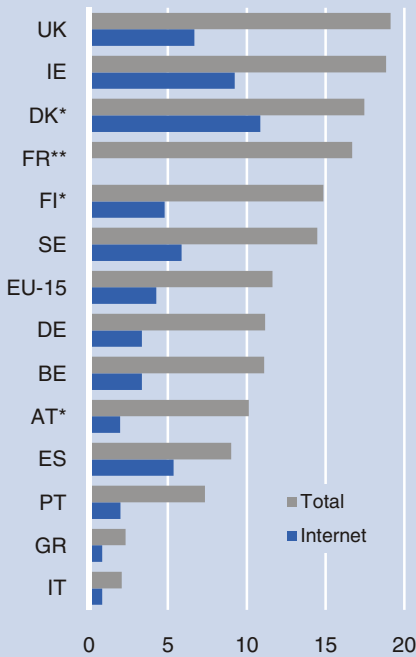
Every additional step in the integration of ICT should tend to increase the company's productivity. However, as e-business applications increase in complexity the cost of reorganising the internal processes and business structures will also grow. The above-mentioned steps of ICT integration into company processes do not necessarily occur in sequence. Companies may, for instance, first push for system integration with suppliers without previously having engaged in e-commerce. So how advanced are Europe's companies in integrating ICT into business processes?

### E-commerce: Mainly procurement

The internet has become firmly established as a procurement channel for many companies: on average, 44% of EU-15 companies purchased inputs via the worldwide web in 2007 (see chart 6). In Sweden, two companies in three use the internet for procurement purposes. But some countries have yet to jump on the bandwagon. For example, in Portugal, Spain and Greece not even 20% of companies order online.

**E-business often conducted via EDI**

Selling via internet, EDI or other networks, % of turnover, 2007



\* 2006, \*\* OECD data  
Sources: Eurostat, OECD, 2008

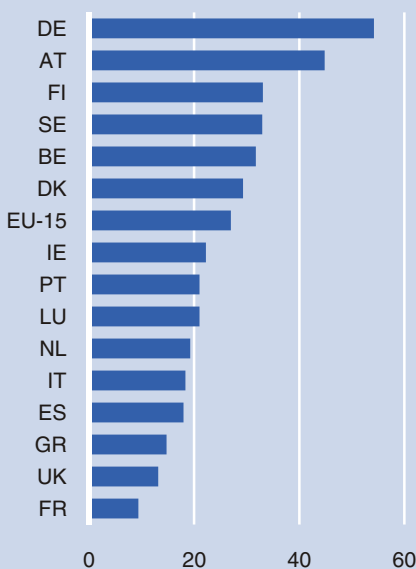
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By contrast, companies use the internet much less as a sales channel. Only 16% of EU-15 companies sell goods and services online. Against the backdrop of the rather limited volume, the diverging figures indicate that the number of sellers is much more strongly concentrated than the number of buyers. This disparity comes as no surprise, since online selling requires special internet platforms while online buying is less complex. For example, it is easy to make purchases directly on a supplier's procurement platform (catalogue system or online shop). This is probably the predominant form of procurement: the EU's E-Business Watch has found that only 10% of the companies it surveys use special software solutions for procurement which require a relatively high degree of standardisation. Therefore, there is likely to be little integration of procurement with other internal systems (e.g. ERP systems) at the other companies.<sup>12</sup> However, this offers relatively large potential to reduce the process costs particularly when buying low-value goods ("C items"). This can be done, for instance, by automating parts of the ordering, release and invoicing procedures.

Nevertheless, looking at online trade alone would mean underestimating the overall significance of electronic business. In the EU-15 countries only about 4% of all companies' turnover is generated over the internet. Factoring in other methods of exchanging information electronically, e.g. *electronic data interchange* (EDI), the average share for e-business is close to 12%, and in some countries (UK, IE) in fact it is no less than almost 20% (see chart 7). EDI is of above-average importance by EU-15 standards in the UK, Ireland and the Nordic countries. In Germany, major companies especially from the wholesale distribution sector (61%, 2006) and the automotive sector (53%) use EDI for procurement. But the retail trade (39%) and other sectors of the manufacturing industry (28% on average) also say that EDI plays a major role.

**Only 25% of companies use CRM systems\***

% of companies, 2007



\* CRM systems are used to store client information and make it available to company staff.

Source: Eurostat

8

**Sophisticated applications are thin on the ground**

Information technology can unfold its full potential if data interchanges are fully automated and it thus becomes possible to integrate business processes. For the integration of internal processes (Level 3 of the OECD classification), the systems may, for example, be broken down into customer relationship management (CRM) or enterprise resource planning (ERP). In 2007, though, barely one-quarter of the companies in the EU countries surveyed used CRM systems to provide access to client data inside the company (see chart 8). The number of companies using ERP systems is also surprisingly low: not even 20% of the companies are equipped with this type of system. These low average values are shaped by the reluctance of small and medium-sized enterprises (SMEs) to use ERP or CRM systems. Such systems are found much more often at large companies, by contrast (see chart 9). All in all, the picture looks better in the area of order processing: approximately 45% of companies have IT systems that link order processing with other systems, such as, for example, invoicing and payments, replacement part deliveries or production and logistics. The favourable reading is mainly attributable, though, to links with invoicing and payment systems, as they are used on average by 40% of the companies. As in all of the categories examined, there are major differences between the EU-15 countries (see chart 10).

