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Diffusion and Impacts of the Internet and E-Commerce: The Case of Denmark

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ABSTRACT

Danish companies are ahead of those in the U.S. in B2C e-commerce. With the exception of Germany, Denmark is leading the group of 10 countries included in the globalization of e-commerce survey data, forming the basis for this report. Yet the surveyed countries are performing substantially better than Denmark in B2B online sales.

Danish companies have high levels of investment in IT, the lowest barriers for e-commerce, and the highest levels of e-commerce drivers. Most indicators for e-commerce readiness, such as use of e-mail, intranet, EDI, extranet, and the provision of mobile services, show that the Danish business sector has adopted the technologies that foster e-commerce development.

Yet our analysis also points to several alarming and surprising findings. The companies have primarily managed to incorporate e-business in the processes controlled by the companies themselves (such as marketing and customer service), but have failed to implement e-business in inter-organizational systems and business integration. Thus, Danish companies appear to have the in-house means aligned for e-commerce exploitation, but have yet to transform their external business relations. The financial sector is the best performing sector with regard to sales, but it is not leading the pack in online services. Also, deficiencies in e-services are found, especially within the manufacturing sector, where few companies are providing product configuration, information, and order tracking. Danish distribution companies have failed to implement services such as gift certificates and product catalogs on their websites.

There is not a substantially higher number of Danish companies reporting success in terms of more efficient business processes, increased staff efficiency, cost reductions, or increased sales areas. For several of these dimensions, there are even fewer Danish companies reporting positive e-commerce impacts.

We group the policy implications of our analysis in four classes -- government, industry associations/service providers, companies, and individuals -- suggesting that government will have to increase research; increase the production of engineers; intensify and broaden public e-procurement and e-government; further facilitate e-commerce regulation to boost online use in all business processes; further European harmonization of legislation regarding cross border online business processes; accelerate liberalization of the labor market to make it easier to expand and contract; and increase public funding schemes for entrepreneurs.

Finally, we point to the need for critically assessing the role of industry associations and service providers in awareness campaigns, and stress the need for surveys and identification of weaknesses as well as best business practices and dissemination of this knowledge in spite of the reluctance of SMEs to listen. For Danish companies, there seems to be a need for better integration with suppliers and customers, focusing on exploiting the benefits of e-business investments and creating higher awareness of, and engagement in e-marketplaces. For individuals, the report discusses the need for continued emphasis on further education and training in IT, languages, and business processes, as well as an increased willingness to change.

INTRODUCTION

Denmark is a small, relatively homogenous, urbanized, highly industrialized, open economy, with a population of 5.3 million and a long tradition of early adoption of new IT-based services. Electronic bank transfers of payments, salaries transferred from employers to banks, direct debit cards for shopping, and check-less electronic clearing between banks were available and used for the majority of transactions from the mid 1970s.

Since the late 1990s, Danes and Danish companies have adopted the Internet to a high degree. Denmark is among the leading countries for use of home PCs, access to the Internet, online sales, and mobile communications (ITU, 2002). In the B2B area, Danish companies are typically further along the uptake route than their European counterparts.

The conditions for e-commerce have been fairly favorable. No significant stumbling blocks are reported, and in general, conditions -- especially for B2B -- are very good (high levels of education, good service institutions for advice and consultation, high innovativeness of Danish companies, high levels of IT competence, and a high availability of vendors for different solutions). To the extent that companies could see its cost-benefit, e-commerce was adopted, especially in order to reduce costs, improve coordination with customers and/or suppliers, and to satisfy customer demand.

The experiences with e-commerce have been mixed. Many new dot.coms were created in the late 1990s, but unfortunately, most of them disappeared rather quickly. But the enormous publicity, enthusiasm, and hype around the dot.coms spurred traditional industry to start innovating through the adoption of e-commerce. Often it turned out to be more difficult or expensive than expected, but the biggest disappointment has been that customers were not ready. This is probably the most often-quoted objection to e-commerce, that 'end consumers do not come to our websites', and in the B2B field, 'our larger trading partners are not yet ready' (PLS Rambøll, 2002).

The impacts are still rather marginal. But predictions are clearly beyond the stage of 'wishful thinking.' Consumers are now picking up e-commerce with annual growth-rates of up to 50%, and B2B has become a major growth area. A Danish survey showed that 10% of all companies have a significant standardized communication system (EDI or XML), and 21% have an e-strategy. 'Internet-related turnover' is now around 10% of the GDP, and this figure is expected to increase by 84% from 2002 to 2004 (PLS Rambøll, 2002). This is likely to have a significant impact on markets, value chains, collaboration structures, and patterns of industry concentration.

Official government policy is strongly in favor of supporting IT in general and Internet-based commerce in particular. In a speech to the nation on December 31, 2000, the Danish Prime Minister Poul Nyrup Rasmussen said:

"I envision a Danish society that is the world leading IT-nation in 2003. This is not an impossible dream. All Danish citizens need to have access to the Internet and the possibility of having an e-mail account. The public sector needs to be at the cutting edge with regards to exploiting IT."

This was more than an empty vision statement. It was followed by a large number of initiatives, from liberalizing the telecom market and pushing legislation (e.g., electronic

signatures), to increasing IT education and supporting the use of the procurement portal for the governmental part of the public sector. Every year the Minister of Research and Information Technology is required to report to parliament on the 'state-of-the-art' regarding progress towards the positioning of Denmark as an Information Society. Political initiatives often use the public sector as a locomotive to push Internet and IT adoption.

BACKGROUND AND A PRIORI EXPECTATIONS

Country Background

Denmark is a small, homogeneous country, not by choice, but by default. The former glory of the Viking age and the Middle Ages is history. England, Normandy, the Northern part of Germany, Estonia, Sweden, Iceland, Norway and other possessions have been lost in many wars, and with them the huge cultural diversity. Today, the population is around 5.3 million, amounting to roughly 2% of the EU and 1% of the total European population. Urban population is among the highest in Europe (85%), and household size is among the lowest (1.8 persons).

GDP per capita is among the highest in Europe -- \$30,470 in Denmark compared to the U.S. figure of \$ 36,211 for 2000. However, comparisons with the U.S. are difficult due to the high volatility of the dollar against the Euro/DKK. The 20% weakening of the dollar against the Euro in the first month of 2003 brought the GDP per capita on par with the U.S.

The import/export portion of GDP is also among the highest (>30%). Income is distributed much more evenly than in any other country except the other Scandinavian countries, and the government plays a major role in the economy through some of the highest income and sales tax rates anywhere.

But Danes get something for their taxes – a large number of welfare services (including 12-month paid maternity leave, free primary and secondary healthcare, generous unemployment benefits, free higher education, six weeks annual paid vacation, a 37-hour work week, and early retirement plans from age 60).

Furthermore, among the OECD countries, Denmark has the second most efficient labor market after the U.S., meaning that the efficiency in acquiring and firing staff is very high. This flexibility is a strong stimulus for entrepreneurs and existing companies to innovate and try out new ventures. If things do not go according to plan, it is possible to lay off staff without financial obligations towards the employees.

Globalization

Doing almost half of its total trade with its four neighboring countries, the Danish economy is part of a regional economy rather than a global economy. The largest share of exports in 2002 went to Germany (20.6%), Sweden (11.3%), England (8.6%), and Norway (6.0%), while the largest imports came from the same countries -- Germany (23.3%), Sweden (12.8%), England (8.6%), and Norway (4.4%) (Statistics Denmark, 2003).

TABLE 1. Globalization Indicators, 2002

	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Percent of companies with establishments abroad	39.8	73.5	49.6	46.1	30.7	40.6	23.9
Percent of companies with headquarters abroad	14.4	18.7	12.1	12.6	17.6	14.5	8.5
Mean percent of total sales from abroad	22.7	46.9	39.1	22.4	16.4	23.4	12.1
Mean percent of total procurement spending from abroad	28.9	36.4	30.3	49.6	10.0	29.1	20.3
Degree affected by competitors from abroad ^e							
Low	67.8	29.7	49.9	72.5	69.6	66.9	68.3
Moderate	16.9	15.8	12.1	13.1	23.0	16.9	15.7
High	15.2	54.4	38.0	14.4	7.3	16.2	15.2

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact question wording: Using a 5-point scale, where 5 is significantly affected and 1 is not at all affected, please tell me how much your establishment is affected by competitors from outside your country. Scores of 1 and 2 were classified as low, a score of 3 as moderate, and scores of 4 and 5 as high.

On all dimensions, the Danish companies show a substantially higher level of globalization than the global sample, with a higher percentage of companies with establishments abroad; a higher percentage of companies with headquarters abroad; a higher percentage of total sales from abroad; and a higher percentage of total procurement spending from abroad.

If we compare the three sectors, the manufacturing sector is clearly the most global. Most of the companies thrive as subcontractors to multinational companies, or play a leading role in very small niches, such as Novozymes in industrial enzymes, Coloplast in ostomy and continence care, Danisco in food ingredients, and Oticon in hearing aids.

Unlike the manufacturing sector, the distribution sector is local, catering almost exclusively to the Danish market and to a small extent the neighboring countries.

Finally, the finance sector is historically local, catering only to the Danish market due to different financial regulations than in most other countries in Europe. During the last 20 to 30 years, deregulation has made it economically attractive to enlarge that focus. Large-scale mergers in the Nordic countries have taken place across the borders, and the largest banks are expanding, especially around the Baltic Sea.

Industry Structure

Turning to industry structure, agriculture played the major role until the late 19th century, when manufacturing began. Because the country is almost void of natural resources (except for crude oil and gas sufficient for about 50 years of consumption), agriculture was the most important export until the middle of the 20th century. Today, Denmark is still the fourth largest producer of pigs in Europe, and the largest exporter of pork in the world, but the role of agriculture is continuously diminishing.

Today, we see a much more diverse picture, as revealed in Table 2, where we show the distribution of GDP according to industry sector for Denmark, compared to three other countries (France, Germany, and the United States). By far the largest sector today is manufacturing, contributing a quarter of the GDP. This sector is followed by distribution (wholesale, retail, and restaurants and hotels) and finance, as in most developed countries.

TABLE 2. GDP Distributed By Industrial Sector (Denmark, France, Germany & the US) (%)

Sector	Denmark	France	Germany	United States
Agriculture, hunting, forestry & fishing	5.3%	3.0%	1.3%	1.9%
Mining and quarrying	1.1%	.5%	n.a.	1.7%
Manufacturing	25.1%	24.5%	28.6%	19.6%
Electricity, gas and water	2.5%	3.0%	n.a.	3.1%
Construction	6.9%	5.5%	7.4%	4.5%
Wholesale and retail trade, restaurants and hotels	16.8%	19.1%	n.a.	18.1%
Transport, storage and communication	11.4%	7.2%	6.1%	6.4%
Finance	23.9%	29.1%	16.7%	30.8%
Community, social and personal services	7.0%	8.0%	n.a.	12.4%
GDP total US \$ (Billions), 2001	161.5	1,309.8	1,846.1	10,065.3
GDP per capita (US \$), 2001	30,193.57	22,138.21	22,459.65	35,445.80

Sources: United Nations National Accounts, 1999; World Bank World Development Indicators, 2003

Comparing the relative importance of the different sectors to France, Germany, and the U.S., it is interesting to note the relatively high importance of agriculture and transportation for the Danish economy.

The reason for the relatively large agricultural sector is, as mentioned above, largely historical. The reason for the large transportation sector is also historical. Since the Viking age, Danes have been a relatively large seafaring nation, and the importance of shipping for the Danish economy is to a very large degree thanks to Maersk Sealand, which is the largest container shipping line in the world.

The three sectors specifically focused on in this report, manufacturing, retail/wholesale, and finance, are discussed in more detail in the three sections below.

Sector Analysis

For the comparative international analysis, we have selected three sectors: manufacturing, retail/wholesale, and finance. Employment and the number of companies/establishments in the three sectors is shown in Tables 3 and 4. These figures will be discussed in the following sections, where the three sectors are characterized.

TABLE 3. Number of Establishments/Companies Within Manufacturing, Retail/ Wholesale, and Finance

	Manufacturing		Retail/Wholesale		Finance		All sectors	
	N	%	N	%	N	%	N	%
SMEs	21,808	98.6	50,463	99.9	49,746	99.8	285,694	96.4
Large	300	1.4	33	0.1	86	0.2	1,030	3.6
Total	22,108	100.0	50,463	100.0	49,832	100.0	286,724	100.0

Source: UCI, IDC, 2002

TABLE 4. Number of Employees Within Manufacturing, Retail/ Wholesale, and Finance

	Manufacturing		Retail/Wholesale		Finance		All sectors	
	N	%	N	%	N	%	N	%
SMEs	311,473	62.3	296,578	64.7	216,394	79.1	172,0921	74.4
Large	188,809	37.7	91,091	35.3	57,102	20.9	590,936	25.6
Total	500,282	100.0	387,669	100.0	273,496	100.0	2,311,857	100.0

Source: UCI, IDC, 2002

Manufacturing Sector

The manufacturing sector includes machinery, tools, instruments, electronics, and a wide range of components produced by subcontractors for the larger industries in Germany and Sweden.

Key characteristics of the Danish industry structure likely to determine the direction and impacts of e-commerce are: 1) dominance of SMEs; 2) relatively low number of MNCs, global brand leaders and/or upstream powerful companies; and 3) niche position of larger companies.

The industry is almost exclusively dominated by SMEs (small to medium size enterprises). Companies with fewer than 200 employees employ no less than 74% of the *private sector* labor force. To the extent that these companies are internationally oriented (with a substantial part of their turnover generated through exports), it is obviously critical to introduce e-business in order to further transactions and collaboration with trading partners. A recent survey on e-commerce in the Danish industry demonstrated that the early adopters of e-commerce using strong vertical value chain integration tend to be the larger and more established companies, rather than the smaller and relatively newer companies (Pedersen, Petersen and Jespersen, 2002). Many SMEs have a hard time keeping up with the large, established firms.

For another part of the industry segment (local-oriented producers), the issue of size is not critical. In a survey from 2001 on steel and manufacturing producers, and in a survey from 2002 on the grocery sector, we found that size did not hold any explanatory power for the uptake of B2B e-commerce (Henriksen, 2002).

The Danish industry structure lacks a MNC (multinational corporation) presence in the diffusion of e-commerce. In particular, it lacks the presence of strong upstream players in the value chain, as well as global brand leaders. There are a few exceptions within the biotech industry (such as Novo Nordic Group, Lundbeck, ACADIA, Ferring Pharmaceuticals, Genmab, Nutri Pharma, and Structural Bioinformatics) and within traditional manufacturing, where the globalization of Danfoss, Grundfos, Carlsberg Breweries, and the Lego Group has fostered the development and implementation of e-logistics.

The third characteristic of Danish industry is that the larger companies are almost all niche players. Danfoss is a world leader in compressors, Grundfos is one of the leading manufacturers of high quality pumps, Radiometer is one of the leaders in blood-gas measurement instruments, and Denmark has three of the five largest producers of hearing aids (Oticon, GN Resound, and Widex).

For many of these companies, there has been collaboration between small industry players and large manufacturers using EDI for more than a decade (Andersen et al., 2000). The

efficiency of EDI systems, once established, is very high. Obviously, Internet-based EDI is generally much easier and cheaper to install, but the security, ease of use, and inter-organizational integration is usually easier to achieve by maintaining the EDI solutions using direct dial or third party transportation vendors.

Retail/Wholesale

The Danish retail sector has a very high concentration. Only 33 large companies employ more than one-third of the labor force (35.3%). This is primarily due to the fact that only two retail supermarket chains control more than two-thirds of all sales of supermarket products. The remaining nearly 300,000 employees work in the 50,000 small shops and wholesale companies employing on average only six staff. These firms are almost all located in the urban areas. There is one shop for approximately 100 Danes.

The main implication of this concentration has been that ‘everybody’ has waited to see what the two largest supermarket chains would do, especially when it came to inter-organizational business processes (ordering, order confirmations, dispatching documents, processing invoices, etc.). Accordingly, when work on EDI began, there was a high level of collaboration among the players in order to make sure that inter-organizational systems were following the same standards. Within the supermarket retail sector this was the HANCOM standard, and all industrial articles in retail trade are provided with the EAN-article number. By the late 1980s, the supermarkets acquired the main bulk of their supplies from the manufacturers using EDI through one large Value Added Network Service (VANS) provider. Four documents were used: order forms, order confirmations, invoices and payments. Later on, more documents were added. On the one hand, EDI provided high IT-literacy, but on the other hand, a very effective EDI worked against a shift to Internet-based e-commerce.

Banking, Insurance, and other Financial Services

Traditionally, the banking and insurance sectors have been very scattered. Within the banking sector alone, there were approximately 500 independent banks in Denmark in the late 1960s. This number has been drastically reduced, and today, in spite of the large number of companies, concentration in the finance sector is very high. Tables 3 and 4 show that while the 86 largest companies employ 57,102 people (20.9% of the work force), the remaining 49,746 companies employ only 216,394 people, or on average approximately four employees each. In the banking sector alone, the two largest banks employ approximately 50% of all bank employees; and in the insurance sector, the three largest companies employ approximately 50% of all insurance staff. This strong concentration is a result of many mergers, especially in the banking sector, a development strongly fueled by IT and other economies of scale.

Danish banks have been in the forefront in the use of IT since the mid- 1960s. The first online, real-time system with cashier terminals in the branches was introduced in 1969. IBM played a strong role in motivating the use and adoption of IT, and in many cases Danish banks were guinea pigs for new applications. Danish banks in those days were quite willing, since employee salaries were among the highest in Europe.

An even stronger influencing force was the government introduction of the ‘pay-as-you-earn-tax’ in 1970, which made it necessary for nearly every salary earner to have a bank account where their salary after taxes was deposited. The Dataløn (joint salary system offered by all banks) was introduced in 1969. Furthermore, the government-enforced personal identification number made identification easy. The government restrictions on maximum interest margins

and a ceiling on loans (to avoid overheating of the economy) in the mid 1980s strongly reduced competition among banks to a question of service, including the number of banking outlets. This strongly regulated banking market also made it a 'no-brainer' to establish a joint infrastructure and collaboration among several hundred banks for all kinds of transfers. Over and above the joint salary system from 1969, a joint electronic transfer payment system was introduced in 1974, and debit cards (Dankort) were introduced in 1983. Before the end of the 1980s, the number of Dankort transactions had surpassed the number of personal checks, and the use of checks today is extremely limited.

In the last decade, national and international mergers have been the overall trend. But there have also been an increasing number of mergers and acquisitions within and between the banking and real estate markets. The dominant players today are Danske Bank and Nordea. The financial sector is aggressive in using e-commerce as a strategic tool and as a means of reducing processing costs. From 1999 to 2000, the numbers of customers using the Internet to complete banking transactions doubled (Ministry of Information Technology and Research, 2000). With its more than ten million Internet users in mid-2002, the Nordic Nordea Bank, which covers all of Scandinavia, has approximately the same number of Internet users as Bank of America, but has more Internet transactions than any other bank in the world.

The mega banks still support the joint debit card (Dankort), making it extraordinarily inexpensive for new players to enter the market, like the totally Internet-based bank Basisbank, which for less than one million Euro got access to several thousand ATMs spread over the whole country. In order for the smaller banks to stay competitive in spite of the technological developments associated with e-commerce, they joined forces and utilized a few large joint data centers, which also conduct their systems development. However, it is likely that in the future the mega banks will go their own way in certain areas and functions.

The high level of regulation means that there is a big incentive to provide e-commerce services, since this will improve customer service and will potentially save substantial amounts for those customers servicing themselves on the websites. Furthermore, given the high concentration of IT-development operations, the costs of new e-commerce applications could be kept at a reasonable level.

Factors Influencing Diffusion

The Danish IT approach in general and in e-business in particular is focused on use rather than on development and production (Andersen, Bjørn-Andersen & Henriksen, 2003). This reflects a business environment that lacks a large high-tech manufacturing industry. But this has not been a barrier. On the contrary, the global IT-vendors have an almost level playing field with very few governmental restrictions on the application and use of IT. This has had a positive impact on the diffusion of e-commerce, both B2B and B2C.

Within the B2B area, the Danish economy and business environment, especially within manufacturing, is characterized by a high number of SMEs and a lack of MNC dominance. This in itself suggests that B2B e-commerce would not evolve quickly. However, there are a large number of other factors suggesting a fairly high level of diffusion of e-commerce in B2B, such as: 1) extensive industry collaboration within several sectors. Within retail, the development of standards and EDI strongly encouraged all major players to coordinate their IT, and in the finance sector strong collaboration between all banks, even to the extent of having joint systems for debit/credit cards, joint infrastructure for ATMs, and joint systems

for Electronic Funds Transfer (EFT), has raised the level of skills and systems countrywide; 2) constant pressure for efficiency in form of cost and labor time reduction due to some of the highest salaries anywhere; 3) a high potential for harvesting IT-enabled labor savings due to the relative ease of laying-off staff; 4) an open economy with a high level of contact with foreign companies; 5) very extensive and successful vocational training programs; and 6) strong governmental support for knowledge diffusion through half a dozen technological service institutions, offering advice and inexpensive consultations for all companies, especially SMEs.