<sup>12</sup> See E-Business Watch (2007), p. 59.

### Extended enterprise remains a pipe dream

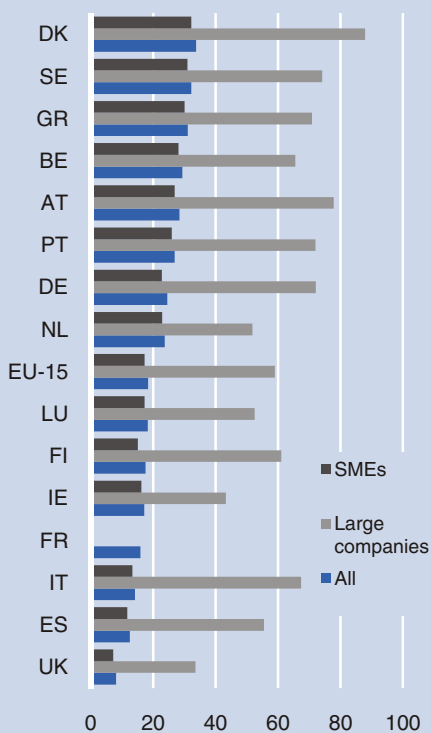
The extended enterprise which integrates internal company processes with those of suppliers or clients is still a pipe dream for most Western European companies. But note that collaboration above all with the technology leaders of a sector may produce important stimuli for small and medium-sized business partners in terms of technology usage, internal organisation and competitiveness.

Across the EU-15 some 15% of the companies have linked their systems for order processing with external partners, and of this segment some 12% with their suppliers and 10% with their clients (see chart 10). An even smaller proportion send invoices electronically (9%); nearly 15%, no less, receive invoices enabling further processing to be done automatically (see chart 11). However, there are substantial differences depending on the size of the company and the sector under review. This can be seen by looking at Germany. Some 44% of Germany's major manufacturers issue digital invoices, and in the automotive sector, in fact, the share is 64%. The food industry (57%), metal production (49%) and wholesale distribution (49%) also achieve above-average readings.

However, the bulk of the companies squander the sizeable efficiency gains that come with the introduction of digital invoices. According to estimates by researchers at the University of Hannover, the German economy offers total cost-savings potential of around EUR 54 bn, mainly in more efficient processes, i.e. in the immediate further processing of invoice data in company bookkeeping and controlling systems. Why don't more companies make use of digital invoicing? A case from Finland illustrates that the lack of interoperability bet-

#### Not even 1 in 5 companies uses ERP

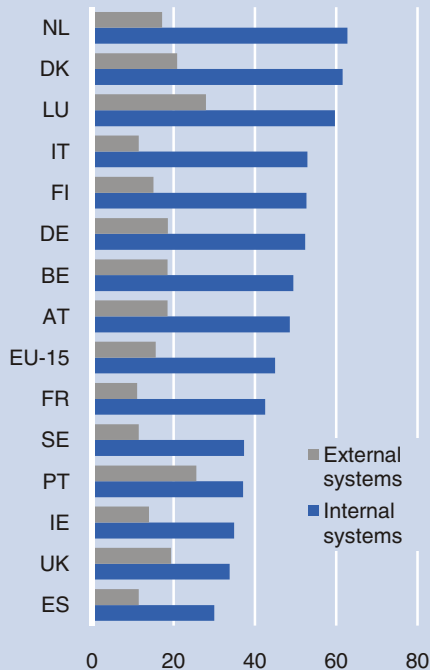
% of companies, 2007



Source: Eurostat **9**

#### Weak links with clients and suppliers

% of companies using IT systems for order processing\*, 2007

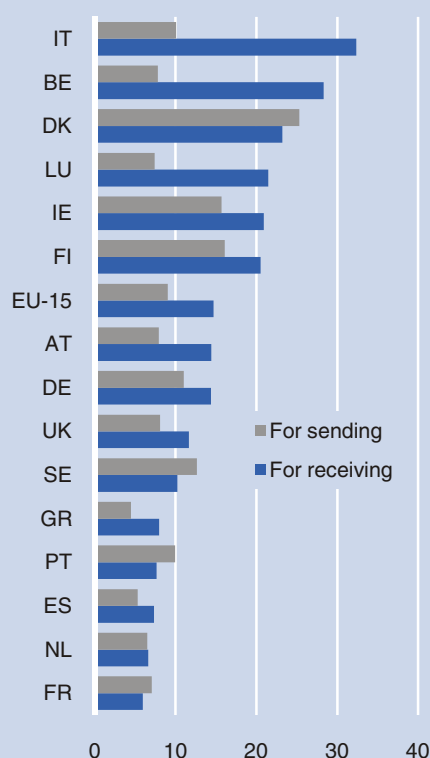


\* Linked to internal systems (procurement, bookkeeping, production, logistics, service) or external systems of suppliers or clients. Percentage of all companies with more than 10 employees.

Source: Eurostat **10**

#### Digital invoices little used

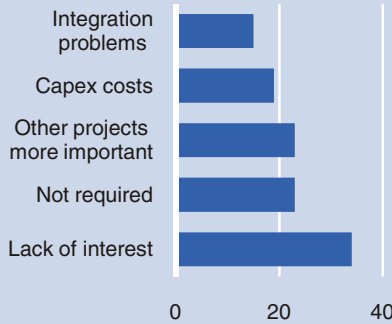
% of companies that use computers, 2007



Source: Eurostat **11**

**Benefits of digital invoicing not recognised**

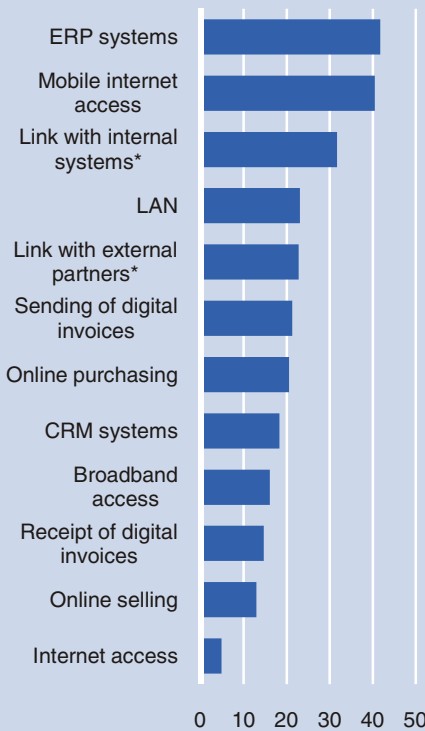
Factors hampering the introduction of digital invoicing in German companies, %



Source: Breitner, 2008 **12**

**Distinct differences**

Difference in usage between large companies and SMEs, pp., EU-15, 2007



\* Companies whose order processing uses IT systems linked to other internal systems or the external systems of suppliers or clients.

Source: Eurostat **13**

ween companies is a significant obstacle.<sup>13</sup> Moreover, another survey shows that the biggest obstacle, apparently, is a lack of interest on the part of the suppliers (see chart 12). Evidently, key decision-makers have still failed to grasp the advantages of digital invoicing and processing.

**Substantial differences – SMEs lagging behind**

It is not very surprising that there are substantial differences in the use of e-business applications across the EU-15 countries. The pattern of advanced countries and less advanced countries familiar from analysis of ICT infrastructure is mirrored in e-business. In the categories discussed here the Nordic countries and Germany rank most often among the leaders, with Spain trailing the field. Also among the laggards are Italy, Greece and Portugal.

The average values for individual countries mask major differences in the use of e-business depending on company size group and sector, though. There is a particularly great deal of ground to be made up in e-business by small companies (less than 50 employees).<sup>14</sup> As the Eurostat data on e-business systems by size category shows, SMEs on average lag behind large companies in the EU-15 in all indicators reviewed in terms of ICT infrastructure as well as internal and external e-business applications. The gap for ERP applications, for instance, is 42 percentage points and for mobile internet access 40 pp (see chart 13).

The trend shows that the difference in usage is greater for complex, networked applications. The gap is not as pronounced on e-business applications which are still not very widespread even at large companies (e.g. receipt and mailing of digital invoices). The gap is also smaller for some elementary indicators on e-readiness (internet and broadband use), with the large companies being well equipped and the small ones hard on their heels.

Some 54% of the small companies and 75% of the micro-companies state that one of the biggest obstacles is that their operations are too small to make sensible use of e-business.<sup>15</sup> Other major reasons are prohibitively high costs, overly complex solutions and security concerns (see chart 14) which are in part closely linked with the problem of scale. Insufficient IT expertise probably also plays a part: only 15% of the small companies employ IT specialists. So in companies without a specialised IT section there is a greater onus on management to decide the course of e-business solutions.