In B2C e-commerce, the high GDP per capita, the high percent of women in the labor force, and the rather equal distribution of income, are likely to be the important driving forces leading to an early uptake of e-commerce. Furthermore, more households are connected to the Internet than anywhere else in the world. Households are to an increasing degree, adopting broadband and mobile technologies. Other drivers for e-commerce in the B2C area include the long tradition of using home banking, smart cards, debit cards, and credit cards.

However, there are also serious inhibitors to B2C e-commerce (Andersen, Bjørn-Andersen & Henriksen, 2003). These include the regional/local orientation rather than the global orientation of vendors; consumers' desire to inspect products first; the non-EURO membership limiting transparency and ease of use when buying in the EU; and the very effective retail structure, reducing the relative advantages of buying over the Internet. Furthermore, the collapse of the high profile Danish e-tailers (Toycity and Gubi), the lack of high-end B2C brand leader products going digital, and the failure of the largest companies to function as locomotives, have all contributed to an e-commerce level that is lower than what could have been expected.

METHODS

Denmark is one of the ten countries participating in the CRITO/GEC Global e-commerce survey. This report presents the results of the Danish survey compared with the average of the ten countries. This is the primary data source for the analyses. The number of interviews is shown in Table 5. Three sectors are investigated, with half the respondents from large companies, and the other half from SMEs, which in this sample are defined as companies with 25 to 249 employees. The number in each cell varies from 32 - 35, and the total number of interviews is 200.

TABLE 5. Survey Sample

	Manufacturing	Retail/ Wholesale distribution	Banking, insurance and other finance	Total number of companies
Large (250 +)	34	34	32	100
SMEs (25 – 249)	35	33	32	100
Total	69	67	64	200

Source: UCI, IDC, 2002

Three additional studies play a substantial role in the further analysis. First, a telephone survey of the extent to which the 23 largest, most highly respected, and most innovative Danish companies within manufacturing, retail, and telecommunication services are using e-commerce in their key business processes. This survey was carried out in August 2001, and includes status questions as well as forecasts for the autumn of 2003.

A third survey is the PLS Rambøll 2002 e-business survey, carried out in collaboration with the country's largest newspaper, two ministries, and the association of IT industries. This survey has three elements: 1) a survey of 1,215 Danish companies constituting a representative sample of the 35,000 Danish companies with more than 5 employees; 2) a sub sample of the 300 largest companies is surveyed with 124 respondents; and 3) a sample of 108 dot.com companies who have been surveyed every year since 2000. The three surveys form a very comprehensive survey, specifically aimed at mapping the Danish e-business landscape.

A fourth study is a cross-national survey of the B2C websites of the 10 largest Australian and Danish companies within ten industry sectors, which has been carried out three times in Denmark and twice in Australia between January 2000 and the summer of 2002 (Elliott & Bjørn-Andersen, 2002).

Finally, a number of other sources are used including case studies, literature surveys, and interviews with key informants.

E-COMMERCE READINESS

Information Infrastructure

Use of E-commerce Technologies

The use of different types of e-commerce technologies/applications by establishment size and by industry sector are shown in Table 6, using data from the GEC survey. This allows a direct comparison with the global sample.

The general picture is that Danish companies are ahead of the average in the global sample. In some areas, the difference is larger than in others. This will be discussed below.

TABLE 6. Use of E-Commerce Technologies, 2002

Percent using ...	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
E-mail	100.0	100.0	100.0	100.0	100.0	100.0	98.5
Websites	96.2	98.4	94.0	93.8	99.9	96.3	74.1
Intranet	83.8	79.7	71.4	74.0	99.5	83.7	63.6
Extranet	39.7	44.2	35.6	39.4	42.3	39.8	32.7
• Accessible by suppliers /business partners ^e	29.9	33.4	25.3	32.5	29.8	30.0	20.9
• accessible by customers ^e	23.0	25.8	34.5	26.8	13.8	23.1	17.8
EDI	68.9	77.7	54.4	78.9	66.5	69.1	44.3
• over private networks only ^e	16.1	32.6	13.0	21.1	13.6	16.5	19.4
• Internet-based only ^e	20.6	8.9	18.0	12.6	29.6	20.3	8.4
• both ^e	31.4	34.7	23.1	45.1	21.3	31.5	15.9
EFT	73.4	75.2	78.0	58.6	86.1	73.5	43.4
Call center	27.1	37.7	27.4	33.8	21.0	27.4	32.3

Source: CRITO Global E-Commerce Survey, 2002

Note: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Percent based on total sample.

It is clear that by 2002, **e-mail** had reached full saturation in all three sectors of industry. This does not mean that everybody in the organization is using e-mail for contacts with customers. For example, the largest Scandinavian bank, Nordea, has still not introduced e-mail between all customers and staff. But staff obviously has access to e-mail between each other and for B2B contacts.

The same holds true for company **websites**, where the penetration level among Danish companies is from the mid to high nineties for the three industries, clearly higher than the average of the global sample.

Intranet is used by two-thirds of the companies within manufacturing and distribution, while there is a 99% uptake for the financial institutions. While the general picture is one of larger establishments being more technologically advanced than SMEs, this is not the case for intranets. We believe that this is an indication of the technology not being particularly difficult to acquire or install, and that a slow uptake is more likely due to organizational adaptability and innovation, and here there are many indications that smaller establishments are more flexible.

Extranet, on the other hand, is only used by 30–40% of the companies, but it is noteworthy that this is a higher percentage than in any of the other countries in the global sample. Manufacturing companies, especially, have developed extranets both for their suppliers and/or other business partners, and for their customers. This points in the direction of collaboration within logistics, procurement, and joint R&D as the prime targets of extranets rather than marketing, sales, and after sales service. This observation is consistent with the general pattern of many Danish SMEs being relatively far down the road of integrating with their large business partners.

On the other hand, it is worth noting the rather low figure of 13.8% extranet utilization for the finance industry for customers. This is surprising since all banks have a rather elaborate Internet presence for their customers, as do insurance companies. The explanation must be that there are some other finance institutions that do not allow their customers access to their websites.

EDI is used by about two-thirds of all firms. The distribution sector is clearly ahead (78.9% as opposed to an average of 69.1% for Denmark, and 44.3% in the global sample), a result of an early adoption of EDI in the early 1990s. Early innovation is still bringing the distribution sector ahead. This is also reflected in the figures for use of private networks as compared to use of the Internet. While the distribution sector is ahead on the use of private (but also somewhat old-fashioned) networks, the manufacturing and finance sectors are both ahead in using the Internet for EDI. Again, Danish companies in all sectors have a significant lead over the global sample.

The reasons for using EDI are illustrated in a survey of the top 300 companies in Denmark (PLS Rambøll, 2002). In this survey, the following e-business functions are used:

- Communication with customers/business partners (82%)
- Sharing of knowledge via Intranet (69%)
- Recruitment (69%)
- Marketing (66%)

- Communication with suppliers (65%)
- Obtaining orders (45%)
- Electronic payments (41%)
- Integration with administrative and accounting systems (40%)

The same holds true for **EFT**. Three out of four Danish companies, large as well as small, use EFT for payment, predominantly in relation to buying and selling. This is well ahead of the global sample. But it is interesting to note that the manufacturing (78.0%) and finance (86.1%) sectors are ahead of the distribution sector (58.6%).

Finally, there is a question of **call centers**. Here, Danish companies have a surprisingly lower penetration than the global sample. There are certainly call center companies available, but they have evidently not managed to obtain the same market share that we see elsewhere, especially in the Americas. One reason could be that Denmark has fairly strict closing laws. This means that ‘every’ B2B company is open from 8:00 a.m. to 4:00 p.m., and ‘every’ shop is open from 9:00 or 10:00 in the morning until 5:30 p.m.. Nobody expects businesses to be open at other times, so why have a call center for calls outside these hours? And for calls during open hours, traditional call centers are used inside the company. At any rate, call centers have not taken off like those in the global sample, although an excellent example of the use of call centers was the Lego Company, when they introduced the Lego World shop. At one point, this website and other Lego business created so much telephone traffic from abroad that the call center outsourced to IBM in Denmark, which had 20 staff primarily handling calls for Lego.

For the information infrastructure applications mentioned above, it is clear that these technologies are no longer strategic advantages. They are operational necessities. It is only a question of a few years before there is an almost 100% penetration. Denmark seems to be around 6 to 18 months further along the adoption/diffusion curve than the global sample or, indeed, the average OECD country. This conclusion is supported in the Australian/Danish comparative study of the use of the Internet for marketing, sales, and after-sales services in the B2C area (Elliott & Bjørn-Andersen, 2002).

Enterprise Integration Strategy

A key requirement for any Internet application to contribute to overall efficiency is the extent to which it is possible to integrate the web applications with the existing large-scale, transaction-oriented systems. This was measured in the GEC survey and shown in Table 7, illustrating the extent to which Internet applications are electronically integrated with internal databases and information systems on the one hand, and with those of the suppliers and business customers on the other hand.

For both of these measures, Danish companies have integrated more than the average of the global sample. Furthermore, a more specific comparison with German and French companies shows that 53% of Danish companies ‘to a great deal have integrated their Internet applications with internal databases and information systems,’ compared to 31.8% of the French and 27% of the German companies (See Appendix A, Table A-2). On the second dimension, ‘integration of Internet applications with those of suppliers and customers,’ the comparable figures (adding to ‘some extent’ and to ‘a great deal’) were 31.6% (Danish), 19.2% (French), and 27.8% (German).

TABLE 7. Enterprise Integration Strategy, 2002

Extent to which Internet applications are electronically integrated with ...	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Internal databases and information systems ^e							
% little to none	22.0	49.7	42.5	21.4	14.3	22.7	52.5
% some	24.2	27.3	24.3	29.0	19.6	24.3	23.6
% a great deal	53.8	23.0	33.2	49.6	66.1	53.0	23.9
Those of suppliers and business customers ^f							
% little to none	58.3	66.3	63.6	47.5	67.5	58.5	72.1
% some	27.0	18.3	17.2	27.4	30.7	26.8	18.3
% a great deal	14.7	15.3	19.1	25.1	1.7	14.8	9.6

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all," please rate the extent to which your Internet applications are electronically integrated with your internal database and information systems. Scores of 1 or 2 are categorized as "little to none," a score of 3 as "some," and scores of 4 or 5 as "a great deal."

^f Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all," please rate the extent to which your company's databases and information systems are electronically integrated with those of your suppliers and business customers. Scores of 1 or 2 are categorized as "little to none," a score of 3 as "some," and scores of 4 or 5 as "a great deal."

For manufacturing, this finding is reflected in the fact that the predominantly SME-size companies are functioning as subcontractors to larger, typically multinational companies. When that is the case, they need to integrate their own systems internally, and they particularly need to integrate with the systems of their customers in order to be flexible, agile, innovative, and competitive.

But it is interesting to note that finance enterprises have integrated much more internally, while the integration with suppliers and customers is spearheaded by distribution. The high level of standardization of products in finance (such as money) makes it necessary and advantageous to integrate internally, but the very high security requirements make it difficult to integrate externally with anyone not dedicated to the same high level of security.

The situation for distributors is almost the opposite. Products are standardized, but there are many thousands, and there are very strong incentives to modify and integrate systems across enterprises in order to enhance effectiveness and reduce the number of errors. On the other hand, the figures also show that this is an area where there is much room for improvement. Clearly, most enterprises have only just started to scratch the surface, and we should expect significant improvements in the development of inter-organizational systems.

Content/Services to Mobile Customers

When it comes to providing mobile content and services, this is a fairly new phenomenon. The typical 9.6 kbits telephone connection does not provide many opportunities, but the advancements towards 2.5 G, GPRS, and Wi-Fi are providing new possibilities for mobile communications. The Scandinavian countries, strongly spurred by Ericsson and to an even higher degree by Nokia, are latching on to these new possibilities.

Many companies tried developing applications using the WAP protocol in 2000. The initial launch of the WAP phone was successful, but most customers soon were disappointed with the lack of usability and the narrow bandwidth. However, in early 2003 several WAP applications were developed. For example, the Danish financial daily Børsen is providing tailor-made financial news for customers using the Nokia Communicator. Each of such applications has a small but rather dedicated number of users. The percentage of the companies in the GEC Survey providing or planning to provide mobile services is shown in Table 8.

TABLE 8. Content/Services to Mobile Customers, 2002

Percent providing or planning to provide mobile content or services ^e	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Already available	29.6	14.6	.2	20.4	52.2	29.2	13.7
Plan to add within the next year	12.1	15.9	21.6	13.2	6.5	12.2	18.2

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Today it is possible to access content or services from various mobile devices such as mobile phones and handhelds such as Palms or Pocket PC devices. Does your organization provide or plan to provide content or services that mobile customers can access?

The difference between the three sectors may at first glance be surprising. Finance is very high, but when considering a service like offering account balances, it becomes clear why most of the banks already are offering that to consumers. On the other hand, very few manufacturing companies are offering mobile services. Their customers are not moving around, and it is still more advantageous to use Internet applications over physical lines than wireless.

It is notable that twice as many enterprises in Denmark, compared to the global sample, are already providing mobile services. Also, it is interesting to note that the number of Danish enterprises planning to use mobile services is significantly smaller than in the global sample. This could be analyzed as the mobile market in Denmark has reached a saturation point. Yet, it could also be interpreted from the angle that the Danish companies have adopted the mobile services and now are exploiting the technology in communication with their customers, business partners, and their own employees.

Denmark seems well positioned to be on the leading edge in the development, application, and increase of such mobile services. In a survey published in September 2002, Denmark was ranked number two after Hong Kong in the 'Top Mobile/Internet Index rankings worldwide' (ITU, 2002). However, it should be noted that the differences in the index are very small, from Hong Kong (65.88), to number five United States (65.04).

Our analysis in this section shows that larger companies have a higher utilization of almost all of the different technologies, but the difference is surprisingly small. Between the different industry sectors, finance is clearly ahead in using Intranet and EFT, while the distribution sector is ahead in using EDI, especially over private networks. Compared with

the two largest developed countries in Europe, France and Germany, Danish companies are substantially ahead on almost all dimensions of IT investments

The level of IT investments in Denmark is higher than the average in the global sample. In general, the IT infrastructure is in place, and the most basic Internet services have been implemented almost universally. There is a large difference between the three sectors of our survey. The finance sector got off to an early start in the 1960s and has kept the lead. Distribution also got a significant boost in the early 1990s due to the EDI initiatives and the joint efforts to standardize and automate. Manufacturing got off to a later start, but is expected to catch up as the possibilities for inter-organizational systems are likely to bring substantial savings in logistics, inventory, and procurement, but also enhancements in R&D and all customer business processes from marketing to sales and after-sales service.

KEY BARRIERS AND INCENTIVES

General Conditions for Development of E-Commerce

Over and above the infrastructure and IT investment, there are other necessary conditions for the development of e-commerce. We have earlier grouped these into: 1) industry structure; 2) financial resources; 3) human resources; and 4) social/cultural factors (Andersen et al., 2002).

An industry structure dominated by SMEs in Denmark is often mentioned as a drawback, since the investment is relatively large for the SME. However, this is to a large extent mitigated by a strong tradition of collaboration, and there are more than one hundred associations and interest organizations competing to support enterprises with e-commerce. In particular, the partially government-funded 'technology support centers,' with several thousand employees, are playing a major role in updating and assisting enterprises in developing and transforming themselves to compete under the new conditions.

Financial resources have been in very short supply for new ventures or start-ups, but this has not been a problem for already established enterprises. There are exceptions, where the financial situation was limiting innovation, but the crucial factor is the cost-benefit of the business plan.

Human resources have been identified as a bottleneck, especially when it comes to very highly skilled specialists (Andersen et al., 2002). On the other hand, the world's highest penetration of PCs in schools (25% in 2002) (European Commission, 2002), the vocational training system, and the policies on furthering the acquisition of PCs in the home have paid off. Human resources are, in general, well equipped and well positioned for utilizing the new possibilities.

Social and cultural conditions could be a key to understanding a slower B2C diffusion than we have seen elsewhere. Danish consumers have not had great incentives to change to buying online. Easy access to off-line shopping, easy payment via debit cards, and the low risk of shopping in traditional stores, have reduced the incentives to shop online. These characteristics may also apply to countries like Japan, Singapore, and France.

Drivers for E-commerce

There are a number of drivers for e-commerce development in a particular sector or a particular country. The GEC survey has illustrated this as shown in Table 9 below, with the Danish data, and in Table 10, showing a comparison with two other countries in Europe.

TABLE 9. Drivers for Internet Use, Establishment Size. Denmark, Germany, & France, 2002

% indicating driver is a significant factor ... ^b	Denmark		Germany		France	
	SME ^a	Large	SME ^a	Large	SME ^a	Large
Customers demanded it	52.2	43.4	24.6	36.8	14.3	25.3
Major competitors were online	37.7	37.0	42.9	41.9	22.0	23.3
Suppliers required it	13.9	27.2	8.2	13.7	9.5	13.0
To reduce costs	56.9	40.7	20.4	17.6	18.2	22.3
To expand market for existing products or services	45.7	38.8	58.4	31.6	21.3	30.0
To enter new businesses or markets	37.2	27.4	45.9	39.1	20.2	21.9
To improve coordination with customers and suppliers	50.7	62.3	42.0	49.2	41.6	36.2
Required for government procurement	14.9	4.3	1.9	10.8	14.6	19.8
Government provided incentives	3.3	5.5	2.0	1.1	9.3	1.7

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees. Survey sample sizes are 100 establishments classified as SMEs and 100 as large.

^b Exact wording of question: Using a 5-point scale where 5 is "a very significant factor" and 1 is "not a factor at all," please rate how significant each of the following was to your organization's decision to begin using the Internet for business. A score of 4 or 5 was classified as "a significant factor."

TABLE 10. Drivers for Internet Use. Denmark, France, Germany, Global, 2002

Percent indicating driver is a significant factor ^c	Denmark ^a	France ^a	Germany ^a	Global ^b
Customers demanded it	52.0	14.6	24.8	36.9
Major competitors were online	37.7	22.0	42.9	31.3
Suppliers required it	14.3	9.6	8.3	22.3
To reduce costs	56.5	18.3	20.3	35.7
To expand market for existing products or services	45.5	21.5	57.9	47.9
To enter new businesses or markets	37.0	20.2	45.7	42.0
To improve coordination with customers and suppliers	51.0	41.4	42.1	43.7
Required for government procurement	14.6	14.8	2.1	15.2
Government provided incentives	3.3	9.1	2.0	8.3

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^c Exact wording of question: Using a 5-point scale where 5 is "a very significant factor" and 1 is "not a factor at all," please rate how significant each of the following was to your organization's decision to begin using the Internet for business. A score of 4 or 5 was classified as "a significant factor."

TABLE 11. Drivers for Internet Distributed by Sector.^a Denmark, Germany, & France, 2002

% indicating driver is a significant factor ^b	Denmark			Germany			France		
	<i>Mfg.</i>	<i>Distrib.</i>	<i>Fin.</i>	<i>Mfg.</i>	<i>Distrib.</i>	<i>Fin.</i>	<i>Mfg.</i>	<i>Distrib.</i>	<i>Fin.</i>
Customers demanded it	59.1	52.3	48.2	32.6	22.3	27.7	15.1	14.5	13.8
Major competitors were online	36.0	26.8	50.0	29.8	45.5	53.7	23.9	19.9	31.8
Suppliers required it	17.8	18.9	7.1	32.3	2.3	.1	5.4	10.9	10.0
To reduce costs	57.7	59.8	53.0	32.5	16.3	24.8	16.0	18.7	21.1
To expand market for existing products/services	42.8	45.5	46.8	51.0	61.3	45.1	23.5	18.9	34.3
To enter new businesses or markets	36.6	33.0	41.1	39.3	49.6	27.6	21.6	19.3	23.2
To improve coordination with customers and suppliers	52.9	58.6	42.5	58.9	38.0	35.2	37.2	44.0	33.0
Required for government procurement	21.4	19.6	6.0	7.6	0.1	5.8	10.2	14.6	26.8
Government provided incentives	3.9	0.6	5.7	8.6	0.0	2.3	1.7	11.7	7.2

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65). Survey sample sizes for Denmark by sector are 69 establishments in manufacturing, 67 in wholesale and retail distribution, and 64 in banking and insurance.

^b Exact wording of question: Using a 5-point scale where 5 is "a very significant factor" and 1 is "not a factor at all," please rate how significant each of the following was to your organization's decision to begin using the Internet for business. A score of 4 or 5 was classified as "a significant factor."

In a small, open, competitive, internationally-oriented, and high cost economy like Denmark, it is not surprising that the three most important drivers are cost reductions (56.7%), customer demand (52.0%), and improved coordination with customers and suppliers (51.0%). Not only are these three identified as the most significant drivers, they are also the ones where the Danish sample is significantly higher than the global sample, as well as the two other most developed countries in Europe (Table 10). We believe that this is an indication of a high level of preparedness in the Danish society.