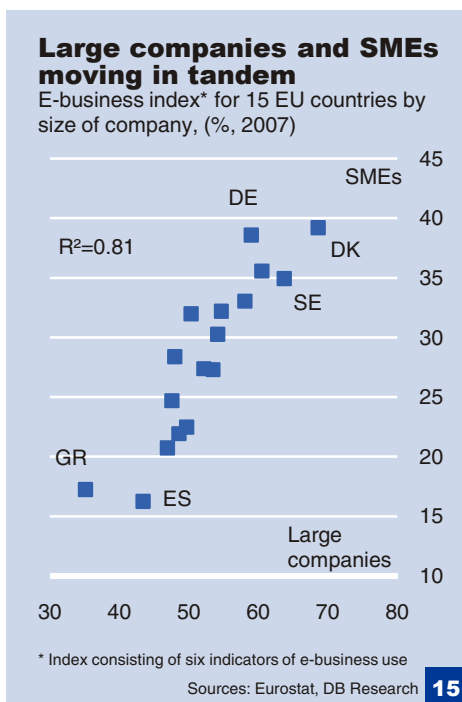
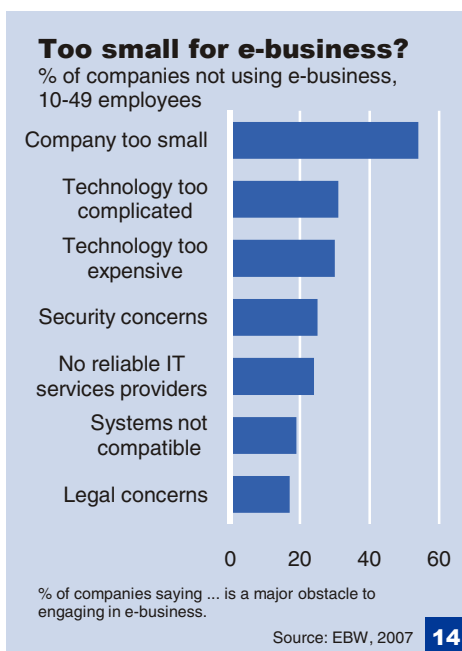
**Same yardstick for SMEs?**

Just how significant for the corporate landscape in Europe with its heavy bias towards the small business segment is the SMEs' low usage of e-business solutions? In the EU countries analysed, over 92% of the sample firms in 2003 were micro-companies, and just over 6% were small companies. This means that relatively sophisticated e-business systems were of only limited significance in close to 99% of the companies.

<sup>13</sup> See Eleftheriadou, D. (2008). Small- and medium-sized enterprises hold the key to European competitiveness: how to help them innovate through ICT and e-business. In Dutta, S. and I. Mia. The Global Information Technology Report 2007-2008, pp. 145-156.

<sup>14</sup> Our analysis is based on the EU classification according to employee numbers, with enterprises employing fewer than 10 people regarded as micro-firms, 10 to 49 employees as small, 50 to 249 employees as medium-sized and more than 250 employees as large.

<sup>15</sup> See E-Business Watch 2006/2007 (2007), p. 70.



However, even though these figures appear dramatic at first glance, several aspects need to be put into proper perspective. First, the gap in their overall significance is less than would be suggested at the outset by the number of companies. In Europe, SMEs generated between roughly 50% (UK) and 70% (Italy) of gross value added in 2005. Second, at the very least it is doubtful whether micro-companies and small companies ought to be measured with the same e-business yardstick as that applied to big companies. For example, small hotels and independent engineering firms certainly do not need any complex internal systems, but they do need an attractive website with a booking function or sophisticated CAD systems. The situation is similar for start-ups: in this case the focus is initially on product development and marketing. The advantage of mailing an invoice digitally will be secondary. So from the company's point of view ICT needs to be used where it can help to reap comparative advantages for the company. However, the degree to which a small company can be integrated in its function as a large company's supplier into the latter's supply chain management system may very well be of crucial importance for the small company's competitiveness.<sup>16</sup>

At the end of the day there seems to be a largely stable relationship between e-business usage at large companies and SMEs, as shown by an index comprising six e-business indicators (see chart 15). This means that, in an international comparison, in the countries in which large companies are very advanced in e-business solutions the SMEs will in most cases also assume leading positions.<sup>17</sup> Even though SMEs use considerably fewer e-business solutions, there is apparently no decoupling from the progress of the large firms. This gives reason for optimism on the future development of e-business at SMEs.

As we have seen, the low use of e-business solutions at SMEs is apparently less serious than assumed at first glance. Nevertheless, with an eye to productivity growth in Europe it should take a prominent spot not only on the microeconomic agenda but also on the economic-policy agenda. For SMEs are responsible for no less than 50-70% of value added in Europe and expansion of e-business is likely to boost the productivity of SMEs and their networked business partners. Experience to date also suggests that, for example, companies might not always be able to solve coordination and standardisation problems on their own. Economic policy should, among other things, focus on countries with a generally low level of e-business penetration: in such countries, the level of SME e-business activities is extremely low.

### ICT usage varies from sector to sector

The economic structure of a country (type and size of the sectors) is another factor which influences the spread of e-business. For the type and scope of a company's e-business activities – disregarding its organisational maturity – also depend on the sector, the specific business line and the predominant competition scenario (see box on page 10). This is documented by analysis of eight e-business indicators for various sectors (excluding financial services). In the

<sup>16</sup> Frequently this is linked with the challenge of being able to communicate with the diverse IT systems of different clients. This is likely to result in higher costs.

<sup>17</sup> While there are differences for a few indicators in certain countries between the usage of e-business at large companies and SMEs, the e-business ranking of the countries remains virtually unchanged even when the companies are classified by size category.

following we concentrate on Germany since, considering the complexity of the data situation, analysis of the sectors at the European level would go beyond the scope of this report.

**ICT bringing changes in competitive environment**

Competition in a given sector and its medium and long-term profitability are shaped by five forces, according to M.E. Porter:\*

1. The rivalry between the current market players;
2. Entry barriers for new companies;
3. The threat posed by substitute goods and services;
4. The bargaining power of supplier industries;
5. The bargaining power of buyers (wholesalers/retailers or end-consumers).

According to Porter, the dominating forces shape the profitability of the sector and are key when companies choose how to map out their strategies. Various factors such as regulation or technology and innovations have the potential to change these forces and thus, indirectly, the competitive environment in a sector. This also applies to information technology. Consumers can compare prices quickly and easily on the internet. Product assessments are available on websites of online traders or special price comparison sites. The increased bargaining power of buyers has crimped margins in the retail sector and intensified competition. This can also be seen in the tourism industry. More and more customers are booking their hotels and flights directly over the internet or gathering information online before they go to a travel agent.

Technological innovations can also lead to the entry of new companies into a sector. This applies for example in the context of the spreading penetration of triple play, i.e. offers of television, telephony and internet all in one single infrastructure (cable or telephone networks) on the basis of IP protocol. Triple play has opened the door for new players that did not formerly operate in the same market to compete with the telecommunications companies: cable-TV providers are now rivals for internet customers, seizing market share from the telecoms operators and squeezing their margins.

Information technology plays a particular role in this process. On the one hand, it has an individual impact on various industries and their profitability through the forces identified by Porter.\*\* On the other, its implementation can be a strategic instrument (among several) with which a company can respond to changes in the five forces. Various surveys show that intensive rivalry between competitors and the striving of the companies to attain a competitive advantage are important driving forces for the introduction of e-business solutions. In the manufacturing sector, supplier pressure is a key factor; in sectors which focus more on end-consumers, such as tourism or telecommunications, the expectations of the customers play a major role.\*\*\* The crucial point is that the forces differ in their manifestation from sector to sector. This is the reason that companies from a variety of sectors have in some cases developed a differing focus in e-business.

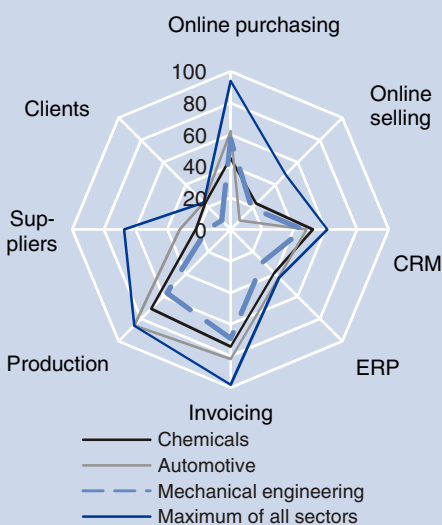
\* See Porter, M.E. (2008). The five competitive forces that shape strategy. Harvard Business Review, January 2008.

\*\* See Porter, M.E. (2001). Bewährte Strategien werden durch das Internet noch wirksamer. Harvard Business Manager, 5/2001, p. 69.

\*\*\* See EITO (2007). Part II.

**Manufacturing sector well positioned**

% of companies using one of the applications\*, DE, 2007



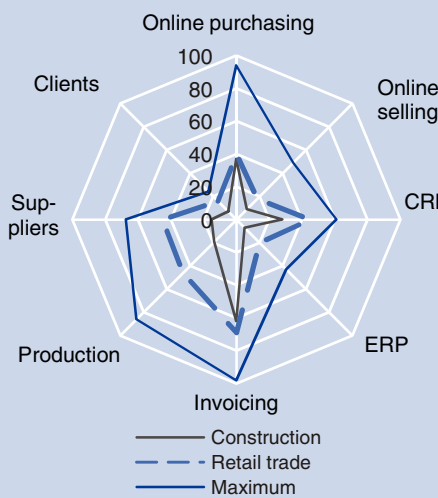
\* "Production/invoicing": companies whose order processing uses IT systems linked to other internal systems.  
 "Client/suppliers": companies, linked with ...

Source: Destatis **16**

E-business is very widespread in numerous branches of the manufacturing industry in Germany. The automotive sector merits particular attention. Other leading industries include chemicals, the production of plastic goods and mechanical engineering (see chart 16). The strengths of the manufacturing industry lie in the internal linking of the systems for order processing with invoicing and payment systems or with production and logistics systems. Such systems are used in 90-100% of all medium-sized and large companies. Furthermore, 40-60% of the companies use the internet for procurement purposes. Networking with clients and suppliers is less widespread – even in the auto industry only one-third of the companies are linked with their suppliers.

**Retailers linked with suppliers**

% of companies using one of the applications\*, DE, 2007

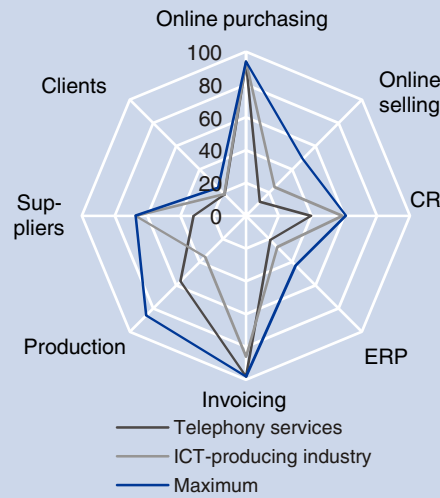


\* "Production/invoicing": companies whose order processing uses IT systems linked to other internal systems.  
 "Client/suppliers": companies, linked with ...