This is also consistent with the PLS Rambøll 2002 report about Internet use in Denmark, which concluded that the key efficiency drivers for 2003 will be:

- Integrating the Internet with administrative and accounting systems, and
- Improving the logistics and efficiency in the flow of goods

If we look at the three sectors, there are fairly small differences except for three factors that we discuss here. First of all, it is important to note that no less than 59.1% of manufacturing organizations claim that 'customers demand' their use of the Internet. This is consistent with the idea that Danish manufacturers live and die by their ability to integrate with their often-large B2B customers.

Secondly, it is worth noting 'that major competitors were online' was perceived to be a strong driver in the financial sector (50.0%). This is easily explained by the very advanced IT-applications of the largest players, and a very real threat that unless a bank could offer Internet-banking, it would definitely appear dated.

The third driving factor, which is not equally relevant for the three sectors, is 'required for government procurement.' This is, for obvious reasons, not as relevant for the finance sector - only 6% of finance companies cite this driver, as opposed to 19.6% and 21.4% for the

distribution and manufacturing sectors. At first glance, it might seem surprising that this factor is only mentioned by one in five companies, given the huge effort by government to force the public sector to procure online. The government issued a circular requesting all Danish governmental institutions to procure online, and it also commissioned the first European Governmental procurement portal, DOIP, in mid-2002. However, DOIP has gotten off to a slow start, and many organizations do not sell to governmental institutions, even though it makes up more than 50% of the GDP.

Barriers to E-Commerce

The perceived barriers to e-commerce adoption and diffusion are shown in Tables 12–16, providing the figures for the three sectors as well as the comparative figures with the global sample.

Only one factor stands out as being of substantial significance, which is that of having a ‘need for face-to-face customer interaction.’ A more careful look at the importance of firm size reveals the surprising fact that larger companies find face-to-face interaction more important than SMEs. A possible explanation is that smaller companies are likely to be more specialized and have fewer customers, enabling them to get to know their customers better and thereby reducing the necessity for face-to-face contact.

Also, the data shows that the need for face-to-face contact is especially high in the financial sector, where there are many customers occasionally needing face-to-face contact at important personal crossroads (new house, new family member, investment decisions). At such crossroads, customers need somebody to talk to, for example, about different insurance needs. Other contacts may have an element of persuasion or negotiation. These interactions are not easily carried out using the Internet, where there is an obvious lack of many context cues, and where it is difficult or impossible to determine intonations, irony, and feelings.

TABLE 12. Barriers/Difficulties for E-Commerce. Denmark, France, Germany, Global. 2002

Percent indicating statement is a significant obstacle ... ^c	Denmark ^a	France ^a	Germany ^a	Global ^b
Need for face-to-face customer interaction	33.6	46.5	11.9	33.8
Concern about privacy of data or security issues	22.7	20.0	24.9	44.2
Customers do not use the technology	26.8	30.5	24.2	31.4
Finding staff with e-commerce expertise	14.6	20.3	41.2	26.5
Prevalence of credit card use in the country	4.7	13.6	21.6	20.3
Costs of implementing an e-commerce site	12.8	21.8	32.3	33.6
Making needed organizational changes	14.4	22.2	30.8	23.9
Level of ability to use the Internet as part of business strategy	19.1	16.2	14.3	24.8
Cost of Internet access	5.8	5.7	1.6	15.1
Business laws do not support e-commerce	15.1	24.1	5.1	24.2
Taxation of Internet sales	8.7	19.9	1.5	16.5
Inadequate legal protection for Internet purchases	11.8	38.7	20.8	34.1

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. “Global” sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^c Exact wording of question: Using a 5-point scale where 5 is “a very significant obstacle” and 1 is “not an obstacle,” please rate how significant the following obstacles are to your establishment’s ability to do business online. A score of 4 or 5 was classified as “a significant obstacle.”

TABLE 13. Barriers/Difficulties for E-Commerce among SMEs and LEs. Denmark, 2002

Percent indicating statement is a significant obstacle ...	Establishment Size ^a	
	SME	Large
Need for face-to-face customer interaction	33.2	48.2
Concern about privacy of data or security issues	22.5	30.8
Customers do not use the technology	27.1	15.0
Finding staff with e-commerce expertise	15.0	0.7
Prevalence of credit card use in the country	4.8	2.7
Costs of implementing an e-commerce site	12.3	34.0
Making needed organizational changes	14.2	24.6
Level of ability to use the Internet as part of business strategy	19.1	17.5
Cost of Internet access	5.7	8.1
Business laws do not support e-commerce	15.3	7.0
Taxation of Internet sales	8.9	.8
Inadequate legal protection for Internet purchases	11.7	16.8

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Using a 5-point scale where 5 is "a very significant obstacle" and 1 is "not an obstacle," please rate how significant the following obstacles are to your establishment's ability to do business online. A score of 4 or 5 was classified as "a significant obstacle."

TABLE 14. Barriers/Difficulties, Manufacturing Sector: Denmark, Germany, France, Global, 2002

% indicating statement is a significant obstacle ^e	Denmark	Germany	France	Global
Need for face-to-face customer interaction	33.1	23	36.1	31.5
Concern about privacy of data or security issues	18.8	20.9	23.5	47.1
Customers do not use the technology	22.4	26.4	27.2	30.3
Finding staff with e-commerce expertise	8.1	28.2	5.5	23.8
Prevalence of credit card use in the country	0.3	17.3	19.2	22.4
Costs of implementing an e-commerce site	20.4	22.5	20.1	32.6
Making needed organizational changes	13.1	26.9	19.3	23.8
Level of ability to use the Internet as part of business strategy	17.2	14.6	18.1	28.0
Cost of Internet access	4.4	4.6	11.1	13.5
Business laws do not support e-commerce	12.8	17.0	20.5	27.6
Taxation of Internet sales	6.1	7	13.0	14.0
Inadequate legal protection for Internet purchases	19.0	13.3	15.9	37.3

Source: CRITO Global E-Commerce Survey, 2002

TABLE 15. Barriers/Difficulties, Wholesale/ Retail Distribution: Denmark, Germany, France, Global, 2002

% indicating statement is a significant obstacle ^e	Denmark	Germany	France	Global
Need for face-to-face customer interaction	27.5	8.8	51.1	34.2
Concern about privacy of data or security issues	12.7	21.5	15.2	40.4
Customers do not use the technology	31.9	24.3	33.7	33.1
Finding staff with e-commerce expertise	13.9	47.7	23.9	28.8
Prevalence of credit card use in the country	0.0	23.0	11.8	19.9
Costs of implementing an e-commerce site	8.0	37.2	23.6	34.9
Making needed organizational changes	12.5	34.2	23.6	24.8
Level of ability to use the Internet as part of business strategy	14.7	14.1	16.2	23.7
Cost of Internet access	6.3	0	3.8	16.3
Business laws do not support e-commerce	10.8	0	23.6	22.6
Taxation of Internet sales	13.4	0	23.5	18.8
Inadequate legal protection for Internet purchases	12.5	2.2	47.1	33.6

Source: CRITO Global E-Commerce Survey, 2002

TABLE 16. Barriers/Difficulties, Financial Sector: Denmark, Germany, France, Global. 2002

% indicating statement is a significant obstacle ^e	Denmark	Germany	France	Global
Need for face-to-face customer interaction	39.8	11.6	37.5	40.1
Concern about privacy of data or security issues	34.7	65.1	45.2	62.0
Customers do not use the technology	23.9	18	16.6	23.2
Finding staff with e-commerce expertise	18.7	13.5	26.7	19.9
Prevalence of credit card use in the country	11.4	19.7	14.1	15.4
Costs of implementing an e-commerce site	13.8	14	11.9	27.6
Making needed organizational changes	17.0	9.3	19.1	17.5
Level of ability to use the Internet as part of business strategy	24.4	14.7	11.2	20.8
Cost of Internet access	6.0	8.8	6.4	12.7
Business laws do not support e-commerce	19.9	21.6	35.0	23.3
Taxation of Internet sales	5.5	1.2	15.5	8.2
Inadequate legal protection for Internet purchases	7.2	26.2	35.1	26.0

Source: CRITO Global E-Commerce Survey, 2002

For all the other barriers to e-commerce, it is characteristic of the Danish respondents to express a uniformly lower level of barriers/difficulties than in the global sample. On most of the dimensions, fewer than half the respondents identify the individual factors as significant. We suggest three possible explanations.

First, we believe that objectively it is probably correct that there are fewer barriers or difficulties for enterprises transforming themselves to Internet-based applications in Denmark. The different environmental factors are rather positive, and any significant barriers have been addressed, but of course not eliminated, by government, industrial associations, and/or general service institutions.

Second, a reason for the rather low perceived barriers could be that Danish enterprises by and large are further ahead than the average enterprises in the global sample. We have argued before that this is the case, and it is quite conceivable that once an enterprise has ‘gotten its feet wet,’ and started implementing different types of Internet-based applications, ‘übung macht den meister’ (German: the more you try, the easier it becomes). The fact that the second most mentioned barrier/difficulty is that ‘customers do not use the new technology’ supports this view. This barrier has also been mentioned quite frequently by Danish Internet-

frontrunners like Danisco and Novozymes, both producing goods to be used by large brand manufacturers, who find that the mega-companies (Nestlé, Unilever, Procter & Gamble, etc) of this world are not yet prepared to procure electronically, and that this is holding them back (Interviews with Jan Sindesen, Danisco and Mette Vestergaard, Novozymes, 2002).

In general, we conclude that there are many positive e-commerce drivers in Danish society, and the barriers seem to be less severe than in most other countries.

DIFFUSION OF E-COMMERCE

Diffusion of E-Commerce Use at Country and Industry Level

Extent and Rate of Diffusion Over Time

E-commerce has traditionally been associated with B2C sales, and the U.S. Christmas sales in 1998 are seen as the first major step forward. The year 1999 showed a doubling of sales in most countries and for most products. Accordingly, most forecasters, such as the Boston Consulting Group, predicted triumphantly (and naively) in 1999 and 2000 that online retail sales would double every year (Boston Consulting Group 2000). They were not the only ones. Gartner Group, Forrester, AMR, and many others were competing to predict the highest forecasts for future online sales. Today, we all know the story of the dot.com bubble burst.

Unfortunately, the Christmas of 1998 was also the peak of class action lawsuits, as so many families had their Christmas holiday ruined because the goods bought online did not appear until after Christmas. This fact bears evidence to one of the key reasons why so many dot.coms did not survive. They did not have proper fulfillment systems. Actually, as it turned out, most of them did not have proven, efficient business processes in any area, except perhaps marketing.

However, the dot.com hype had a significant impact on traditional industries. It absolutely 'scared the hell out of them.' A good example was 'Industry Day' in September of 2001. This is the most important day for Danish industries, when CEO's of the 600 largest companies and top-level representatives from government meet to discuss key issues. On that particular occasion, there was just one issue: How to cope with the digital economy and the Internet. An interesting event this day was a carefully choreographed dialog/play between a father who had a 300-person company and his son, who had started a successful dot.com company. Hardly anyone left the room without feeling that this was a challenge to address. When the dot.coms had peaked and were facing severe difficulties, traditional industries woke up to the challenge and took significant steps to embrace the Internet.

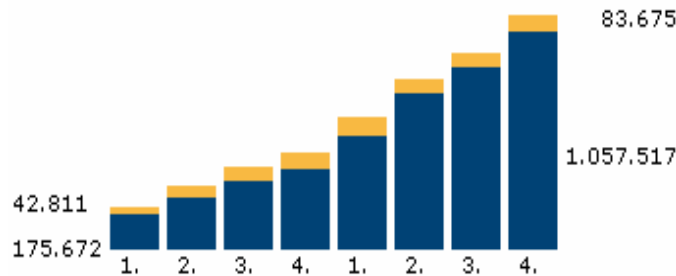
Accordingly, from 1999 to 2001, nearly all Danish companies with more than 25 employees started taking the Internet seriously by establishing websites for marketing, and most of them embarked upon the development of Internet-based applications for different types of business processes.

Current E-commerce Revenues

A very reliable, but not necessarily valid estimate of e-commerce revenue is found on the website of PBS, the central clearing house for payment transactions owned by all the banks. Looking at their figures, we see that the total number has gone up from 218,483 in Q1 of 2001 to 1,141,192 in Q4 of 2002. In fact, there has been more than a doubling in one year

from 487,354 in Q4 of 2001 to 1,141,192 in Q4 of 2002. However, a significant part of this increase is the downloading of ring-tones for mobile phones, which is hardly a good predictor of typical Internet behavior.

FIGURE 1. Number of Internet Transactions per Quarter Using Credit/Debitcards



Source: PBS (2002).

Legend: The figure shows the four quarters of 2001 and 2002. Dark column is Dankort (debitcard)/VisaDankort, Grey is international credit cards.

Results from the PLS Rambøll 2002 survey summarizes the current status of e-business in Denmark:

- Internet-related sales (B2B and B2C) grew from 81 billion DKK (\$11.6 billion) in 1999, 91 billion DKK (\$13.0 billion) in 2000, 123 billion DKK (\$17.6 billion) in 2001, and are expected to grow to 162 billion DKK (\$23 billion) in 2002 and to 226 billion DKK (\$32.3 billion) in 2003.
- The ratio between B2B and B2C sales is roughly 80 to 20.
- The growth pattern is roughly similar for B2B and B2C. Both are expected to grow 30-40% a year.

Nature of Use of the Internet

An overview of the extent to which the Internet is used in key business processes is shown in Table 17 on the next page.

The data clearly shows that by far the most popular business process supported is advertising and marketing, which, of course, is the business process most easily supported. The figure for Danish companies of 88.8% is also higher than any of the other countries in the global sample, including France (26.4%), Germany (77.7%) and the U.S. (64.3%).

The second most popular Internet-supported business process is purchasing, where again the figure for Danish companies (67.5%) is much higher than the global sample (46.8%). Here, the comparable figures for France, Germany, and the U.S. are 24.1%, 60.8% and 73.2%, respectively.

Nearly three-quarters of all companies in the developed world have started procuring online. However, our figures do not provide any information about the proportion of goods or services procured online. It could be fairly ordinary buying of software, books, and plane tickets; booking of hotel rooms; maintenance, repair, and operation (MRO) targeted products

and services; or direct products utilized in production. Actually, it is surprising that about a quarter of all enterprises in the developed countries do not use the Internet for procuring indirect goods and services. In other words, it is a clear confirmation that not all enterprises have embarked upon the ‘risky business’ of buying supported by the Internet; but it is also a clear indication that online purchasing is an area where there is great potential.

TABLE 17. Uses of the Internet, 2002

Percent using the Internet for ... ^e	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Advertising and marketing purposes	89.0	79.9	69.2	98.9	88.3	88.8	57.6
Making sales online	47.5	32.0	28.0	40.4	63.3	47.2	29.9
After-sales customer service and support	57.0	52.1	47.6	59.1	59.2	56.9	43.7
Making purchases online	67.3	78.0	71.5	67.1	66.0	67.5	46.8
Exchanging operational data with suppliers	56.1	43.4	60.6	45.6	63.6	55.8	48.1
Exchanging operational data with business customers	40.5	41.3	54.1	32.8	41.6	40.5	50.7
Formally integrating the same business processes with suppliers or other business partners	44.5	41.6	29.7	52.5	43.3	44.4	33.9

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. “Global” sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Does your establishment use the Internet for ...

On the two other business processes, ‘making sales online,’ and ‘after-sales customer service and support,’ we also find that a higher percentage of Danish companies have used the Internet to support these than in any other country (except in the U.S., where the percentage is slightly higher). Clearly, Danish companies are homogenously behind those initiatives that do not require a lot of collaboration from business partners.

However, if we look at the last three business processes in Table 17, we find a rather different picture, as shown in Table 18, where we focused particularly on a comparison with the other European countries, the U.S., and the global sample.

For these three business processes it is clear that we see a penetration in roughly half of the Danish companies, but this does not constitute a global lead. Although Danish companies are further on the uptake curve for all three business processes than French companies, a higher percentage of German companies have established these electronic links with suppliers and customers. We believe that to a large extent the explanation can be found in the small size of Danish companies compared to their (mostly much larger) business partners. It is the larger business partner that calls the shots. It is not often that the tail is allowed to wag the dog.

TABLE 18. Use of the Internet for Collaboration Business in Denmark, France, Germany, U.S., and Global, 2002

Percent using the Internet for ... ^a	Denmark ^b	France ^b	Germany ^b	U.S. ^b	Global ^c
Exchanging operational data with suppliers	55.8	35.7	59.7	42.8	48.1
Exchanging operational data with business customers	40.5	39.7	51.9	53.8	50.7
Formally integrating the same business processes with suppliers and other business partners	44.4	24.0	47.6	35.5	33.9

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a Exact wording of question: Does your establishment use the Internet for ...

^b Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^c Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

When it comes to company size, it is a common belief that SMEs are behind large enterprises when it comes to utilizing the Internet. Yet only in purchasing do we see a higher percentage of the large enterprises using the Internet. For all the other business processes, a higher percentage of the SMEs are using the Internet for making their business processes more efficient and effective.

In comparing the three sectors, manufacturing has the largest penetration in 'making purchases online' (presumably direct goods), and in exchanging operational data with business customers. A good example is the Bang & Olufsen HiFi manufacturer, which has total integration: forward into the distribution companies and all the way to the retail shops on the sales side, and backward to the suppliers of components on the procurement side. All sales and procurement are Internet-supported.

In the distribution sector, it is impressive that no less than 98.9% of companies are using the Internet for advertising. It is also worth pointing out that more than half (52.5%) are integrating the same business processes with those of their business partners. This confirms a picture of a sector where the margins are low, and where the advantages of the Internet for reducing costs have been utilized to a very large extent.

In the third sector (finance), the most common applications of the Internet for improving business processes are online advertising and marketing. But it is also notable that finance in general has reached rather far in the direction of selling online, providing services (typically self-service) online, and even exchanging operational data with suppliers.

In summary, when it comes to utilizing the Internet for business processes, which can be carried out almost unilaterally (e.g., marketing, sales, and after-sales service), a larger percentage of Danish companies have implemented different Internet solutions than the other nine countries in the sample (see Appendix A, Table A-6). However, when it comes to integration of business processes through collaborative schemes, Danish companies are not on par with the leaders (developed economies like Germany and the U.S., but also developing countries like Mexico and Brazil).

Use of Marketplaces

One of the most exciting features of the New Economy was expected to be the advent of e-marketplaces, e-hubs, and e-exchanges. The excitement is captured in this quote from IBM's Louis Gerstner, in 2000:

'The next chapter in the e-business revolution involves the transformation of entire markets and the redefinition of industries. We will see the rise of a new class of entities: e-marketplaces, that will help online buyers and sellers find each other, attack the inefficiencies of traditional markets, and carve out for themselves important roles in the e-business economy.'

TABLE 19. Participation in an Internet-Based Trading Community, 2002

	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Percent who have heard of the concept of an Internet marketplace ^e	95.5	92.9	91.8	92.6	99.9	95.4	80.0
Percent participating as a buyer only ^f	2.7	7.2	0.4	6.8	0.2	2.8	6.7
Percent participating as a seller only ^f	7.9	7.6	11.9	8.0	6.0	7.9	12.2
Percent participating as both a buyer and a seller ^f	5.4	12.2	12.9	6.8	1.0	5.6	16.9

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Have you ever heard of the concept of an Internet marketplace, exchange or trading community, through which multiple businesses buy and sell goods and services?

^f Percents based only on those establishments that have heard of the concept of an Internet marketplace.

The predictions for e-marketplaces were as ambitious as the predictions for Internet vendors. Gartner Group predicted that they would capture 35% or \$2.7 trillion of worldwide B2B sales. But the e-marketplace bubble burst like the dot.com bubble. The results of our survey regarding e-marketplace participation are shown in Table 19.

In spite of the fact that almost all Danish enterprises have heard of the phenomenon of e-marketplaces (95.4%), and that this figure is substantially higher than the average of 80.0% for the global sample, a significantly smaller percentage of Danish enterprises seem to be participating as buyers, vendors, or both.

One explanation could be the early adoption of EDI with their main trading partners and a subsequent reluctance to change to e-marketplaces. However, we do not believe that this could be the full explanation. The data on e-marketplaces shows a similar trend with the figures on 'exchanging operational data with business customers' in Table 17, where Danish companies are also lower than the global sample. This suggests that Danish companies might

have been very early in getting their feet wet (establishing websites especially for marketing and advertising), but they seem reluctant to jump in, and seriously modify their business processes through integration with business partners. This hypothesis is confirmed in a survey of procurement behavior of the 23 largest and most innovative Danish companies, shown in Table 20.

TABLE 20. Procurement Behavior on E-Marketplaces for Leading Danish Companies^a

		2001 ^b	2003 ^c
		Actual	Forecast
		number of	number of
		enterprises	enterprises
Transaction	Identify potential suppliers	32 %	68 %
	Investigate or determine prices	27 %	77 %
	Buy online	23 %	77 %
Collaboration	Give wishes for future deliveries	9 %	59 %
	Improve production plans with supplier	5 %	36 %
	Inform suppliers about future production needs	9 %	55 %
	Inform suppliers about future engineering needs	5 %	55 %

Source: Heiberg, 2001

Notes: ^a Sample of the 23 largest and most innovative Danish companies expected to set the pace.

^b Question: Does your company use e-marketplaces for any of the following transactions or collaboration activities?

^c Question: Do you expect your company to be using e-marketplaces for any of the following transactions or collaboration activities in 2003?

The survey results in Table 20 show a clear distinction between the number of enterprises doing (simple) transactions with their suppliers, and the ones who have entered into a more collaborative mode, focusing on improvement of the inter-organizational systems. Almost none of them were doing collaboration in 2001, but two thirds expect to do so in 2003. Indeed, we seem to be in the middle of a 'ketchup-bottle effect.'

If we look at the three sectors, it is clear that knowledge about e-marketplaces is uniformly high, between 90% and 100%. But when it comes to actually participating in e-marketplaces, the highest participation is found in manufacturing. This confirms the scenario we have seen several times -- that (relatively small) Danish manufacturing companies have to enter into electronic collaboration in order to integrate as seamlessly as possible with the large customers in the B2B markets.

For distribution companies, the pattern is that relatively few organizations use e-marketplaces for buying, selling, or both. In both cases the figure is 6 to 8 %. Given the fact that very large e-marketplaces are developing both from the brand vendors and from the large buyers (supermarket chains), there seems to be a large risk associated with not trading on the marketplaces.

For finance, all of the companies knew about e-marketplaces, but they were only used to support sales activities. We suspect that most of them had been thinking about their own marketplaces. The two largest Danish banks, Danske Bank and Nordea, have a large marketplace of their own, offering electronic retail outlets for their business customers to sell to their private customers. This is a big success, especially for the banks, if both seller and buyer are customers. In this case, all transactions become internal to the bank with a dramatic reduction in costs, due to the absence of any trust problems.

All in all, e-marketplaces are used surprisingly little by Danish companies. For the countries in the global sample, the percentage of companies using e-marketplaces is much larger, except for France and Japan, which are on the same level as Denmark. But it is worth noting that Danish companies are far behind companies even in developing countries like Mexico, Brazil, China, and Taiwan (See Appendix 7).

Channel Conflict

The e-business literature has many discussions of potential channel conflict, especially when it comes to dis-intermediating the distributor or other intermediaries. The extent to which companies are facing channel conflicts is shown in Table 21, which shows how establishments are using the Internet to sell products and services.

TABLE 21. How Establishments Use The Internet To Sell Products and Services, 2002

Percent indicating Internet used to ... ^c	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Address new markets only	3.5	9.0	16.7	0.1	0.0	3.7	15.3
Address traditional distribution channels only	57.8	21.0	44.2	77.6	48.7	57.1	44.1
Compete directly with traditional distribution channels	35.3	55.0	30.7	18.8	50.0	35.7	27.4
Replace traditional distribution channels	3.3	15.0	8.4	3.5	1.3	3.5	13.2

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Which of the following statements best characterizes how you are using the Internet to sell products and services.

In interpreting the data in Table 21, it is important to note that respondents were given only one choice and had to select which of the four was the best match. By far the most dominant use was to address only the traditional distribution channels. This is a strategy chosen by several of the PC vendors in Denmark that sell through distributors (Fujitsu/Siemens, IBM, HP), while Dell sells directly and bypasses the distributors. The Internet strategy for the traditional PC vendors has been to strengthen and further empower the distributors to compete in the market through better access to knowledge and provision of sales/configuration tools.

Compared to the global sample, very few Danish companies are using the Internet to replace traditional distribution channels, at least in the short run. This might be a very risky strategy, when sales through the online channel still contribute only a marginal proportion of total sales (4.8 %).

Online Sales

The data in Table 22 shows that online B2C sales by Danish enterprises are about twice as large as in the global sample (7.6% for Denmark and 3.8% for the global sample). It is also especially worth noting that it is almost exclusively the SMEs that have been successful in adopting this new sales channel. Only 0.5% of total consumer sales are made by the large enterprises using the Internet. Compared to France, Denmark is leading, but is behind Germany in wholesale and retail distribution. Denmark is ahead of Germany in manufacturing and finance.

TABLE 22. Online Sales, 2002

	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Type of Online Sales ^e							
% B2B only	15.3	25.6	23.7	20.5	6.6	15.5	12.9
% B2C only	15.2	4.6	3.7	6.8	28.5	15.0	7.1
% both B2B and B2C	22.9	8.5	17.1	13.1	34.6	22.6	15.0
Mean percent of total consumer sales conducted online (all establishments) ^f	7.8	0.5	3.4	4.0	14.1	7.6	3.8
Mean percent of total business sales conducted online (all establishments) ^g	4.9	3.1	5.9	0.6	8.7	4.8	4.0
Mean percent of total consumer sales conducted online (only those doing B2C sales online) ^f	22.6	6.6	16.4	20.6	24.4	22.5	18.6
Mean percent of total business sales conducted online (only those doing B2B sales online) ^g	15.0	10.5	15.6	2.2	26.0	14.9	15.1
Percent of websites that support online payment (only those doing online sales)	49.2	8.2	23.6	37.2	69.1	48.3	33.6

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Percentages are based on the full sample (all establishments). Exact wording of question: Are these online sales to other businesses or to consumers or to both?

^f Exact wording of question: What percent of your establishment's total consumer sales are conducted online?

^g Exact wording of question: What percent of your establishment's total business to business sales are conducted online?

In B2B sales, Danish enterprises are ahead of the global sample. Germany is leading within the manufacturing and wholesale and retail distribution sectors. Only in finance is Denmark ahead of Germany; 3.1% of large enterprises state that they are 'conducting sales online,' whereas 4.0% in the global sample are conducting online sale.

Thus, the data suggests that e-commerce has diffused along the SMEs and the financial sector primarily within the B2C segment. Wholesale and retail distribution is, particularly in the B2B segment, clearly behind in online sales.

There is an almost equal three-way split between whether the enterprise sells to businesses (15.5%), consumers (15.0%), or both (22.0%). As suspected, enterprises within the manufacturing and distribution sectors rely more strongly on B2B, while enterprises in the finance sector cater to both types of customers.

The actual amounts traded show that Denmark is still in the lower part of the diffusion/adoption 'S-curve.' Danish enterprises report that only 7.6% of their total B2C turnover comes from online sales, while 4.8% of B2B sales are conducted online.

The final question in Table 22 shows the percentage of websites that support online payment. The finance sector shows the highest penetration as suspected. Online payment is much easier in this sector, and one would expect an almost 100% penetration within a rather short time period. Again, it is worth noting that the SMEs are the ones spearheading this innovation, with 49.2%, compared to the larger establishments that only reach a level of 8.2%.

Online Services

A more in-depth investigation of the kind of services offered online is shown in Table 23 on the next page. The most general issues concern the mean percentage of total consumer/business services conducted online. In general, the percent of services conducted online for Danish companies is substantially higher than the global sample, roughly twice as high for B2C, and three times as high for B2B. However, there are some important shortcomings.

First, it is surprising that large companies are only conducting 3.4% of their total consumer services online as compared to 16.2% of the SMEs. We believe this is a structural phenomenon in the way that most large Danish companies are only reaching consumers indirectly through distributors.

Second, it is noteworthy that the distribution sector including retail is only conducting 0.4% of its consumer services online. Clearly, this is not a coincidence. The established retailers, especially the largest supermarket chains and department stores, are reluctantly utilizing the Internet. As one supermarket CEO stated: 'We have the best locations in the physical world, and we have more than 100 years experience in optimizing the business processes in that world.' We have very little incentive to go through the effort of teaching the consumers to rely more on shopping in the virtual world' (Interview with CEO of Dansk Supermarket, 2000). The figures document that this is the strategy used. But this strategy is also opening up opportunities for dot.com retailers and global players like Amazon, as well as very small, agile, cost-conscious, primarily Danish e-tailers, who are carving out a niche for themselves which is likely to take a substantial chunk out of the total traditional retail sector.

Third, it is worth noting the large differences between the three sectors in supporting the different, more detailed business processes. With online services, wholesale/retail distribution and financial services are above the global sample, whereas manufacturing is clearly behind. Danish manufacturing companies support product configuration and order tracking to a very small extent, almost to the lowest degree in the total sample. The low score on product configuration could be due to the nature of the products. Order tracking is only done by 8.8% of the manufacturing companies (the same level as Brazil and Mexico), while typically 40 to 70% of companies in the developed countries are offering this service to their customers. The only areas where manufacturing is higher than the global sample are in service and technical support, and account information.

TABLE 23. Online Services, 2002

	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Type of Online Service ^e							
B2B only	22.8	43.9	42.1	32.0	7.4	23.3	23.1
B2C only	19.1	12.7	9.3	8.6	33.0	19.0	12.9
Both B2B and B2C	53.5	41.2	39.8	52.1	59.5	53.2	33.3
Mean percent of total consumer services conducted online ^f	16.2	3.4	18.8	0.4	22.4	15.9	7.6
Mean percent of total business services conducted online ^g	32.7	17.5	28.2	12.2	35.6	32.2	11.0
% of manufacturing websites which support ... ^h							
Product configuration	9.8	29.3	10.9			10.9	54.7
Order tracking	8.7	9.8	8.8			8.8	21.5
Service and technical support	61.8	90.2	63.2			63.2	54.4
Product specification	62.7	100.0	64.6			64.6	79.9
Account information	31.3	19.5	30.7			30.7	17.0
% of wholesale/retail distribution websites which support ... ^h							
Gift certificates and/or registry	0.2	58.3		0.6		0.6	20.6
Product catalogues	79.7	69.2		79.6		79.6	69.8
Product reviews	50.0	53.8		50.0		50.0	48.6
Ind. customization	59.3	53.8		59.2		59.2	21.3
Account information	40.8	46.2		40.8		40.8	21.7
% of banking and insurance websites supporting ... ^h							
Online services such as filing applications, filing claims, paying bills, transferring funds	55.9	50.0			55.7	55.7	53.9
Access to account information	58.2	47.4			57.9	57.9	57.3
Online tools such as research tools, planning tools, etc.	43.3	60.5			43.6	43.6	52.0

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Percents are based on the full sample (all establishments). Exact wording of question: Are these online services to other businesses or to consumers or to both?

^f Percents are based on the full sample (all establishments). Exact wording of question: What percent of your establishment's total services to consumers are conducted online?

^g Percents are based on the full sample (all establishments). Exact wording of question: What percent of your establishment's total services to businesses are conducted online?

^h Percents are based only on those establishments that have a website and conduct business within the specified sector.

The distribution sector shows a much more advanced but also different level on the five detailed services. Compared to Germany and France, gift certificates and product catalogues are rarely used by Danish distribution companies, while 'individual customization' and 'account information' are more widespread than in those two countries.

In the finance sector, Danish companies are roughly on par with France, Germany, and the average in the global sample, but Danish companies are clearly not as advanced in this field

as companies in China, Taiwan, and the U.S., where a substantially larger proportion of businesses have online services (Appendix A, Table A-10).

All in all, the figures for the three sectors illustrate that Danish companies are far from world class in providing online services via the Internet.

Online Procurement

No less than 67.5% of all Danish companies are purchasing online, as shown in Table 24, a figure which is on the same level as other developed countries like Germany and the U.S., as well as developing countries like Brazil and Mexico, but way ahead of companies in France and Japan (see Appendix A, Table A-11). For Denmark, 16.7% of the value of direct goods is procured online (the highest figure in the global sample except for Japan); 14.4% of all goods ordered for resale are ordered online (the highest figure in the global sample except for Mexico); and 13.1% of the value of all supplies and equipment (MRO products) is ordered online (the highest figure in the global sample except for the U.S.). In general, the figures for Danish companies are about twice that of those in the global sample. (Table A-11).

There is no doubt that a significant part of this purchasing is done merely by using the website of the vendor (e.g., Dell to buy lap-tops), but in comparing the figures for ‘integration of systems with those of suppliers and business customers’ (a great deal, 14.8%; some, 26.8%; and little to none, 58.5%) in Table 24, it is clear that some modification and integration of the procurement process has taken place.

TABLE 24. Online Procurement, 2002

	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Percent of establishments doing online purchasing	67.3	78.0	71.5	67.1	66.0	67.5	50.8
Mean percent of money spent for direct goods for production is ordered online (all establishments) ^e	17.0	12.3	16.7			16.7	8.3
Mean percent of money spent on goods for resale is ordered online (all establishments) ^f	14.4	19.3		14.4		14.4	6.8
Mean percent of money spent on supplies and equipment for doing business is ordered online (all establishments) ^g	13.2	12.0	15.9	13.6	11.3	13.1	8.3

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. “Global” sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Question asked only to those in the manufacturing sector; percent based on all manufacturing establishments. Exact wording of question: What percent of the money your establishment spends on direct goods for production, such as parts and components, is ordered online?

^f Question asked only to those in the wholesale/retail distribution sector; percent based on all wholesale/retail establishments. Exact wording of question: What percent of the money your establishment spends on goods for resale is ordered online?

^g Percent based on all establishments. Exact wording of question: What percent of the money your establishment spends on supplies and equipment for doing business is ordered online?

The government is also strongly encouraging the use of online procurement, especially through the DOIP as discussed in the section on marketplaces. Technically, DOIP was operational in the summer of 2002, but less than 1% of all companies used this portal that year. But some forecasters believe that it will rise to 48% by the end of 2004 (PLS Rambøll, 2002, p 40). Helge Sander, Minister of Science, Technology and Development, announced early in 2003 that it was the policy of the government that 50% of all Danish public sector procurement should be online by end of 2005 (speech given at Teknofo, Copenhagen, February 13, 2003).

In our opinion, however, it will take substantially longer. The main reason is that each public institution is free to use its budget and buy where it wants. In general, this is seen as the most effective way of managing, since the management of an institution is expected to choose rationally based on the total costs of procurement, where the price may not be the most important factor. However, large institutions like Copenhagen Municipality claim that they can reduce procurement time from 45 minutes to 10 minutes per transaction using the DOIP portal (Helge Sander, *ibid*), so perhaps such figures will spur adoption.

Diffusion of E-Commerce Industry

The introduction and diffusion of the e-commerce and e-business industry has been as dramatic and as volatile as any in history. The concept of 'Internetspeed' became more than just a buzzword. Successful business models one year turned out to be financial disasters the next. We shall discuss the development over the last five years by looking first at the trading companies and then at the support industry.

E-commerce companies/dot.coms

E-commerce in general, and dot.coms in particular, were certainly not invented in Denmark. Inspiration came -- as most business innovations do -- from the U.S., and to some extent from the U.K. and Sweden. The shining examples of Amazon, Yahoo, and E-Bay filled the front pages of first the IT-trade press, then the business press, and soon after the bigger daily newspapers. Innovators of all types with skills, expertise, or money hastened to latch onto this new goldmine. E-commerce companies sprang up typically one year after the U.S. and 6 months after Sweden. No idea seemed too flawed to get funding, and in 1999 and early 2000, a typical reply to a business plan from venture capitalists was that an idea was not ambitious enough. 'Why settle for only the Danish market or the Scandinavian market, why not adopt a European strategy?' Or, as expressed in the words of Thomas Siebel (Siebel & House, 1999):

- *The web loves a risk taker....*
- *The name of the game, right now, is not revenue but exposure....*
- *The battle for name recognition will be won and lost over the next three years (1999 - 2002)....*
- *By being too cautious here, you may count yourself out ...*
- *If you don't solidify your name recognition in this wide-open space, there is no guarantee that playing catch-up later will enable you to displace the smart online leader.*

Indeed, many followed that strategy, such as Boo.com, Toycity.com, Gubi.com and Boxman.com, to mention a few. But all of these spectacular attempts failed when funds started to dry up in 2000, and with the failures, a lot of venture capital was lost. Another

failing dot.com was 'On-wine,' an online e-tailer with tastings, wine-bars, and recommendations for what wine to buy, and a very ambitious website developed for \$600,000. However, the company could not generate enough revenue to recoup this investment when faced with competition from the half-dozen other wine e-tailers, which had established very basic online wine shops using virtually free software. Indeed, one might even say that the only dot.coms to survive in Denmark were the ones who had chosen a strategy opposite the one suggested by Thomas Siebel above. In other words, only those who opted for limited budgets with a rapid change towards a positive cash flow, and had viable and robust business models, could survive.

One example is Aarstiderne.com, which started selling ecological vegetables directly to consumers on a subscription basis. Aarstiderne.com decides what to put in the weekly deliveries and also supplies interesting recipes. There is now a wide selection of products, and it is possible to change deliveries online. This subscription business model has been a great success. The number of different types of vegetable boxes has been enlarged, and the company also extended the product assortment with fish, bread, and fruit.

Haburi.com is another example of a Danish dot.com company with an interesting business model. This is a virtual factory outlet selling brand name fashion clothing and accessories. The largest markets are the U.K., Germany, Denmark, and Sweden. Unfortunately, the company went bust in early 2003 with an accumulated deficit of approximately 36 million Euro, but it has been taken over by a German company, which is continuing the business. The main reasons for the large deficit were the considerable investments made when venture funds were plentiful, and a growth rate in sales less than the projected doubling every year.

In addition to the dot.com companies, the e-commerce era has seen the advent of a number of portals, such as Jubii (the Danish equivalent of Yahoo but with a larger market share than Yahoo in Denmark), OFIR, Opasia (owned by the largest telecom provider), and AOK, plus the marketplaces of the two largest banks, Danske Bank and Nordea. The marketplace of Nordea Bank, Solotorvet.com, is one of the largest, with 115 Danish e-shops in early 2003. All of the shops are directly accessible from the web page of the bank, and buying is easily facilitated since payments are made directly from the chosen bank account in a totally secure environment.

Finally, it is worth mentioning the two large, horizontal, third-party e-marketplaces for B2B, Gatetrade and IBX. Both of these have been established primarily in order to provide procurement solutions for large companies for MRO products.

Gatetrade was originally proposed by Oracle to a large group of potential investors, and was eventually established with four large shareholders, Danske Bank, Danish Post, Maersk IT, and TDC (earlier Danish Telecom). Each had a particular interest in the marketplace over and above procurement, such as banking, logistics, IT, and telecommunication.

The technical problems for Gatetrade in establishing its website turned out to be larger than expected. Although Gatetrade was the 52nd marketplace established on the OBX platform using Oracle, Gatetrade found on several occasions that it was the first to encounter specific problems. Furthermore, it turned out that security was not acceptable to the governmental standards required in Denmark. Accordingly, the original solution of hosting the database in California had to be abandoned, and the hosting transferred to Denmark.

The uptake of using Gatetrade for procurement has been much slower than expected, even from the four original investors, although by the end of 2002 two of them were handling a substantial (but not disclosed) part of their procurement via Gatetrade. However, it was a great breakthrough for Gatetrade when it succeeded in securing the public sector procurement platform (DOIP). It is official government policy that 40% of public procurement by 2005 should take place using Gatetrade. In early 2003, vendors were struggling to prepare to deliver catalogs in the UNSPEC standard with the different prices for the different customers or customer groups. Vendors, on the other hand, were struggling to organize procurement procedures and business processes in order to make use of Gatetrade. Gatetrade expected to break even by the end of 2003, with a turnover of about \$1 billion a year.

E-commerce and support activities

Many claim that those who made money from the gold rush in California were not primarily the gold miners but those providing supplies or services, from clothing and tools to hookers and transporters. In the e-commerce area we see a similar picture. Few of the dot.coms made it really big, and most of the growth took place in companies providing infrastructure, software, hosting, services, and consulting, even though some of those firms have also had trouble on the stock exchange. The most important of these support companies are grouped below.

E-shop providers

E-commerce saw the advent of a large number of companies capable of supporting e-shops. Some provided assistance programming everything from scratch using HTML, PHP, or ASP. Others utilized the possibilities provided by portals and ISPs (such as TDCs, Opasia, or the MSN-network). These companies provided basically three types of solutions, from quick and dirty self configuring websites requiring no programming as one extreme, to more advanced websites offering integration with existing sales systems as the other extreme. These solutions were typically acquired by the smaller e-shop vendors.

Large e-shops or those aspiring to 'make it big' had very elaborate systems developed, often relying on a high degree of integration with production, ordering, and logistics systems. A good example is Lego Worldshop, where Lego acquired a fully developed system from IBM Denmark, which later turned the system into a 'standard package' market under the name of 'Global Merchant.'

Irrespective of the path chosen, a large software industry was created to facilitate the development of e-commerce solutions for e-shops. Some of these software providers were paid in cash, but many took equity in the e-shop, and did not survive when the e-shop failed. Finally, the largest Danish companies had their e-shops developed as add-ons or extensions to their ERP systems (such as SAP and Oracle Financials/Applications, but also the Danish Navision, which had almost 50% of the SME market for ERP systems in Denmark in 2002). Navision was also one of the two ERP system providers for SMEs, and was acquired by Microsoft in 2002 to form the basis for its strategy of integrating into the applications market.