Source: Destatis **17**

**IT: Manufacturers and providers at leading edge**

% of companies using one of the applications\*, DE, 2007

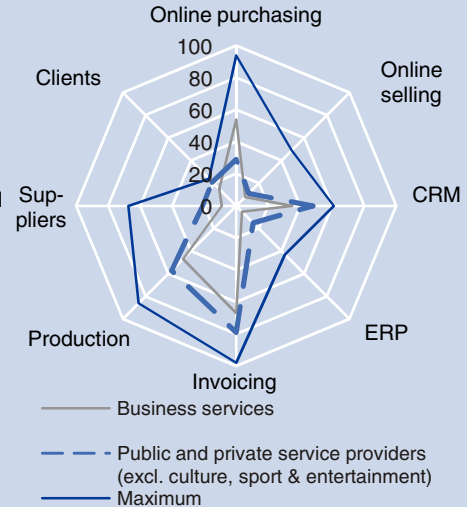


\* "Production/invoicing": companies whose order processing uses IT systems linked to other internal systems.  
 "Client/suppliers": companies, linked with ...

Source: Destatis **18**

**Other service providers often only average**

% of companies using one of the applications\*, DE, 2007



\* "Production/invoicing": companies whose order processing uses IT systems linked to other internal systems.  
 "Client/suppliers": companies, linked with ...

Source: Destatis **19**

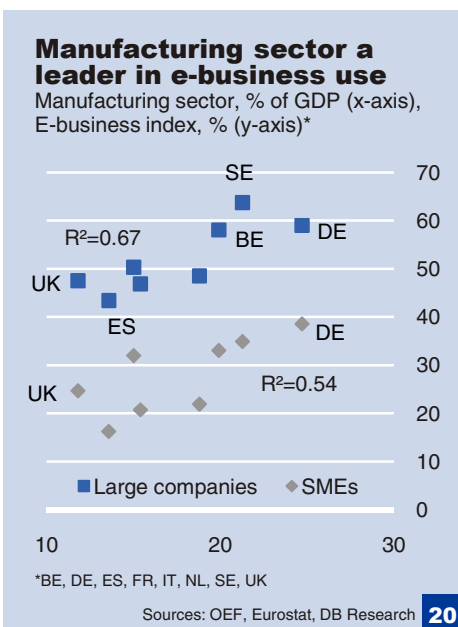
A large number of sectors show a similar pattern in e-business – though at different levels: the internal networking of order processing with invoicing and production systems is in most cases very far advanced. Moreover, a large proportion of companies in various branches of industry use the internet as a procurement channel; online sales activities are not as much in evidence. CRM systems find much greater acceptance than ERP systems. Networking with external partners is generally not very common; however, it is still better with suppliers than with clients. Among the sectors that use e-business to a below-average degree in most of its forms are construction and hotels, as well as real estate and rentals. These sectors feature a large proportion of small and medium-sized companies.

Apart from these general observations there are several industry-specific features which are worth mentioning.

- Integration with suppliers has made substantial progress in the retail trade: 45% of companies there have integrated their order-processing systems with those of their suppliers (see chart 17). Surprisingly, the share of retailers with e-commerce operations only slightly exceeds the average for all companies (18% vs. 14%). This share rises to 26% if only the companies with internet connections are factored in. This suggests that the share of small retailers without internet access is relatively high.
- In the hotel sector, a strikingly large share (50% of all hotels) accepts online bookings. In fact, in the category of medium-sized hotels (50-249 employees), the reading comes to around 80%. This mirrors the trend towards disintermediation: customers now go online to book their hotel stay or their flight directly. This group no longer uses the services of travel agencies or tour

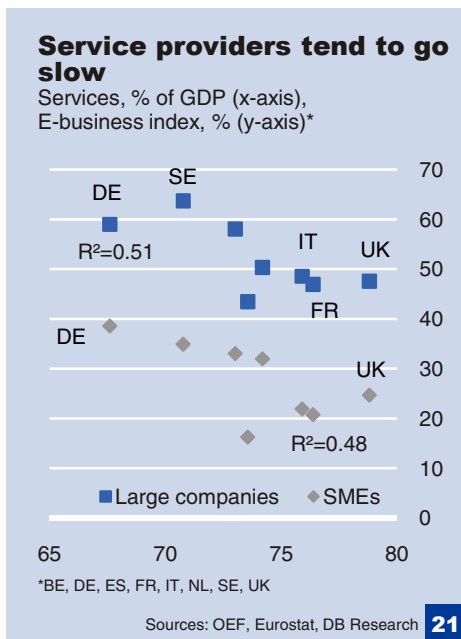
operators.<sup>18</sup> There is an above-average share of companies selling goods and services online also in other sectors in which disintermediation plays a major role. This holds in Germany for example for companies from the paper, printing and publishing industries (35%) as well as culture, sport and entertainment (32%).