Payment providers

Any e-shop needs a payment system. In the beginning, many shops would just use their websites as a storefront, directing customers to their physical store. However, this was

impractical, and many observers believed that a secure payment system was a necessary prerequisite for consumers buying on the Internet.

Danish PBS, the center for all debit card, credit card, and EFT transactions in Denmark, has a natural monopoly on clearing online payment transactions at some stage in the process. However, to facilitate the process, a large group of independent software service providers emerged, providing a link between the e-shops and PBS. An example is Dansk Internet Betalings System, which in early 2003 had about 800 customers, each paying a monthly fee of 300 or 800 DKK (\$45 or \$115) for provision of an encrypted secure payment service. When a customer is ready to buy, a new window is opened, and the payment is done using the DIBS software.

PBS also started developing a better security standard, together with MasterCard, which would be more secure than the widely used SSL-encryption standard. The SET standard, relying on public/private key technology, however, has not yet taken off, even though it was clearly much more secure. It was just too cumbersome for consumers to first have to install the software on their own machines, and a large number of vendors did not offer the solution.

Web-hosting

Web-hosting is another new business area where there are a number of larger players such as the 'usual suspects' of IBM, Cap Gemini, and TDC, but also new larger players like Mondo, Tiscali, and UNI-2. Indeed, most of the ISPs are also providing web-hosting. In fact, there are probably more than one hundred smaller companies providing hosting services.

Domain registration

Domain registration is another interesting new business area, where there are probably 500 to 600 companies capable of registering and maintaining new domains on a DK-hostmaster. The trend seems to be that this service, like many of the other services, is being taken care of by companies specializing in this particular area. One such Danish company is Speednames, which has been very innovative in developing business in this area, and has offices abroad.

Web-development

Development of websites has been mentioned above, and in relation to the further development of e-commerce solutions, software houses offer Internet solutions for any need. Initially most of these were tailor-made, but over time, more and more plug-in standard packages became available. Often systems could be developed for a fraction of the price just one year later, when standards become available. The typical make/buy choice became more and more tilted in the direction of buying standards rather than having one developed as we see in other areas.

One of the most amazing developments was the original Framfab Company, which started in 1996 and grew to a staff of 3,500 within five years. By any standard, this was the optimization of the Internet arena. The young, aggressive, flamboyant, and creative company was a true child of the so-called 'New Economy.'

This was reflected in its share value. The market cap of Framfab on the Stockholm stock exchange in March 2000 was valued at 35.8 billion SKR (\$4.4 billion), which was equal to

the consolidated value of three of the largest companies in Sweden: Saab, Swedish Match, and SKF. However, one year later in March of 2001, the share price for Framfab had dropped to 0.7 billion SKR (\$0.09 billion), while the market cap of the other three had grown to 43.0 billion, a healthy growth of 11%.

But, there were a number of other independent software houses popping up in Denmark like Areneum, Mouse House, and Cell Networks. All made creative solutions, but could not survive the extremely sharp downfall of the dot.com crash in 2000 and 2001. And with them, the two most highly profiled venture funds solely dedicated to 'the New Economy,' 2M Invest and Brandt.com, fell as well.

Consulting

The development of the e-commerce field was strongly fueled by the consulting companies; from the large international companies (Andersen Consulting, Deloitte & Touche, etc.), to new innovative companies (Ashton Group, Catenas), all the way to the vast number of small one-person companies. Some of these even took an equity share in the many dot.com and e-marketplaces (e.g., Andersen Consulting), often as payment for their services. Originally, there was work for everyone, but when the prospects of the initial 'Icarus-line'¹ turned downward, the consulting companies were the first ones to identify the problems and many of the large international consulting companies, who had more strings to their bows than just e-commerce, managed to turn their attention to a more diversified set of business problems. The many more specialized consulting companies were less bolstered, both financially and intellectually, to survive the dot.com collapse.

Conclusion

Altogether, the readiness in Denmark to engage in the e-commerce revolution has been rather high compared to other countries, although of course there are large differences between the main groups, the providers, the merchants, and the consumers.

The **providers** (software, hardware, infrastructure, consultants, etc.) have been in the absolute forefront, pushing the development in obvious self-interest. We do not have data to support the question of whether they pushed more or better than the other groups, other than the fact that they have been more effective than in most other places.

E-commerce 'merchants' (sellers), both B2B and B2C, have been willing to be influenced, and have to a very large extent gotten off to an early start, although not as fast as the most early adopters in the U.S., the U.K., and Sweden (such as Amazon, E-Bay, Boo.com, Boxman, and Dell, to name a few of the most cited examples from the Danish medias in the late 1990s). The most 'low-hanging' fruit (those with websites, selling a few obvious advantageous goods) was picked first, and Danish companies have clearly been in the forefront globally. Furthermore, Danish companies in general have also been substantially faster (further ahead than every country in the global sample) on the diffusion/adoption curve when it comes to modifying business processes like advertising/marketing, online sales, after-sale customer support, and purchasing online.

¹ Icarus in Greek mythology was a youth who tried to fly all the way to the sun with wings of wax and feathers, all the time upward, and finally the sun melted his wings and he fell into the water.

However, when it comes to substantially integrating or modifying business processes, Danish companies are behind the global sample. Danish companies are not at all ahead on dimensions such as:

- Exchanging operational data with business customers
- Exchanging operational data with suppliers
- Integrating the same business processes with business partners
- Trading on e-marketplaces

This ought to be of great concern, since these are the dimensions that are likely to determine long-term profitability and market presence. The future will belong to inter-organizational systems, and unless companies are capable of doing that, they are likely to be excluded from trading relationships.

Finally, when it comes to **consumers**, Danes are obviously a very heterogeneous, diverse group, from the early trendsetters ('techsetters') to the 40-50% of the population who have not yet tried to buy anything on the Internet. On average, Danish consumers seem to be among the leading nations in the increase of e-commerce, but it is important to stress that we are still in the very early stages of the diffusion/adoption curve.

This development has been spurred by a 'holy coalition' of leading users, the media, the government, and the providers (HW, SW, infrastructure providers, consultants, etc.). These groups have been successful in raising the expectations and creating an atmosphere of guilt/fear, that if one was not part of, and did not act now (with a website, an e-business strategy, or online purchasing), one would be eternally lost. This had the desired effect of furthering innovation and early adoption, as documented in the global sample. However, after the initial steps, when it comes to modifying business processes or modifying consumer behavior, old habits change very slowly. It is by no means certain to us that the Danish position among the leaders is sustainable.

IMPACTS OF THE INTERNET AND E-COMMERCE

Impact of Doing Business Online on Efficiency

As discussed above, Danish companies are in the forefront regarding adoption and utilization of the Internet compared to the global sample. Accordingly, one would also expect that Danish companies to a larger extent than the global sample, have been able to harvest the benefits in the form of efficiency gains. This has been investigated in the GEC survey shown in Table 25, where ten different efficiency measures are reported.

The overall result is surprising and disappointing, given the relatively high investments in IT-infrastructure, the low barriers, the strong drivers, and the high use of the Internet. Danish companies have not been able to harvest benefits to any larger extent than companies in the global sample. Denmark is above the global sample on five dimensions, but is not in the lead on any dimension on impacts (see also Appendix 12).

One of the most positive effects is found on the first dimension, '**internal processes made more efficient**,' where no less than 39.4% claim that there has been high impact. This is slightly higher than the global sample (33.9%). Not surprisingly, the largest percentage of

high impact is found in the finance sector, where the possibilities for integration are the highest (47.7%). In comparison, only 23.3% of the French and 22.8% of the German financial sector report high impacts on this variable. Some might find it surprising that the Internet, which in its very nature predominantly facilitates external communication/processes, should have an impact on internal processes. However, there are at least two good reasons for this. First, the Internet in general, and Intranets in particular, further internal communication and coordination through increasing transparency in all those processes where applied. Second, extranet and enhanced integration with business processes of customers and suppliers also contribute to higher efficiency in internal processes.

TABLE 25. Impacts of Doing Business Online, 2002

Percent indicating high impact ^e	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Internal processes more efficient	39.4	39.8	25.3	38.2	47.7	39.4	33.9
Staff productivity increased	16.4	17.3	26.0	8.6	18.8	16.5	27.2
Sales increased	25.0	12.2	24.0	16.0	32.9	24.6	20.5
Sales area widened	19.7	17.3	17.5	15.0	25.1	19.6	31.4
Customer service improved	44.8	37.9	43.8	30.0	59.4	44.6	34.8
International sales increased	3.8	6.2	16.5	0.6	0.5	3.8	19.5
Procurement costs decreased	17.7	15.7	18.8	16.4	18.2	17.7	17.7
Inventory costs decreased	11.9	10.2	12.2	22.1	0.7	11.8	14.0
Coordination with suppliers improved	27.0	29.8	23.7	33.8	22.4	27.0	29.8
Competitive position improved	29.8	25.2	23.9	18.2	42.6	29.7	29.8

Source: CRITO Global E-Commerce Survey, 2002

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all." please rate the degree to which your establishment has experienced the following impacts since it began using the Internet for business. A score of 4 or 5 was classified as "high impact."

It is more surprising that only 16.5% of the Danish companies claim that there has been '**increased staff productivity**,' especially since 27.2% of companies in the global sample have experienced this. One explanation could be that the productivity was already at a very high level in most Danish companies, whereas there was some 'low hanging fruit' to be harvested in some other countries, where the Internet (and related technologies) provided an excuse to reengineer processes which hitherto had been too difficult to change.

Three dimensions are related to sales. The number of Danish companies that had experienced '**sales increases**' was 24.6% (compared to the global sample of 20.5%), but only 19.6% reported that their '**sales area widened**' (compared to 31.4% in the global sample), and only 3.8% had experienced '**increased international sales**' (compared to the global sample of 19.5%). Since 88.8% of the Danish companies are using the Internet for advertising and marketing, and 47.2% of them are making sales online, it is surprising that so few of them report a high increase in sales. It is even more surprising that so few report that their sales area has widened domestically and internationally. It is clearly not enough just to have a website and hope that customers latch on to it. More needs to be done, especially regarding

the international situation. Integration with customer systems and a higher involvement in e-marketplaces to increase traffic are potential drivers of more positive developments.

In **'improved customer service,'** 44.6% of the Danish companies identify a high impact here. This is the second highest number in the global sample, behind only Mexican companies. In actual fact, of course, the question should be directed to customers and not the service providers. But since we only have the results from the sender, we need to treat these figures with some caution. Not surprisingly, it is in the finance sector where the highest number is reported. No less than 59.4% of the finance institutions report that their customer service has improved. But, in this sector, it is surprising that the number is not larger.

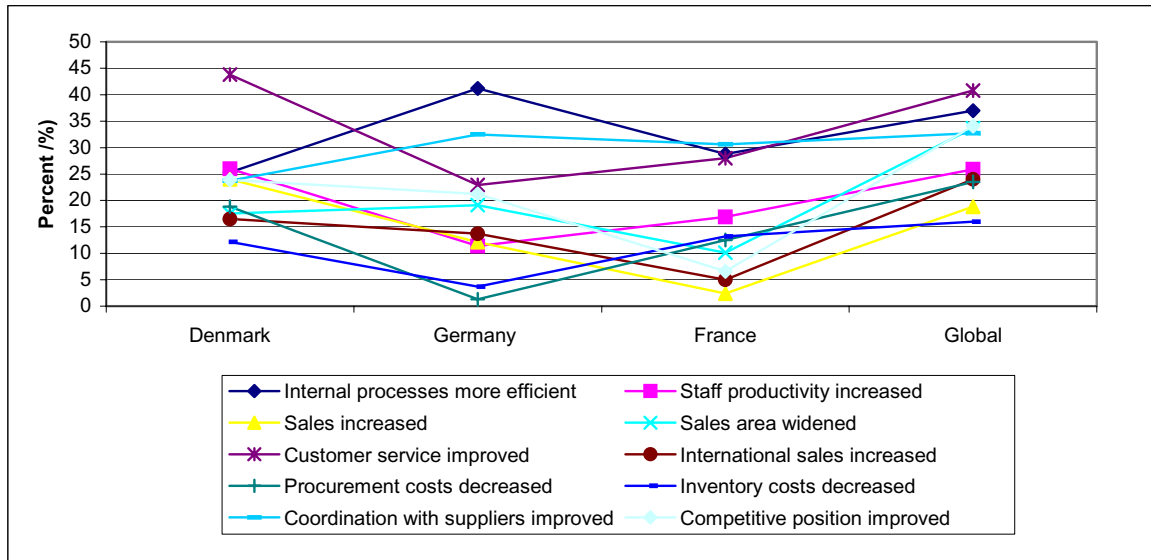
A **'decrease in procurement costs'** was experienced by 17.7% in the Danish sample, and a meager 11.8% could report that their **'inventory costs decreased.'** These figures are fairly close to the global sample, and there is little variation due to company size and industry, with the obvious exception of finance companies, which do not report on reductions in inventory. We believe that for both of these dimensions, companies have not yet achieved a level of sophistication in their e-commerce/e-business solutions, where it has been possible to harvest such efficiency gains.

'Coordination with suppliers' has been experienced by 27.0% of the Danish companies – a figure almost on par with the global sample (29.8%), and with no significant difference according to size or industry.

Finally, we asked the more general and somewhat overarching question of whether the **'competitive position had been improved.'** 29.7% of the Danish companies had experienced an improvement (compared to the global sample of 29.8%), and the only significant industry difference was that more finance companies had seen an improvement (42.6%), while only 18.2% of the distribution companies reported improvement.

The sector reporting the most positive impacts compared to Germany and France is the financial sector, whereas manufacturing reports the least positive impacts. In Figures 2-4 we compare the impacts by sector in Denmark, Germany, France, and the global sample.

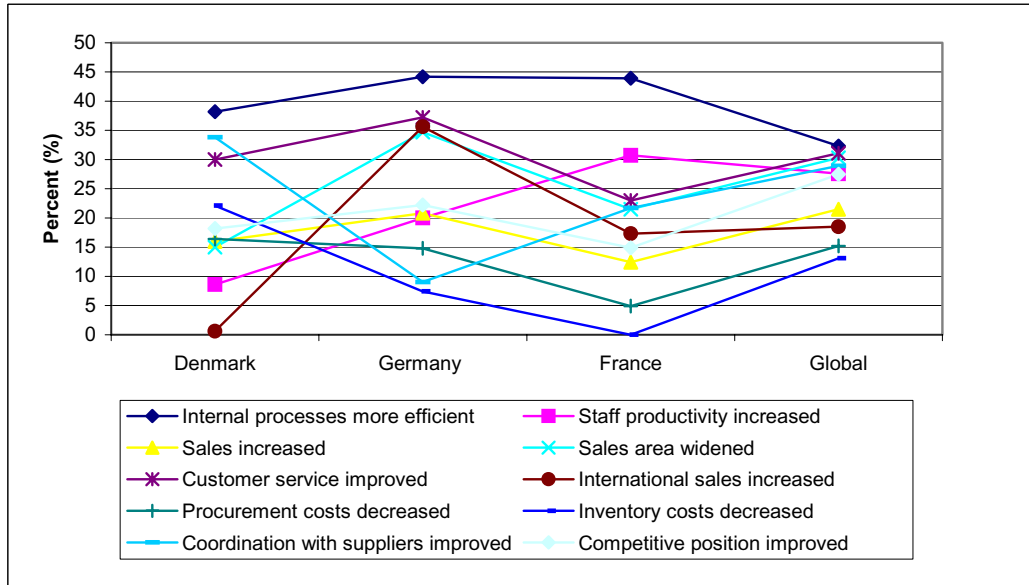
FIGURE 2. Impacts of Doing Business Online Within the Manufacturing Sector. Denmark, Germany, France, and Global Sample, 2002



Source: CRITO Global E-Commerce Survey, 2002

Note: Please consult Table 25 for definitions and sample sizes

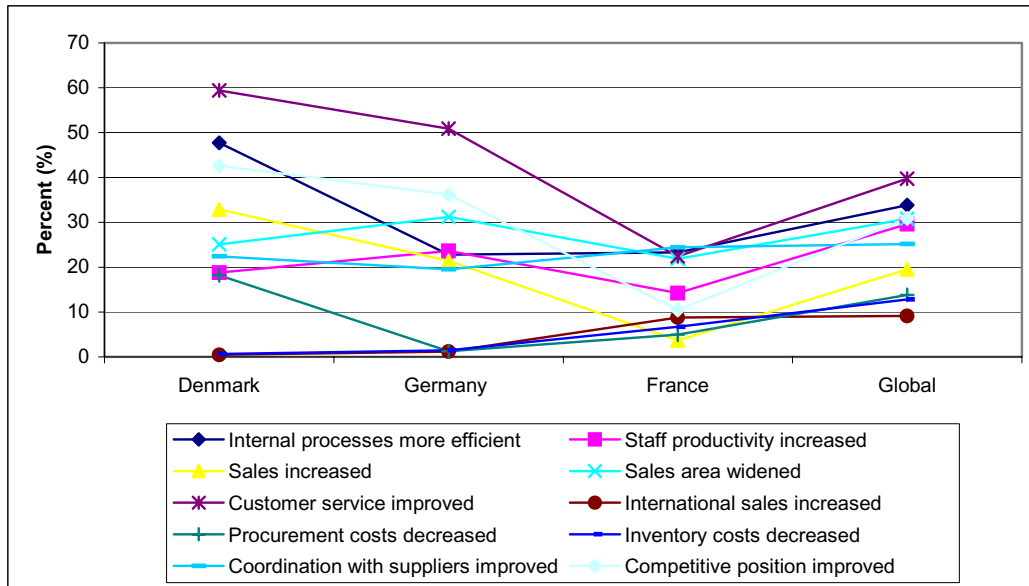
FIGURE 3. Impacts of Doing Business Online Within the Wholesale/Retail Distribution Sector. Denmark, Germany, France, and Global Sample, 2002



Source: CRITO Global E-Commerce Survey, 2002

Note: Please consult Table 25 for definitions and sample sizes

FIGURE 4. Impacts of Doing Business Online Within the Financial Sector. Denmark, Germany, France, and Global Sample, 2002



Source: CRITO Global E-Commerce Survey, 2002

Note: Please consult Table 25 for definitions and sample sizes

In summary, the efficiency gains reported by the Danish companies do not reflect the high level of e-commerce readiness, the large investments in Internet applications, the presence of many positive drivers, and the relative absence of barriers for this development. Internal efficiency gains have been harvested, and customer service has been improved. But the figures for international sales increases are particularly disappointing, and there seems to be a case for a deeper analysis of why almost no Danish companies report increases in sales area, when close to one third in the global sample report this positive effect. This is even more surprising since Denmark has one of the highest figures for exports as a percent of GDP.

Danish companies have gone further down the road toward providing online sales and services, but the lack of integration (including the use of e-marketplaces) suggests to us that they have not yet been able to exploit the leading position to obtain efficiency/effectiveness gains which are beyond the average in the global sample.

Impact of Doing Business Online on Industry Structure

The final set of questions from the GEC-survey were related to the way in which the Internet has changed industry structure, value chains, markets, and the competitive climate. The hypotheses are, of course, that markets become more transparent, more efficient, and more competitive.

More than 40% of the companies in the Danish, as well as the global sample report that the ‘**number of distribution channels**’ has increased. The Internet has added at least one new distribution channel for information, online services, customer support, and online sales. This is especially the case for companies within the finance industry, since the product of these companies is easy to digitize.

But traditional manufacturing companies can also benefit. Novozymes (the global leader in enzymes for industrial purposes such as detergents, baking powder, and more than fifty other processes) developed a private trading exchange for their 20,000 SME customers. For their 16 or 17 key customers, Novozymes enters into a type of collaborative agreement regarding integration of their sales processes into the procurement processes of their customers (e.g., vendor managed inventory). But all the other customers either order from the website, or pay a penalty of \$150 to order by fax. More than 40% of all orders in 2002 were received via the website. In addition to the ‘buying room,’ the website includes a ‘product room’ containing ‘all you ever wanted to know about industrial enzymes,’ drawing on a large number of sources for updating, as well as a ‘customer service-room.’ This much acclaimed website was selected as the best B2B site in Denmark in 2002, and hailed by Accenture as one of the leading European B2B sites in their report, “The Surprising Success of European E-Commerce” (Accenture, 2001). Furthermore, the ‘**number of suppliers**’ and the ‘**number of competitors**’ have increased for 16.7% and 18.0% of the Danish companies, although these numbers are only about two-thirds of those in the global sample. We do not have a good explanation as to why Danish companies had this lower estimation.

Finally, 48.3% of the Danish sample (compared to 41.5% in the global sample) report that there is an ‘**increased intensity of competition.**’ This is what we would expect. The Internet makes it much easier to identify new potential suppliers, identify their products and prices, inspect the quality of their goods and services, negotiate conditions, and handle logistics, especially from hitherto rather inaccessible markets such as China.

TABLE 26. Impacts of Doing Business Online, 2002

% indicating ^e	Establishment Size ^a		Sector ^b			Total	
	SME	Large	Mfg.	Distrib.	Finance	Denmark ^c	Global ^d
Number of distribution channels increased	42.8	31.9	27.5	31.8	60.9	42.5	40.2
Number of suppliers increased	16.9	10.5	24.7	20.6	7.8	16.7	29.9
Number of competitors increased	18.2	9.8	12.8	14.3	23.9	18.0	27.9
Intensity of competition increased	48.6	35.9	35.2	29.2	73.5	48.3	41.5

Notes: ^a SMEs (small and medium sized establishments) are those with 25-250 employees; large are those with more than 250 employees.

^b Manufacturing includes all establishments classified as SIC 20-39; distribution includes wholesale and retail (SIC 50-54, 56-57, 59); finance includes banking and insurance (SIC 60-65).

^c Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^d Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China, and Japan. “Global” sample sizes by sector are 743 in manufacturing, 701 in wholesale and retail distribution, and 695 in banking and insurance; by size, 1,088 establishments are classified as SMEs and 1,053 as large.

^e Exact wording of question: Please indicate whether the following have increased, decreased or stayed the same in your establishment since it began using the Internet for business.

Over time, we would expect to see increased coordination and control within the four areas of:

- Collaborative demand forecasting, replenishment, and promotion planning towards customers in the downstream supply chain
- Collaborative supply planning, procurement, and production scheduling upstream in the value chain

- Collaborative logistics planning, transportation management, and distribution services, typically with third party companies
- Collaborative product engineering and design of new products

One of the Danish companies that has ventured furthest down this route is the HiFi manufacturer Bang & Olufsen. They have totally integrated their downstream supply chain to distributors and retailers, and their upstream supply chain towards components suppliers.

An interesting change in industry structure has taken place during the 1990s with the Danish textile industry. In the early 1990s, there were 20,000 seamstresses in an area in the middle of Jutland around Herning. Today, there may only be 200 (Danish Textile Union, interview, 2001). The reason is that Danish seamstress salaries of \$12 to \$13 /hour cannot compete with salaries in Poland, Lithuania, and Asia. Previously, the transaction costs of sending the cloth to these places was too high. Today, with the advances in the Internet and to some extent lower transportation costs, it is possible to outsource production to these places. Accordingly, the nature of the industry has changed. Design, management, logistics, sales, and marketing are still carried out in Denmark, but the labor-intensive part is sent to areas/countries where the labor costs are substantially lower.

A third example relates to the area of B2C kitchen durables. An increasing number of consumers now utilize www.hvidevarepriser.dk. Here consumers can search for information on all types of durables and their prices. Typically, the prices on this site are only 5% higher than the prices from the manufacturer/importer.

This type of website is now changing the nature of the market for white goods. Unofficial sources in the industry claim that 10% of all sales of white goods are now distributed through these types of discount stores, where the business model is to obtain orders from the website, and not procure from manufacturers until an order is obtained. Delivery takes place directly from the warehouse of the manufacturer to the consumer with a margin of 5%.

In other markets, such as job advertising or advertising of real estate, there is a clear reduction in the number of traditional newspaper ads. No official statistics exist, but the unofficial estimate is that in 2002, the number of traditional advertisements was reduced by 20%. Some of this is explained by the downturn in the economy, but that does not explain the full story. The Internet has sparked an irreversible trend.

One of the expectations has been that the Internet would create a devastating price competition where the lowest cost would be determined by the most efficient supplier, and where a small price difference would cause all buyers to shift their suppliers. Clearly this has not been the case. There are many more aspects to buying than the price, such as quality, trust, and service. But, regarding price, we have seen a tendency towards ‘virtual cartels.’ If a vendor in a market with standard products (such as airline tickets or CDs) lowers prices, there is no question that competitors as a general rule will find out long before customers. Accordingly, almost all competitors will be able to follow suit and eliminate price differentials. Thus, we find that prices published on the net are either standard prices (with no negotiation possible) or maximum prices as a starting point for negotiations. This is another type of change in market conditions.

In summary, competition has changed. But we believe that we are still in the early stages of the total restructuring of whole industries, markets, and value chains. We have given a

number of examples of how this is taking place already. However, we are still in the early stages of the transition towards the New Economy.

CONCLUSION

In general, Danish society, and Danish industries in particular, have a relatively high IT-awareness and the technological prerequisites for a fast, widely dispersed, diffusion/adoption of e-commerce. Danish companies are clearly ahead of the global sample in using e-mail, establishing websites, and using intra/extranet, EDI, and EFT. Danish companies are also ahead when it comes to internal integration of Internet applications with other internal systems (such as databases and other information systems, often called ERP systems). When we look at integration with systems of suppliers and customers, Danish companies are ahead of the global sample, although not by a large margin.

Furthermore, the prerequisites for even more progress are present. The drivers for e-commerce (e.g., that customers demand it) are perceived as stronger, and the barriers (privacy objections, lack of credit-cards, costs of e-commerce, etc.) are clearly perceived as less obstructing than in the global sample and in developed countries like Germany, France, and the U.S.

As one would expect, Danish companies got off to an early start not just in developing websites and using e-mail, but more actively embarking upon re-engineering their business processes. According to the global sample, more Danish companies were using the Internet for advertising/marketing, selling online, after-sales service, online purchases, integrating business processes with suppliers/customers, and exchanging operational data with suppliers. Only 'exchanging operational data with business customers' and 'participation in Internet-based trading communities' (e-marketplaces) were less widespread among Danish companies than in the global sample.

According to the GEC survey, the mean percent of total consumer sales conducted online for Danish companies is double that of the global sample, and the mean percent of total business sales is also ahead of the global sample (4.8% as opposed to 4.0%). Furthermore, readiness to accept payment online is at 48.3%, compared to the global sample of 33.6%.

We see the same picture for online services. Substantially more Danish companies provide some services online (53.2% as opposed to 33.3% in the global sample), twice as large a percentage of total consumer service is conducted online (15.9% as opposed to 33.3%), and the mean percent of total business services is 33.2% in Danish companies as opposed to 11.0% in the global sample.

In general, when comparing the performance of SMEs and larger companies, there is not a big difference. Typically, SMEs have been faster and more flexible in getting onboard e-commerce than the larger companies. Only the smallest SMEs, those often called micro-companies (with 5 to 9 employees), and SMEs with 10 to 24 employees, are generally viewed by organizations such as The Association of Danish Industries, to be lagging behind.

The picture of relatively high IT-readiness, high adoption, strong drivers, low barriers, and high levels of online participation in all business processes has, however, not had a significant impact on business. There are not a substantially higher number of Danish companies reporting successes such as more efficient business processes, increased staff

efficiency, cost reductions, or increased sales. On several of these dimensions, there are even fewer Danish companies reporting these positive developments.

One possible solution to this paradox could be related to the fact that very few companies have increased the number of suppliers, so they may not have exploited the procurement possibilities. Maybe the answer could be found in the fact that more Danish companies (48.3% as compared to the global sample of 41.5%) report that the intensity of competition has gone up. We see a clear need for more proactive Internet-based business strategies and policy implications.

Clearly, our study points in the direction of increased focus and accelerated efforts if Danish companies are to take advantage of the early uptake of the Internet.

All in all, Denmark has been among the leaders in the e-commerce field until 2002, although by no means in the highest position. The very high costs of labor, the open economy, increased competition, and the relative ease at which it is possible to catch up in the e-commerce race, make it a key challenge to further boost the restructuring of Danish industries to meet the challenges of the networked economy.

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**APPENDIX
DISTRIBUTIONS FOR ALL 10 COUNTRIES**

TABLE A-1. Use of E-Commerce Technologies, 2002

Percent using ...	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
E-mail	99.6	98.3	100.0	100.0	97.7	100.0	95.9	100.0	99.9	99.8	98.5
Web-site	79.8	79.0	70.7	96.3	54.5	91.8	69.5	57.1	83.0	73.4	74.1
Intranet	56.2	50.9	37.7	83.7	68.0	84.4	60.8	51.2	67.0	80.8	63.6
Extranet	28.7	31.1	33.2	39.8	15.2	22.3	36.3	30.1	31.5	49.7	32.7
▪ accessible by suppliers/ business partners ^c	16.9	22.6	10.7	30.0	11.6	14.0	28.7	19.1	23.8	26.4	20.9
▪ accessible by customers ^c	15.6	16.2	15.9	23.1	11.4	11.8	21.9	22.7	20.0	21.5	17.8
EDI	42.5	58.4	36.7	69.1	44.6	67.7	25.0	22.8	32.8	63.8	44.3
▪ over private networks only ^c	17.1	19.7	7.5	16.5	29.9	30.8	9.7	9.9	16.6	34.1	19.4
▪ Internet-based only ^c	8.4	28.5	7.0	20.3	4.6	10.1	3.9	6.8	9.7	7.9	8.4
▪ both ^c	16.1	10.1	22.2	31.5	8.3	26.6	10.4	5.1	6.0	21.8	15.9
EFT	62.7	70.6	52.4	73.5	30.3	86.6	25.7	19.7	42.8	7.6	43.4
Call center	40.5	44.5	46.1	27.4	22.4	30.3	20.8	19.0	24.5	39.9	32.3

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country. Survey sample sizes for Denmark by sector are 69 establishments in manufacturing, 67 in wholesale & retail distribution, and 64 in banking & insurance; by size are 100 establishments classified as SME and 100 as large.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Percent based on total sample.

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-2. Enterprise Integration Strategy, 2002

Extent to which internet applications are electronically integrated with ...	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Internal databases and information systems ^c											
% little to none	52.9	60.1	58.4	22.7	49.3	55.5	47.2	42.8	40.0	56.7	52.5
% some	15.4	12.3	12.0	24.3	18.9	17.4	36.3	24.7	37.2	29.2	23.6
% a great deal	31.7	27.6	29.6	53.0	31.8	27.0	16.5	32.5	22.8	14.2	23.9
Those of suppliers and business customers ^d											
% little to none	67.2	81.5	89.4	58.5	80.8	72.2	62.9	62.0	47.7	81.1	72.1
% some	16.5	9.5	8.7	26.8	14.1	10.7	29.2	26.3	27.7	16.6	18.3
% a great deal	16.4	9.0	1.9	14.8	5.1	17.1	7.9	11.7	24.5	2.3	9.6

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country. Survey sample sizes for Denmark by sector are 69 establishments in manufacturing, 67 in wholesale & retail distribution, and 64 in banking & insurance; by size are 100 establishments classified as SME and 100 as large.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all", please rate the extent to which your internet applications are electronically integrated with your internal database and information systems. Scores of 1 or 2 are categorized as "little to none", a score of 3 as "some" and scores of 4 or 5 as "a great deal".

^d Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all", please rate the extent to which your company's databases and information systems are electronically integrated with those of your suppliers and business customers. Scores of 1 or 2 are categorized as "little to none", a score of 3 as "some" and scores of 4 or 5 as "a great deal".

Source: CRITO Global E-Commerce Survey, 2002

Table A-3. Content/Services To Mobile Customers, 2002

Percent providing or planning to provide mobile content or services ^c	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Already available	14.6	7.2	3.9	29.2	8.0	17.9	15.1	17.5	11.6	16.4	13.7
Plan to add within the next year	15.7	46.1	30.8	12.2	13.8	12.3	16.1	9.6	16.5	15.1	18.2

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Today it is possible to access content or services from various mobile devices such as mobile phones and handhelds such as Palms or Pocket PC devices. Does your organization provide or plan to provide content or services that mobile customers can access?

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-4. Drivers for Internet Use, 2002

Percent indicating driver is a significant factor ^c	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Customers demanded it	35.5	35.7	44.7	52.0	14.6	24.8	45.1	47.8	51.5	36.9	36.9
Major competitors were online	33.1	38.9	26.9	37.7	22.0	42.9	32.7	39.5	39.6	19.4	31.3
Suppliers required it	18.7	32.7	24.3	14.3	9.6	8.3	28.0	32.5	30.6	26.3	22.3
To reduce costs	32.6	58.3	60.8	56.5	18.3	20.3	39.5	41.3	46.9	27.4	35.7
To expand market for existing product or services	49.8	64.6	59.3	45.5	21.5	57.9	55.3	46.8	58.1	23.5	47.9
To enter new businesses or markets	39.2	64.9	54.1	37.0	20.2	45.7	42.9	54.4	54.4	33.6	42.0
To improve coordination with customers and suppliers	41.6	74.1	60.9	51.0	41.4	42.1	38.3	49.9	67.8	33.3	43.7
Required for government procurement	9.0	33.2	24.4	14.6	14.8	2.1	22.3	22.9	31.7	4.7	15.2
Government provided incentives	3.4	12.8	14.5	3.3	9.1	2.0	12.3	28.5	29.6	1.9	8.3

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Using a 5-point scale where 5 is "a very significant factor" and 1 is "not a factor at all," please rate how significant each of the following was to your organization's decision to begin using the Internet for business. A score of 4 or 5 was classified as "a significant factor".

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-5. Barriers/Difficulties, 2002

Percent indicating statement is a significant obstacle ... ^c	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Need for face-to-face customer interaction	41.7	25.6	32.5	33.6	46.5	11.9	30.6	36.6	38.3	42.7	33.8
Concern about privacy of data or security issues	47.1	57.6	48.6	22.7	20.0	24.9	45.3	66.3	48.1	55.2	44.2
Customers do not use the technology	26.9	38.7	47.6	26.8	30.5	24.2	32.6	31.0	26.9	30.1	31.4
Finding staff with e-commerce expertise	24.1	31.1	34.2	14.6	20.3	41.2	19.7	27.0	20.0	28.8	26.5
Prevalence of credit card use in the country	16.3	19.8	23.2	4.7	13.6	21.6	30.2	18.3	24.1	9.1	20.3
Costs of implementing an e-commerce site	31.5	35.2	33.6	12.8	21.8	32.3	28.6	40.0	45.3	52.7	33.6
Making needed organizational changes	14.5	32.3	32.9	14.4	22.2	30.8	22.4	17.5	38.2	27.6	23.9
Level of ability to use the Internet as part of business strategy	20.5	29.0	22.4	19.1	16.2	14.3	31.1	24.2	21.8	31.0	24.8
Cost of Internet access	10.8	3.6	20.4	5.8	5.7	1.6	21.9	24.3	33.6	24.5	15.1
Business laws do not support e-commerce	8.1	27.3	31.6	15.1	24.1	5.1	40.8	27.9	34.8	21.6	24.2
Taxation of internet sales	14.8	21.5	26.8	8.7	19.9	1.5	19.1	17.8	28.3	15.2	16.5
Inadequate legal protection for Internet purchases	11.9	45.1	41.4	11.8	38.7	20.8	54.5	48.6	43.6	20.8	34.1

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Using a 5-point scale where 5 is "a very significant obstacle" and 1 is "not an obstacle," please rate how significant the following obstacles are to your establishment's ability to do business on-line. A score of 4 or 5 was classified as "a significant obstacle".

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-6. Uses of the Internet, 2002

Percent using the Internet for ... ^c	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Advertising and marketing purposes	64.3	72.9	58.6	88.8	26.4	77.7	52.1	48.0	61.0	52.7	57.6
Making sales online	43.2	11.8	28.2	47.2	12.1	57.3	23.0	32.5	29.6	21.2	29.9
After sales customer service and support	55.6	40.2	23.1	56.9	16.3	53.3	55.4	41.4	38.9	25.0	43.7
Making purchases online	73.2	64.8	54.9	67.5	24.1	60.8	31.3	26.7	28.6	32.6	46.8
Exchanging operational data with suppliers	42.8	50.1	51.9	55.8	35.7	59.7	47.0	42.5	44.9	52.5	48.1
Exchanging operational data with business customers	53.8	46.7	49.2	40.5	39.7	51.9	52.1	46.3	50.5	53.1	50.7
Formally integrating the same business processes with suppliers or other business partners	35.5	54.8	48.8	44.4	24.0	47.6	30.1	24.0	40.9	16.3	33.9

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country. Survey sample sizes for Denmark by sector are 69 establishments in manufacturing, 67 in wholesale & retail distribution, and 64 in banking & insurance; by size are 100 establishments classified as SME and 100 as large.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Does your establishment use the Internet for ...

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-7. Participation in an Internet-Based Trading Community, 2002

	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Percent who have heard of the concept of an Internet marketplace ^c	72.3	88.7	84.3	95.4	62.3	86.6	87.6	82.0	85.2	72.8	80.0
Percent participating as a buyer only ^d	13.6	20.1	11.0	2.8	4.6	1.4	6.7	4.5	3.6	0.5	6.7
Percent participating as a seller only ^d	31.9	7.3	10.5	7.9	7.6	13.9	10.0	18.3	4.9	13.5	12.2
Percent participating as both a buyer and a seller ^d	44.7	23.1	7.1	5.6	5.9	19.6	22.0	20.6	17.9	0.2	16.9

Notes: ^aResponses were weighted based on the total number of establishments by employee size within the sector for each country. Survey sample sizes for Denmark by sector are 69 establishments in manufacturing, 67 in wholesale & retail distribution, and 64 in banking & insurance; by size are 100 establishments classified as SME and 100 as large.

^c Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^d Exact wording of question: Have you ever heard of the concept of an Internet marketplace, exchange or trading community, through which multiple businesses buy and sell goods and services?

^e Percents based only on those establishments which have heard of the concept of an Internet marketplace.

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-8. How Establishments Use The Internet To Sell Products and Services, 2002

Percent indicating Internet used to ... ^c	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Address new markets only	8.5	25.0	25.7	3.7	39.0	7.5	23.6	25.2	0.9	11.5	15.3
Address traditional distribution channels only	44.6	48.5	60.3	57.1	30.8	75.8	9.9	34.2	37.3	21.8	44.1
Compete directly with traditional distribution channels	28.8	9.1	10.2	35.7	24.6	16.7	49.1	19.6	47.4	37.2	27.4
Replace traditional distribution channels	18.1	17.4	3.9	3.5	5.6	0.0	17.4	21.0	14.3	29.4	13.2

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Which of the following statements best characterizes how you are using the Internet to sell products and services.

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-9. On-Line Sales, 2002

	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Type of On-Line Sales ^c											
% B2B only	15.8	5.7	8.9	15.5	6.6	34.0	9.1	14.9	8.5	7.2	12.9
% B2C only	14.2	5.8	9.5	15.0	4.5	11.5	2.9	8.8	6.5	1.4	7.1
% both B2B and B2C	17.6	18.3	18.5	22.6	3.9	18.4	14.0	14.4	17.4	12.8	15.0
Mean percent of total consumers sales conducted on-line (all establishments) ^d	5.0	2.4	3.5	7.6	0.2	8.8	1.3	4.5	2.3	4.9	3.8
Mean percent of total business sales conducted on-line (all establishments) ^e	5.5	4.5	3.6	4.8	0.0	8.4	2.1	6.0	6.2	3.0	4.0
Mean percent of total consumer sales conducted on-line (only those doing B2C sales on-line) ^d	16.6	10.2	12.9	22.5	3.8	30.7	9.1	21.1	12.0	35.6	18.6
Mean percent of total business sales conducted on-line (only those doing B2B sales on-line) ^e	17.8	20.2	13.4	14.9	0.3	16.0	10.4	24.2	31.7	15.1	15.1
Percent of web-sites that support on-line payment (only those doing on-line sales)	33.5	10.7	33.2	48.3	49.3	40.5	8.8	34.3	21.2	94.1	33.6

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Percents are based on the full sample (all establishments). Exact wording of question: Are these online sales to other businesses or to consumers or to both?

^d Exact wording of question: What percent of your establishment's total consumer sales are conducted online?

^e Exact wording of question: What percent of your establishment's total business to business sales are conducted online?