- In the sectors that serve a rather fragmented mass market, there are many instances of order processing being linked up with invoicing: this applies, for example, to the areas of telecommunications (98%), energy and water (86%), and culture, sport and entertainment (78%).
- Unsurprisingly, the sectors with a focus on ICT services or production are themselves big users of ICT as an input factor – albeit not across the board. Strengths in e-business are to be found above all in procurement and invoicing systems (see chart 18). In the three subgroups telephony services, ICT manufacturing<sup>19</sup>, and data processing and databases, for example, 87-94% of the companies do their purchasing over the internet. In ICT manufacturing, two-thirds of the companies network with suppliers and approximately 60% use CRM systems. The service providers in the areas of data processing and databases use CRM systems just as often. These industry segments are pioneers in Germany in the given categories in a comparison of different sectors.
- Most of the other service providers<sup>20</sup> tend to show average to below-average use of e-business (see chart 19). Networking between clients and suppliers as well as online selling of services are particularly low-profile. This comes as a surprise particularly for business services. However, this industry also bears the hallmarks of the SME, so the generally low degree of networking among SMEs is likely to be mirrored here. By contrast, the very mixed field of public and private services (such as public administration, education, healthcare) seems to have a somewhat better footing. The given sectors (excluding the banking and insurance industries) account for close to 50% of gross value added. This highlights the fact that, in the context of overall productivity growth, accelerating the introduction of e-business solutions ought to be prioritised in certain parts of the services sector.



A breakdown of e-business usage among German companies by sector produced a very mixed picture. There is evidence that weaknesses are harboured in more complex internal ICT solutions, external networking and the use of the internet as a sales channel. Furthermore, there are sector-specific differences: companies use ICT for differing reasons in areas where technologies can particularly boost process efficiency and/or where they have to meet changes in client and/or supplier expectations. Numerous sectors of the manufacturing industry and IT producers and service providers play a pioneering role, a fact that should be emphasised. By contrast, much of the services sector still has ground to make up in its

<sup>18</sup> However, the reverse trend of re-intermediation has also been observed: for example, there are a growing number of online travel intermediaries. Travel agencies are also increasingly offering personalised, custom-tailored services on the internet (known as dynamic packaging). See EITO (2007). p. 119f.  
<sup>19</sup> Office equipment, computers and accessories (DL 30), electronic components (DL 32.1), telecommunications technology (DL 32.2).  
<sup>20</sup> These include, for example, real estate, rentals & leasing, business services, public administration, education and training, and healthcare.



use of ICT. This is not peculiar to Germany. Data for eight EU countries reveals that the countries in which manufacturing generates a fairly large proportion of GDP also show a higher degree of e-business usage (see chart 20). On the other hand, the higher the share of the services sector in GDP, the weaker is a country's e-business performance (see chart 21). However, the same proviso applies to the services sector as to the demand for greater ICT usage in small companies. ICT solutions are not equally appropriate for all service providers: given their production structures providers of personal services will tend to use ICT to a lesser degree also in future, while logistics or wholesale and retail firms, for instance, can generate substantial productivity gains by using RFID technologies.

### More in the future

Over the next few years look for the market maturity and roll-out of several technologies, applications and business organisation models that will even further foster the automation of processes and networking within and between companies. They will pave the way towards an increasingly flexible deployment of information technology. Furthermore, they are likely to enable companies to further reduce media fragmentation and make it easier to tap information on processes and products so that this very information can flow into company management processes. This may be illustrated by several examples:

#### SaaS helps SMEs

- In the more narrowly defined area of company IT infrastructure, software and services, the main focus is on making processes more flexible and modular in line with demand. *IT utility services* enable the client to flexibly tap a provider's software (*software as a service, SaaS*) and hardware capacities (*utility computing*). Scalable services – for companies with strongly fluctuating demand in particular – and pay-per-use are arguments supporting the case for IT utility services. This concept especially helps SMEs since by flexibly procuring IT services via the market they can reduce investment costs, realise price advantages and benefit from the use of standard software.

#### SOA enables recombination of services

- Within companies the concept of *service-oriented architecture (SOA)* is likely to attract more and more users over the next few years. SOAs aim to break down the applications used in companies into individual services. Such architecture takes account of rapid changes in business processes and enables services to be recombined quickly and flexibly. This reduces the complexity of business IT landscapes and eases the task of outsourcing services.

#### RFID: More than rationalisation technology

- *Radio frequency identification (RFID) chips* will find broad application going forward, for instance on the production floor (e.g. in the auto industry), in retail trade and logistics.<sup>21</sup> First of all, RFID acts as a rationalisation technology by helping to cut inventories, shorten book-to-bill times and upgrade information along the value chain. RFID helps not only within the company but especially also in enhancing exchanges of information between specialised companies that operate in global supply chains (e.g. logistics).