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-10. On-Line Services, 2002

	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Type of On-Line Service ^c											
% B2B only	20.4	6.3	7.6	23.3	8.2	38.6	27.8	21.3	20.1	29.8	23.1
% B2C only	21.5	6.1	8.0	19.0	16.2	22.0	3.5	5.7	13.8	18.7	12.9
% both B2B and B2C	34.7	63.3	48.0	53.2	18.8	29.8	34.3	26.8	47.2	15.2	33.3
Mean percent of total consumer services conducted on-line ^d	7.2	11.4	19.8	15.9	2.4	4.7	7.2	8.6	17.1	6.0	7.6
Mean percent of total business services conducted on-line ^e	13.6	26.4	10.8	32.2	13.2	18.1	5.7	15.2	31.4	14.5	11.0
% of manufacturing web sites which support ^f											
Product configuration	57.8	38.3	50.7	10.9	98.2	66.5	69.3	66.5	46.0	74.7	54.7
Order tracking	48.0	7.8	4.0	8.8	71.3	56.7	42.2	53.6	61.9	26.6	21.5
Service and technical support	63.1	39.6	22.6	63.2	97.2	69.0	72.9	54.0	21.1	47.7	54.4
Product specification	77.7	96.1	69.3	64.6	98.4	70.6	100.0	80.7	61.9	93.3	79.9
Account information	27.5	35.1	3.5	30.7	30.7	16.9	30.7	40.2	33.7	23.8	17.0
% of wholesale/retail distribution web sites which support ... ^f											
Gift certificates and/or registry	25.2	0.1	28.6	0.6	49.9	12.2	7.1	0.3	59.0	48.8	20.6
Product catalogue	83.4	100.0	85.1	79.6	99.5	98.6	96.5	52.5	99.8	98.1	69.8
Product reviews	53.4	34.0	70.6	50.0	50.1	36.5	96.5	6.0	50.5	2.6	48.6
Ind. customization	52.4	32.4	35.8	59.2	0.7	24.3	5.3	1.7	16.7	0.6	21.3
Account information	54.5	32.4	21.9	40.8	50.1	1.4	25.5	49.3	0.1	1.3	21.7
% of banking and insurance web sites supporting ...											
On-line services such as filing applications, filing claims, paying bills, transferring funds ^f	58.6	35.9	81.0	55.7	12.4	77.3	78.4	96.2	93.5	67.8	53.9
Access to account information	72.8	67.4	38.3	57.9	10.2	61.6	79.8	80.6	18.7	67.8	57.3
On-line tools such as research tools, planning tools, etc.	71.8	65.1	62.2	43.6	3.2	45.8	55.8	74.2	56.1	39.4	52.0

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Percents are based on the full sample (all establishments). Exact wording of question: Are these online services to other businesses or to consumers or to both?

^d Percents are based on the full sample (all establishments). Exact wording of question: What percent of your establishment's total services to consumers are conducted online?

^e Percents are based on the full sample (all establishments). Exact wording of question: What percent of your establishment's total services to businesses are conducted online?

^f Percents are based on only those establishments which have a web-site and conduct business within the specified sector.

Source: CRITO Global E-Commerce Survey, 2002

TABLE A-11. On-Line Procurement, 2002

	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Percent of establishments doing on-line purchasing	74.3	71.0	60.9	67.5	24.6	62.0	40.2	35.5	36.6	32.8	50.8
Mean percent of money spent for direct goods for production is ordered online (all establishments) ^c	10.5	9.2	16.2	16.7	2.6	6.9	3.9	6.8	7.4	20.0	8.3
Mean percent money spent on goods for resale is ordered online (all establishments) ^d	10.7	19.2	13.6	14.4	3.0	6.7	4.8	2.9	4.2	0.0	6.8
Mean percent of the money spent on supplies and equipment for doing business is ordered online (all establishments) ^e	19.3	12.8	12.6	13.1	3.5	7.1	3.2	3.6	6.6	.01	8.3

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Question asked only to those in the manufacturing sector; percent based on all manufacturing establishments. Exact wording of question: What percent of the money your establishment spends on direct goods for production, such as parts and components, is ordered online?

^d Question asked only to those in the wholesale/retail distribution sector; percent based on all wholesale/retail establishments. Exact wording of question: What percent of the money your establishment spends on goods for resale is ordered online?

^e Percent based on all establishments. Exact wording of question: What percent of the money your establishment spends on supplies and equipment for doing business is ordered online?

TABLE A-12. Impacts of Doing Business On-Line, 2002

Percent indicating high impact ^c	Americas			Europe			Asia				Global ^b
	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	
Internal processes more efficient	28.0	53.5	32.9	39.4	37.9	41.8	31.0	42.4	35.1	28.7	33.9
Staff productivity increased	30.8	37.5	40.3	16.5	26.2	18.6	23.9	27.9	39.9	24.3	27.2
Sales increased	24.1	36.2	26.5	24.6	9.3	19.1	25.6	26.1	30.6	1.2	20.5
Sales area widened	35.9	25.4	27.8	19.6	19.1	31.5	48.5	33.0	47.0	3.4	31.4
Customer service improved	40.2	54.9	45.1	44.6	24.1	35.5	36.9	43.9	44.6	11.2	34.8
International sales increased	9.0	19.7	12.8	3.8	13.0	28.1	32.8	33.4	42.3	5.0	19.5
Procurement costs decreased	12.5	20.0	25.1	17.7	6.7	11.2	29.7	25.0	32.4	4.2	17.7
Inventory costs decreased	10.8	13.8	27.9	11.8	3.8	6.2	21.1	24.1	20.7	5.3	14.0
Coordination with suppliers improved	29.2	50.7	34.4	27.0	24.3	14.5	29.4	25.6	43.6	33.8	29.8
Competitive position improved	33.3	45.1	24.0	29.7	12.5	23.1	41.2	38.0	49.5	10.1	29.8

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the sector for each country. Survey sample sizes for Denmark by sector are 69 establishments in manufacturing, 67 in wholesale & retail distribution, and 64 in banking & insurance; by size are 100 establishments classified as SME and 100 as large.

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample sizes by sector are 743 in manufacturing, 701 in wholesale/retail distribution, and 695 in banking & insurance; by size are 1,088 establishments classified as SME and 1,053 as large.

^c Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all", please rate the degree to which your establishment has experienced the following impacts since it began using the Internet for business. A score of 4 or 5 was classified as "high impact".

Source: CRITO Global E-Commerce Survey, 2002

APPENDIX B

**Impact of IT in the Danish Banking Industry,
With Specific Illustrations from
The Nordea Group and Lån & Spar Bank**

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This report forms the industry sub sector study of the report:

**Diffusion and Impacts of the Internet and e-Commerce:
The Case of Denmark
GEC III report**

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ABSTRACT

Danish banks have traditionally been in the forefront globally with regard to the automation and introduction of IT. But, when e-commerce opportunities emerged in the late 90's, the majority of Danish banks resisted the development. They saw no reason to be the prime movers in cannibalizing their own key competitive advantage: the 2,500+ retail-outlets (branches) were placed in all the best locations, on corners of shopping streets². However, once pure Internet banks were introduced in 1998 - 2000, all major banks (and the computing centers servicing the smaller banks) launched massive initiatives to bring the brick-and-mortar banks back into the driver seat using Internet banking. At the end of 2003, more than 30% of all Danish bank customers were using the Internet for banking.

This development in the banking industry is illustrated using two cases. The first is one of the most ambitious attempts at creating a Nordic based international financial service company capable of spearheading the transition to the digital economy - the case of Nordea. This bank is in the midst of various transformation processes across the organization due to several years of multiple cross border mergers and acquisitions, new composition of the group executive management, increase in automation of business processes to reduce costs, and different innovations involving a change of the roles of value network partners.

The other case is Lån & Spar Bank, which is one of the smaller Danish banks, which performs basic IT services at a joint computing centre owned with many other smaller banks, but for strategic purposes, has its own IT development done in-house and in close collaboration with the business units. This bank has been in the forefront in adopting new IT-solutions.

This report consists of an analysis of the background for the development of the Danish banking sectors, the key processes in the Danish banking industry, the environmental and policy factors influencing development, the e-commerce readiness in the Danish banking sector, the diffusion of e-commerce, and finally the impact on efficiency, industry structure, and competition.

The main results are that there are more Danish financial institutions using Internet technologies and Internet applications than in the other nine countries in the GEC survey. Furthermore, we suspect that they have, on average, been using them for a longer period than the global sample. However, when we compare the figures in the GEC survey on the 'Use of Internet for the different business processes,' and 'Online support,' the number of Danish financial institutions having Internet applications is not higher than the other nine countries.

Furthermore, when we look at the GEC survey data for the 'Impact of doing business online,' we see a corresponding picture of more or less the same percent of Danish financial institutions reporting high positive impacts from using the Internet as we find in the other countries.

² Only a few smaller banks like Lån & Spar bank started experimenting in 1995, when customers conducted 7,700 transactions online

If we limit the discussion from all financial institutions to just banks, we believe that Danish banks are in the forefront globally when it comes to the adoption of IT in general, and Internet related technologies in particular. The main reason why the figures do not show this is one of perception and relative change. Danish banks have had a joint IT-infrastructure for approximately 30 years, and they have worked on improving business processes and self-service for a very long period, based on an effective infrastructure which does not exist as efficiently anywhere else. Consequently, the added value of Internet and related technologies has not been that revolutionary as we find in most other countries.

But this does not mean that Danish banks are trailing behind in the Internet revolution. It is our conclusion, in spite of the GEC-survey data, that in looking at the financial sector, Danish banks are in the forefront globally, when it comes to the use of Internet and related technologies for improving their business processes and self service to customers. Most financial institutions are past the so-called transaction stage and trading stage. They are now entering the stages of online assisted advice to customers and straight through processing (STP), with a total integration of online customer transactions within the main bank's systems (i.e. for credit scoring).

DANISH BANKING INDUSTRY

The Danish finance industry investigated in the GEC survey included banks, insurance companies, financial advisors and other financial institutions. However, in this paper, we shall concentrate on the banking sector, which in itself is complex enough.

Banks can be classified into three types of institutions: commercial banks catering to industry/commerce; saving banks catering to households and their savings; and "realkreditinstitutioner" (mortgage banks) providing housing loans for private consumers as well as businesses.

Over the more than 100 years of existence, the borders between the three types of institutions are getting blurred, and today the differences are clearly diminishing. Almost all retail banks are becoming more like financial supermarkets catering to all types of customers and all types of banking business, drawing upon specialized financial institutions for special tasks. Mortgage banks are approaching retail banks and commercial banks through the establishment of retail banking activities. In the future, the difference is likely to disappear. Below we shall concentrate exclusively on the commercial banks and the savings banks – the Danish Retail banking sector.

In the early 70's there were approximately 300 savings banks and about 80 commercial banks. This number has been substantially reduced since. In the early 90's the two largest banks merged to become Danske Bank, and within less than six months, the third, fourth and sixth largest banks merged to become Unibank. With these moves, Denmark had two banks which were large enough to compete with 'anybody' in the Nordic region. Since the early 90's, the number of banks has decreased every year as shown in Table 1, covering the period from 1992 - 2002. This also illustrates the growing concentration and rationalization, which has occurred during the last decade.

TABLE 1. Figures Describing the Danish Banking Sector

	1992	1997	2002
Number of Danish bank head offices	210	191	181
Foreign banks in Denmark	6	15	17
Number of branches of Danish banks	2,467	2,178	2,067
Number of employees in Danish banks	52,161	42,283	42,634

Source: www.finansraadet.dk/fakta+om+finanssektoren#2 (December 2003)

In spite of the large number of banks, the concentration in the finance sector is very high. The two largest banks together have approximately 75% of the total balance, as shown in the following list indicating market share measured on balance:

- Danske Bank: 50.5%
- Nordea (Danish part): 23.4%
- Jyske Bank: 5.0%,
- FIH: 2.8%
- Sydbank: 2.8%.

The next 17 banks share 9.8%, followed by 71 banks with a total balance of only 5.0% of the market. The remaining 88 banks share just 0.4% of the Danish market. (<http://www.finansraadet.dk/fakta/>)

Another way of expressing the level of concentration is the so-called CR5 concentration ratio, expressing the market share of the five largest banks in a country. For 1999, the CR5 ratios were Sweden (85), the Netherlands (82), Denmark (81), Belgium (80), Finland (68), Italy (48), France (46), Austria (43), UK (30), Germany (16), and the EU average (57). (Konkurrence- og forbrugerstyrelsen, Copenhagen, 2002).

However, the number of banks is still high, considering a population of only 5.3 million in Denmark. The reason for the large number of small banks still in existence is primarily the strong joint institutions supporting all Danish banks (large or small), and the fact that all small banks are serviced by three large IT centers.

If we look at the total number of branches, Table 1 shows a small reduction over ten years. This means that the number of inhabitants per branch is going up, and in 2003 the figure is a little over 2,500 inhabitants per branch, on average. This figure is just a little lower than the EU average and pretty close to the figures for France, Germany and the Netherlands (<http://www.finansraadet.dk/fakta/>).

Over the last ten years the number of employees in the banking sectors has also gone down from around 1% of the total population in 1992, to a little less than 0.8%, which is pretty much the average in the EU. This could indicate that there are little differences between the banking systems. However, it is our opinion (supported by different representatives from the Danish banking industry) that there is a much higher level of automation in Northern Europe, a higher percentage of customers serving themselves, and a much larger variety of banking services offered by banks in these countries than in Southern Europe.

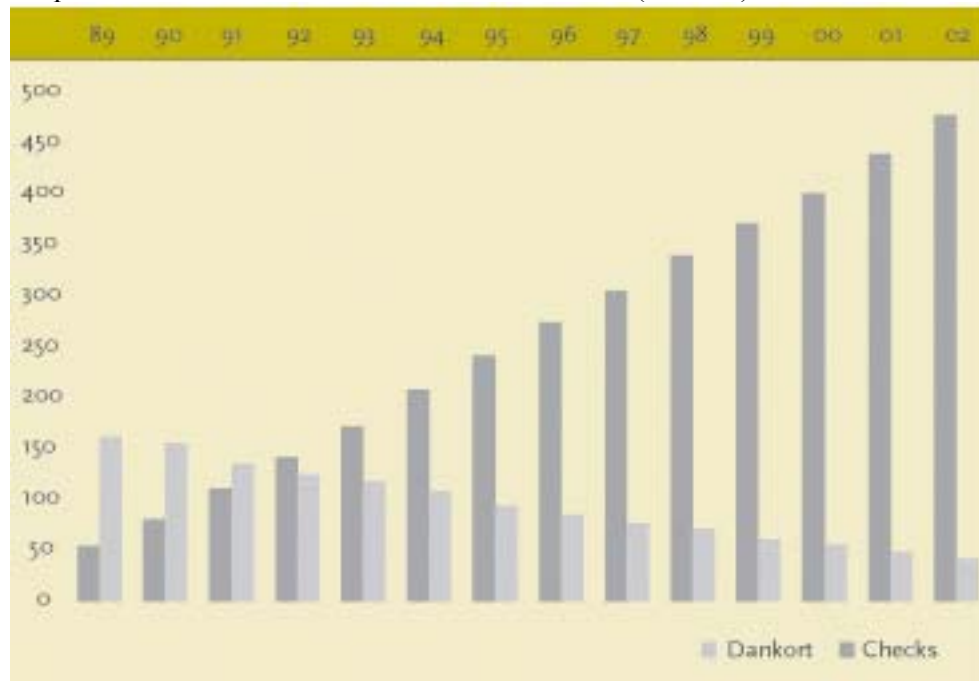
EARLY IT SYSTEMS FOR THE FULL BANKING SECTOR

In the first decades after the Second World War, a number of joint banking institutions were established in Denmark. These were aimed at increasing efficiency in a banking sector with far too many small players by providing a joint system for every bank to use. A major reason was that if such systems were developed, it would be possible for even very small banks to avail themselves of paying only a fraction of the costs, compared to banks developing systems themselves. A second reason was that none of the banks at that time could establish such an infrastructure just for themselves.

Compared to other countries, Denmark has an exceptional well developed IT-infrastructure for all banks. Good examples of such joint systems for the entire Danish banking sector including subsidiaries of foreign banks are:

- PBS from 1970/71. This organization was created to handle all transfers of funds between banks electronically. This was especially important for check clearing, which became totally electronic from the early 1980's. This means that the bank who receives the check keeps the physical paper, and the full clearing is done electronically.
- Multiløn (joint salary system) created in 1969 to facilitate payment of monthly salaries from the bank of the employer to the banks of all the employees.
- Swift, the European network between banks first established in 1977.
- VP (Værdipapircentralen). After a slow start and a lot of political debate over almost five years, the VP Securities Services Company was established in 1981 in order to electronically handle all transactions in bonds and shares. From 1983 bonds were transferred from paper and in 1988, after a lot of reluctance on behalf of Danish businesses fearing "big brother" interventions, all shares were transferred to the system. As far as we know, Denmark was the first country in the world where all securities were stored and traded electronically. From that time, banks and dealers would integrate their systems directly into VP systems for the execution of trading and the operation of the database with all Danish securities.
- In the late 1980's, all Danish banks agreed on a joint standard for exchange of data, the so-called UDUS standard (Schou,1995) and the development of the PI-net, to increase communication.
- PKK 1981, which was established to launch and manage a national debit-card for all adult Danish inhabitants. The debit card (Dankort) came into existence in 1983. Since a debit card transaction would cost less than 10% of a check transaction, the purpose was to get Danes to use the debit card instead of checks for all payments except small purchases, where cash would be used. The debit card has been an overwhelming success as shown in Figure 1. In 2002, 3.3 million Danes conducted 477 million debit card transactions, i.e. more than 145 per card. In the same year, the number of checks has fallen to 16 a year per person. At the same time, the average amount on a debit card transaction has fallen to approximately 45 Euro, while the average amount for checks has gone up to 227 Euro (<http://www.finansraadet.dk/fakta/>). Furthermore, it is interesting to note that there are about five times as many debit card transactions as there are credit card transactions in spite of the fact that most Danes do not pay anything for the 4 – 5 weeks of credit on a credit card.

FIGURE 1: Development in the Number of Checks and Debit Cards (Dankort) Transactions



Source: <http://www.finansraadet.dk/fakta/> (December 2003)

An illustration of the infrastructure is found in Appendix 1, which shows that all basic computing is done in six computing centers³. The figure shows how ‘all’ shops in Denmark through the use of POS systems are linked directly to the joint PBS clearing house. When a consumer makes a debit card transaction in the shop, the data goes to PBS, where the data is sent to the IT-system of the customer’s bank to be withdrawn from the account of the customer. At the same time, the amount is placed in the account of the shop within its IT-system. This is all done automatically in real-time. All ATM transactions first go to the IT-system of the bank owning the ATM and from there immediately to PBS for redistribution. Finally, Internet-bank transactions and Interactive Voice Response (IVR) goes directly to the IT-centers of the banks, and from there to PBS as illustrated using the Lån & Spar Bank as an example.

- ATM’s from 1984. Initially, unions resisted the introduction of ATMs and were supported by government. Accordingly, the widespread diffusion came later than in most other advanced IT countries, but when they were finally launched, all ATM’s outside the branches were part of a joint system, i.e. no matter which bank had issued the debit card, cash can be withdrawn from any ATM in the country.

Over and above these systems for all of the banks including foreign banks, joint-computing centers for a range of banks have been in existence since the 60’s. The joint computing centre for all savings banks (SDC) has played a major role, just like two computing centers owned and operated jointly by the smaller and mid size commercial banks. These three joint computing

³ In actual fact, two of the three largest banks have outsourced the operations of their IT-centers to IT Facility management companies like IBM and CSC, but conceptually/logically their computing should be seen as being their own IT-function.

centers have managed to provide state-of-art computing for their owners (even though some commentators believe that two of them are now falling behind in the provision of state-of-art solutions – Børsen, December, 2003). But the third one, SDC has even developed the ‘Core Bank’ system launched in 1998, which for several years has been the prime banking application package sold by IBM. For the last few years, responsibility for development and marketing of the system was in the hands of Fidelity, a US based SW-vendor. Currently this seems to be one of the most advanced banking systems globally.

But the existence of these three joint computing centers has also meant that it has been possible for a very small bank to stay in business. All computing was outsourced, and it was possible to utilize all the standard systems like electronic fund transfer and securities administration. Last but not least, the customers in the small bank could have the full benefit of the debit card system, have access to cash withdrawal from several thousand ATM’s across the whole country, and utilize the full banking infrastructure.

These joint sector benefits for smaller banks were even extended to pure Internet based banks appearing in the late 90’s. They could also avail themselves of all the joint institutions. As a board member of Basis Bank (one of the most highly profiled Internet banks) explained in 2001, “the initial investment in getting access to all the joint services including a state-of-the-art banking computing system was less than 1 million Euro” (CEO of Icelandic Banken, 2001).

FACTORS INFLUENCING THE DIFFUSION AND IMPACT OF E-COMMERCE

From the mid 1960s, Danish banks were in the forefront internationally with regard to using IT. For example, the first online, real-time system with cashier terminals in the branches was introduced as early as in 1969. In this process, as in almost all other IT innovations in the 60’s and 70’s, IBM played a strong role in motivating the use and adoption of IT, and in many cases Danish banks were guinea pigs for new applications. For several decades IBM had a market share of IT to Danish banks of more than 60%, much more than in other countries.

The most important reasons for this early adoption/automation had to do with having tightly controlled banking systems (restricting competition), relatively high salaries of employees (among the three highest in Europe making automation relatively more attractive), shortage of labor in many years, and a relatively high level of education enabling the development and introduction of new IT.

The high level of unionization in the banking sector (>90%) was a major factor influencing computerization. In the late 70’s unions resisted the introduction of new technology due to risk of lay-offs and risks of demeaning of jobs. However, after technology agreements had been established between unions and management in the banks in the late 70’s, and after the initial distrust had prevailed for a couple of years, the unions became a trusted partner in the introduction and diffusion of new banking applications. Unions among other things were strong supporters of joint banking solutions, and since they had good links to government, there was a societal pressure for the banks to join forces in sharing the ATMs, rather than each establishing their own ATM infrastructure.