#### Focus on higher information quality

- With more bandwidths, more powerful mobile terminal devices and convergent services, *mobile business applications* will

<sup>21</sup> See Heng, S. (2008). RFID chips: Enabling the efficient exchange of information. Deutsche Bank Research. E-economics No. 69.

become reality for an increasing number of companies. For example, mobile sales and service solutions are an interesting way to boost process efficiency. The rapid availability of data, accelerated processes and a higher quality of information are, according to empirical studies, the most important objectives pertaining to the use of mobile business applications.

**PLM is being introduced rather slowly**

— *Product life-cycle management (PLM)* is frequently referred to as the “digital factory”. The goal of PLM systems is to gather and store all the data pertaining to a product in its life cycle. The aim is to smooth collaboration between the departments of a company and its partners. An extensive integration job, since data have to be compiled from various systems (production planning and management, ERP systems and production data from manufacturing execution systems (MES)). So far, PLM systems have mainly been deployed at the big auto makers; their parts suppliers are gradually following suit.<sup>22</sup>

Automation, increasing flexibility, IT-supported collaboration and data usability are progressing vigorously, as this by no means complete list of examples shows. However, the solutions presented have differing time horizons. While mobile business solutions, for instance, are already widespread, IT utility services or SOA are forecast to enjoy a veritable boom in future. Up to 2010, SaaS turnover is expected to grow by 26% p.a. worldwide, and utility computing by 39% p.a.<sup>23</sup> By contrast, PLM systems are likely to be introduced more cautiously owing to sizeable process adjustments and the related high investment costs. The same holds true for electronic invoices or collaborative solutions between companies. All in all, though, the trend towards an IT-driven increase in process efficiency will continue. Of necessity, advanced IT concepts will go more or less hand in hand with an extensive reorganisation of business structures. This makes them relatively costly, but they will also offer numerous opportunities in view of their productivity potential.

**Conclusion: Still lots of untapped potential**

**More complex internal systems not very widespread**

European companies are still not making sufficient use of electronic business. Generally, most of the applications in use are relatively simple ones that require only limited adjustments to business processes. Sophisticated, internal ICT-based processes are being used by only 20-25% of the EU companies surveyed – the one exception being the networking of order processing with invoicing and payment systems. The “extended enterprise” model is also only a vision of the future. So what this boils down to is that most of Europe’s companies are continuing to miss out on chances to reap the productivity gains that can be generated by using more sophisticated ICT applications for e-business in connection with organisational redesign.

**Sizeable differences between countries, sectors and company sizes**

Remarkably large differences come to light in comparisons of countries, sectors and company size categories. Companies from the Nordic countries and Germany hold the lead in implementing e-business processes. By contrast, not only companies in large EU countries such as Italy and Spain, but also Greece and Portugal, are

<sup>22</sup> In 2006 one-quarter of the parts suppliers had implemented partial solutions, of whom only 5% used them. See BITKOM, Roland Berger Strategy Consultants (2007). *Zukunft digitale Wirtschaft*, p. 48. Berlin.

<sup>23</sup> See BITKOM, Roland Berger Strategy Consultants (2007). *Zukunft digitale Wirtschaft*, p. 97. Berlin.

not very advanced. A pronounced difference also emerges between large and small companies: small companies lag behind considerably in the use of e-business applications. The difference in usage tends to be greater in the case of sophisticated, networked applications. Even though small companies can only use information systems sensibly to a more limited degree than large companies and should therefore not be measured by the same yardstick, an expansion of electronic business and related organisational re-design are no doubt likely to boost the productivity of SMEs and their business partners.

**In Germany, manufacturing sector holds the lead**

After all, the use of e-business solutions varies markedly from sector to sector. In Germany, numerous sectors of the manufacturing industry are quite advanced in e-business. Performance in some of these sectors is shaped by large companies which drive the trend. Moreover, the sectors with a focus on ICT services or production are among the pioneers. By contrast, most of the traditional service providers, which are very important for their share of value added, still have a lot of ground to make up in the field of e-business solutions.

**Innovations offer opportunities**

Product and process innovations are shaped to a large extent today by ICT, and this will also hold true in future. Technologies such as RFID or mobile business applications will help companies to conceive appropriate, innovative processes for their business models. Concepts such as SaaS, SOA or PLM are likely to further boost companies' process efficiency. However, the number of companies using SOA or PLM at the forefront of innovation is likely to be limited, since these concepts require extensive restructuring investments. By contrast, IT utility services, especially SaaS, can open doors for smaller companies.

**Persistent need for coordination**

The large e-business gap in certain sectors, e.g. in the case of many traditional service providers, and among the SMEs also points to a persistent need for economic-policy coordination going forward. As has already been the case in various initiatives of the EU and the member states, the focus should be on certain sectors with more of an SME bias and on issues that cross sector boundaries, such as electronic invoices. A cross-country perspective can also be very helpful in this respect. Knowledge transfers, standardisation and trial models may be a helpful place to start. Without them it will be virtually impossible to integrate the majority of European companies into the realm of electronic business.

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