Government also contributed to making computerization almost mandatory through the introduction of a number of requirements. These included a so-called “additional labour market pension” (forcing all employers to keep track of the collection and transfer of these small amounts), the introduction of ‘pay-as-you-earn-tax’ in 1970, and requirements for banks to report interests earned and paid by all citizens for tax-declaration purposes. These requirements made it necessary for every salary earner to have a bank account where salary after tax is deposited. But the government also facilitated computerization through the introduction of the personal ID number, making it rather easy to identify customers across accounts.

Furthermore, the government restrictions on lending (to avoid overheating of the economy from 1970 to 1980) and from the mid 70’s on maximum interest margin, strongly reduced competition among banks to a question of offering (free) services including the number of banking outlets. This strongly regulated banking market furthered the establishment of a joint infrastructure and collaboration between the banks, but it was also a strong inducement for increased automation.

From the early 90’s, banks in Denmark started offering PC-solutions for B2B as well as B2C customers, and towards the end of the 90’s, all banks in Denmark were offering and strongly promoting the use of Internet-based banking.

The CRITO Global survey in Tables 9 – 11 in the main report provides an overview of the key drivers for e-commerce as reported by the financial institutions surveyed⁴. Looking at the figures in Table 11 specifying the drivers for the finance sector, we find that no less than half of the Danish financial institutions mention cost reduction as a key driver. This is especially interesting compared with the similar figures for Germany and France, where less than a quarter of the institutions mention this driver. Other key drivers mentioned by 40–50% of the financial institutions were “coordination/communication with customers,” “that customers demand it,” to “expand the market for existing products,” to “enter new businesses or markets” and last but not least “because customers demand it.” Again for all of these drivers, it is interesting to note that there are approximately twice as many Danish financial institutions mentioning these drivers than we see for German and French institutions.

The fact that about half of the financial institutions surveyed indicated that “customers demand it” and that “major competitors were online” as key drivers is interesting, because it underscores that in the early days of Internet banking, most of the banks were not too keen on embarking upon Internet-based banking. This pressure from the market is interesting, and we believe a reflection of the marketing efforts and the relative success of pure Internet banks. The brick-and-mortar banks already had huge investments in branches on the most attractive locations, i.e. on the corners of the shopping streets and in the shopping centers. This was their competitive advantage, which had been established over a period of over one hundred years. Accordingly, the established banks did not welcome the advent of pure Internet banks. Of course they wanted to reduce their own costs by providing their customers with self-service facilities, but they saw no

⁴ Please note here that the GEC survey is a representative survey of all institutions in the finance sector, not just banks. As such, this could account for some of the differences which are not easily explained. However, great care has been taken to avoid any systematic difference in the way the Danish sample has been selected compared to the way it has been selected in the other countries.

reason why they should ‘teach’ the customers to use Internet rather than the branches, which provided them with a competitive advantage.

It was only when the traditional banks were threatened by what in the early days looked like a huge rallying behind pure Internet banks that they sped up their development of Internet applications for customers.

The Internet banks received a lot of press in 1999 and 2000, but since then the brick-and-mortar banks were capable of meeting the challenge and coming up with similar Internet-based solutions. Since it turned out that bank customers were much more loyal than most believed, (customers are even prepared to pay a premium fee and/or higher interest for having a traditional bank) a major shift to pure Internet banks did not occur.

KEY PROCESSES IN THE VALUE CHAIN

To get an impression of the Danish banking scene, and the key processes in the value chain, it could be useful to look a little closer at the case of Nordea (short for Nordic Ideas), the largest bank in the Nordic countries, and the second largest in Denmark.

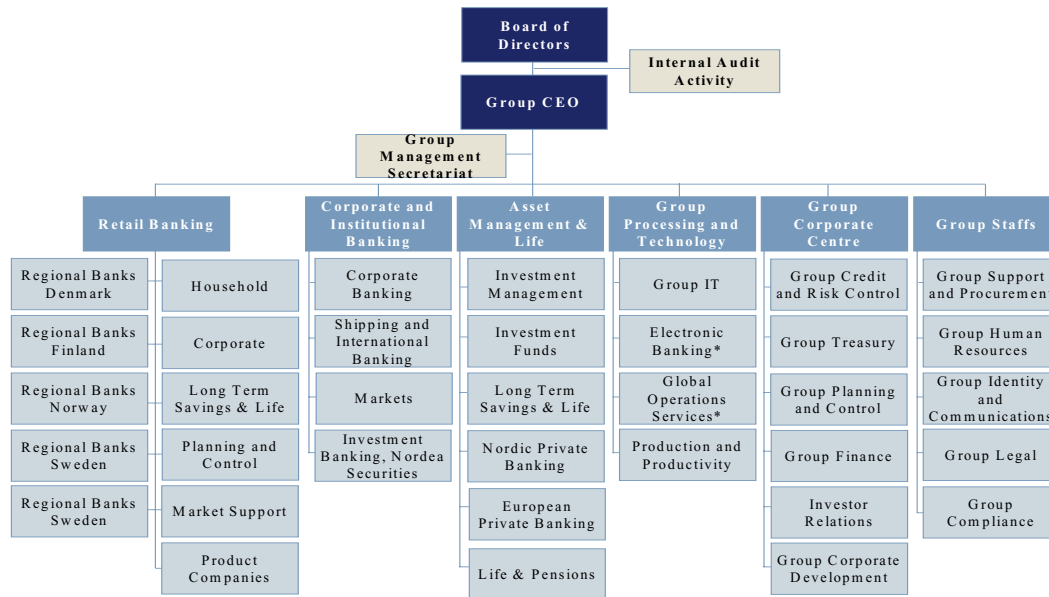
A brief historic outline of the Nordea Group reveals an ongoing process of mergers and acquisitions. The merger of the two groups MeritaNordbanken and Unidanmark (parent company of Unibank) resulted in the creation of the Nordea Group in March 2000. In 2002 this was the largest financial services group in the Nordic and Baltic region. The group is listed on the stock exchange in Copenhagen, Helsinki and Stockholm, and had a market capitalization of EUR 15.6bn at that time.

Nordea has significant positions in Nordic banking markets, i.e. 40% market share in Finland, 25% in Denmark, 20% in Sweden and 15% in Norway. Also, in the Nordic insurance market, Nordea has significant positions.

One might get an idea about the key processes in a large financial supermarket like Nordea by looking at the organizational chart shown in Figure 2, where one can notice the separate but joint function of Electronic Banking placed as one of the Group Processing and Technology departments.

Nordea operates in three business areas: Retail Banking, Corporate & Institutional Banking, and Asset Management & Life. Each business area is responsible for financial results, customer relations, distribution, products and business development and support. In 2001 the revenue split between the different business areas was approximately: Retail Banking 71%, CIB 21%, and Asset Management (including Life and General Insurance) 8%.

FIGURE 2. The Organizational Chart of the Nordea Group



Nordea has three vital support functions:

- *Group Processing and Technology* includes Group IT, Electronic Banking, Global Operations Services and Production and Productivity.
- *Group Corporate Centre* includes Group Credit and Risk Control, Group Treasury, Group Planning and Control, Group Finance, Investor Relations and Group Corporate Development.
- *Group Staffs* includes Group Support and Procurement, Group Human Resources, Group Identity and Communications, Group Legal and Group Compliance.

Nordea has a customer base containing 9.7 million private customers, 1 million corporate customers and 500 large corporate customers. The distribution network of Nordea is the most comprehensive in the region entailing 1,245 bank branch offices in 22 countries, and 40,000 employees.

On their website, the Nordea bank is stating their policy in the following way:

Being a universal bank and bank assurer, Nordea offers a broad range of financial solutions and advisory services, focusing on opportunities for cross selling and up-selling. The role of branch offices is changing into focused service, advisory centres and sales offices along with the intensified use of the Internet, call centers and mobile banking. Nordea is and aims to remain a world e-leader in e-based financial solutions.

We have chosen to cite this quote in order to indicate the key importance that the Nordea bank is attaching to the Internet and e-banking. Even though the Danish part of Nordea is not the most

advanced in the group, the Nordea Bank has one of the largest total number of online customers with 3.3 million online at the end of 2003.

Another example of advanced use of IT is the small bank called Lån & Spar.

In the late 1980's, while a recession was going on in Denmark and the 6 biggest banks decided to merge into the two megabanks Danske Bank and Unibank, a small bank called Lån & Spar Bank decided to go on its own.

With only 15,000 customers and ranking as bank number 42 in the country, the future was quite challenging. However, Lån & Spar decided to develop the rather new concept of a 'Direct Bank' for private customers building on a high exploitation of technology, since it did not have a huge branch system. (CRIM, London Business School, Lån & Spar Bank A/S: Building a Direct Bank. Case A+B Michael Earl).

Launching two new concepts at the same time – a direct concept offering some PC-banking services at attractive prices and a service concept offered through the branch system - attracted a lot of new customers.

Being a member of Savings Banks Data Centre (SDC), L&S had outsourced its basic IT with mass transactions to SDC, but at the same time L&S hired programmers to offer private customers advice electronically and later on more complex transactions.

Part of the strategy was customer segmentation. Not only did the bank exclude all corporate customers, but it also decided to make the bank especially attractive to white collar workers and academics. (Markides, Costas: All the right moves. HBSP, 2001).

In 1992/93 Lån & Spar Bank launched the first advice applications on diskettes that included budget programs, tax calculations, price comparisons, fee comparisons etc. From 1995 the applications were launched on CD ROMs. Presently, the bank has issued more than 1 million diskettes and CD ROMs for free to the Danish population.

In 1993 the bank took the initiative to launch the first real-time, online PC Bank in the world. They enabled their customers to access their accounts directly at the data centre (SDC) to do banking business on their own.

In 1997/98 Lån & Spar Bank, together with two other members of the data centre, launched the first full-service Internet bank in Denmark, the so-called Lån & Spar Nextbank. They were technically able to do this earlier, but the number of Danes having access to the Internet was rather limited at that time. In fact, Internet banking became one of the biggest drivers to attract people to the Internet.

L&S has continued its focus on electronic services to customers. Since 1993 it offered a public accessible chat room open to all its customers. Initially it was offered as a Bulletin Board, and since late 1995 it was offered directly on the Internet. In the year 2000 the bank introduced a B2E (Business-to-Employee) virtual bank concept, where L&S offers a co branded banking

solution for employers and trade unions, carrying the name of the employer or trade union in question, but based on all the L&S banking solutions.

Today Lån & Spar Bank is ranked as number 12 in Denmark with approximately 150,000 customers still pursuing differentiation by tailoring their services on top of the outsourced mass transaction system. Lån & Spar Bank offer services through 15 branches and 25 co branded virtual banks.

E-COMMERCE READINESS

For the traditional banks, the question of providing e-banking was primarily a question of the IT architecture and IT applications. To a lesser extent, it was a question of changing business processes, training staff etc.

If we look at the IT-status in the six IT-centers (the three owned by the largest four banks plus the three joint centers serving groups of smaller banks shown in Appendix 1), there was a relatively high level of flexibility and agility to meet this new challenge. Among these, Danske Bank and SDC have integrated state-of-the-art architectures and customer interfaces, (e.g. all accounts and all other relationships with a customer were integrated into one consolidated overview) and these two IT-functions could provide relatively quick Internet solutions.

However, the IT situation in Nordea was much more challenging. This is mainly a consequence of the many mergers and acquisitions where a joint IT infrastructure had not been enforced as we see in Danske Bank, where every time they merged with another bank, they rolled out the Danske Bank solutions in that bank. This situation in Nordea is still a huge challenge when the ambition is to provide state-of-the-art online solutions to the consumers.

For Lån & Spar Bank the situation to some extent is much easier. They get their basic IT-services from the joint computing centre SDC, primarily handling all mass transactions, and they have a leading role in deciding the actual development of IT-solutions in SDC. The three largest shareholders of SDC, Spar Nord Bank, Amtssparekassen Fyn, and Lån & Spar Bank have all contributed to the IT development for the last 8-10 years. Amtssparekassen Fyn played a key role in the development of a totally new 'Core Banking System' launched in 1998, which today is capable of providing state-of-the-art banking services. For several years this was the banking application sold by IBM as their standard application, but sales/support of the package has now been transferred to a US-based company called Fidelity Information Services, Inc.

On the other hand, Spar Nord Bank and Lån & Spar Bank were the key drivers in developing self-service for customers. Lån & Spar Bank, especially, has worked for years with a strategic driven IT development. One might say that L&S is developing the banks business strategy with a strong focus on IT, or that IT strategy is a consequence of the bank's corporate strategy. At any rate, it is the corporate strategy of L&S to move from the early stages of e-business to a stage where e-business is totally integrated into the business strategies.

DIFFUSION OF E-COMMERCE IN 2003

The financial sector has been aggressive in using e-commerce as a strategic tool and as a means of reducing processing costs. From 1999 to 2000, the numbers of customers using the Internet to complete banking transactions doubled (Ministry of Information Technology and Research 2000), and there has been a strong growth to around one-third of all customers using e-banking in 2003.

All Danish banks pursue a Multi-Channel strategy, where customers can combine their use of channels and select the most convenient channel at any given moment. High accessibility, integration and efficient business processes in all channels, is seen as one of the most important means to provide services that meet customer's expectations and ensure the highest level of customer satisfaction.

The tremendous change in the way in which basic bank transactions are carried out is illustrated in Table 2 showing the changes in the number of transactions using the different challenges. It is especially worth noting the tremendous relative drop in the number of cashier generated transactions since the mid 90's where it was 46.4% to November of 2003, where it only accounts for a meagre 6.8%. This is counteracted by the similar increase in the number of online transactions which have gone from 0.9% in September of 1994 to close to half at the end of 2003.

TABLE 2: Monthly Number of Transactions Generated Using the Six Different Modes of Interaction in the Lån & Spar Bank

	September 94		1.1.1.1.1.1 June 1997		November 2003	
	Number	Percent	Number	Percent	Number	Percent
Cashier transactions	398,000	46.4	408,000	29.2	200,000	6.8
Payment systems EFT	53,163	6.2	102,727	7.4	161,304	5.6
ATM transactions	37,345	4.4	55,592	4.0	67,719	2.3
Interact. Voice Resp.	60,440	7.0	100,480	7.2	75,576	2.6
Debit card transaction	301,655	35.1	592,929	42.5	1,082,016	37.0
Online banking	7,627	0.9	134,900	9.7	1,334,446	45.7

We do not have comparable figures for the banks in the CRITO sample, but the figures are put into perspective by a report from Forrester (2003), which indicate the percent of transactions in 2003 (excluding debit card transactions) in a typical European bank: ATM (52%), cashier (26%), online (17%), and call centre (5%). Indeed, the difference is huge. In the same report, Forrester is estimating that the typical European bank will not have online transactions reaching the same percentage level as L&S bank until 2009. Danish banks seem to have adopted a 'right-channelling' approach, and in the words of Forrester: "The efficiency gap between the right-channelling leaders and the laggards will widen as highly leverage able electronic channels substitute for human channels. The leaders will be able to post disproportionate gains in customer service and transactional efficiency ... (as found with) right-channelling masters like Danske Bank" (Forrester 2003 p 11).

If we look at the number of financial institutions offering online services, account information and online tools as reported in Appendix 10 of the main report, it is clear that the number of financial institutions offering these services online in Denmark is only on par with the average in the global sample, and clearly behind the US, Brazil, and the four Asian countries. We do not have a good explanation for this.

However, if one looks at the potential ways of using Internet and related technologies for banking applications, it is possible to identify four levels of ambitions:

- Transaction stage – customer individually handles payments and transfers from own account to others, and to a large extent debits and credits to personal accounts takes place using EFT. This has been in place for all Danish banks since 2000. What still lacks is making all customers serve themselves.
- Trading stage – here the customer will buy and sell stocks/shares electronically. Systems for this are also now in place in all banks in Denmark, and in a handful of pure Internet businesses, but since there is not a culture for owning shares in Denmark like in Sweden or the US, this does not have the same widespread adoption in Denmark.
- Advice stage – portal solutions where customers can ask financial advice (i.e. when buying a house), and where the customer and the bank clerk see the same screen. This is still not technically possible in most Danish banks. Customers have their (often much more fancy and newer interface), while bank clerks have more traditional interface systems built as interfaces directly on top of the transaction systems. These systems are likely to come into effect in 2004/2005.
- Straight Through Processing (STP) - stage based on automatic behavioural and credit scoring models will be in place in 2005/2006.

As indicated above, Danish banks have a long tradition of being in the forefront globally when it comes to the adoption of IT. However, if we look at one of the two large banks, we get a different picture. If we focus again on Nordea, they offer a variety of e-business solutions to their B2C as well as their B2B customers. Some of the most important examples are presented below:

E-payment and Solo Market. Internet customers can make secure online purchases using e-payment. In 2002 Nordea had over 1,800 e-payment agreements with vendors who accept e-payment and more than 600 are represented at the electronic marketplace Solo Market, accessible from the national web site in Denmark, Finland, Norway and Sweden. Online buyers thus have convenient access to a wide range of goods and services - including customers using WAP and GPRS phones.

For e-commerce vendors, net customers are an ideal target group, sufficiently large in number, familiar with online operations, and modern attitudes and purchasing power. By accepting e-payments, vendors eliminate invoicing and credit risks. This is particularly important with a large number of small transactions.

Furthermore, via Solo Market, vendors get access to buyers in market places in Denmark, Finland, Norway and Sweden. Nordea's local home pages (www.nordea.dk, www.nordea.fi,

www.nordea.no and www.nordea.se) have become important portals, as an online customer typically visits the e-banking services 4 to 5 times on average a month, via these portals.

E-invoice. E-invoice is a kind of semi-direct debit - an e-invoice sent to the customer's or buyer's computer rather than printed on paper. A company that uses online invoicing saves on postage costs and can provide better service in an interactive online customer relationship. A customer using e-invoice can receive an invoice directly to their computer, and approve payment without having to retype the details. Via this online invoice, the customer can also link to the online service of the vendor in order to obtain more information. The main emphasis has been put on consumer invoicing. B-2-B invoicing is going to be the next step.

E-identification and E-signature. Many enterprises and public sector institutions need to be able to identify their online customers/clients. As early as 1992, the insurance companies in Finland began to use bank delivered e-identification. For example, in dealing with authorities, this service can be used to send information to the corporate register maintained by the National Board of Patents and Registration of Trademarks. Net customers can also sign agreements with third parties using their electronic ID's as a signature. There is also significant potential for an electronic signature of contracts. Since April of 2003, e-signature has been available in Denmark, but at the end of 2003, the uptake is still far from 10% of the population.

E-salary. E-salary is a service designed to enable employees to browse through their monthly salary data electronically via e-banking services. Thus, the sending of a pay slip on paper will no longer be necessary. Another substantial benefit is that the pay slip details are saved in files, thereby providing the user access to earlier salary data.

Another similar innovation has been the launch of **e-box** in March of 2001, jointly owned by the Danish Post, DM-data and Kommunedata (Joint-computing centre for municipalities and regions). The idea here is to avoid sending invoices, account statements, etc to consumers and instead send the documents to a joint database, where the consumers can download it but also store it forever. For the consumer there are no costs involved in maintaining an account, and it is even possible to store electronic versions of private documents (birth or marriage certificates, deeds, etc) in a safe place. For the sender (public institutions, utilities, banks and others who send millions of letters every day), this represents a huge saving, since they do not have to pay postage or print material. Furthermore, the consumers would always be able to find copies of old statements, and there would not be a need to send out copies to people who have lost documents. After a slow start, and after a lot of advertising, including the sponsoring of one of the most popular national teams, this has taken off. At the end of 2003 there was around 250,000 consumers who had a part of their formal communication with public/private institutions including bank statements stored here.

CoinClick (www.coinclick.dk) is a micro-payment system allowing service providers to charge for small amounts in a very easy, secure way. It was developed and launched in August 2002 by the two largest banks in Denmark (Danske Bank and Nordea), in cooperation with the association of regional banks, the electronic payment processing company PBS, and the largest Danish telecom operator TDC (Tele Denmark Communication). Among them, these

organizations have 1.5 million Internet banking customers and 1.9 million users of mobile services.

CoinClick is an Internet account - a type of 'web wallet' – for the payment of small sums ranging from approximately 8 cents to 8 Euro. Users can establish an account on Coin Click's home page or via their net bank. By using CoinClick, customers can easily pay for digital services (music files, invoices, financial advice and sports news, etc.) using Internet and mobile phones.

CoinClick offers two types of accounts: Payment in advance and payment in arrears. While the former is free, payment in arrears accounts cost only one DKK (app 0.134 Euro) per month for the buyer. For vendors, fees depend on sales volume, but will typically be around 10%.

The adoption of CoinClick has been very slow compared to expectations and original business plans. The number of registered users has gone up from 250,000 in 2002 to 300,000 in 2003, and the number of vendors has increased to 13 by the end of 2003. However, the actual number of transactions is still disappointingly low and the turnover is less than 100,000 Euro/year. It seems that the only way to make money selling content over the Internet in Denmark is on a subscription basis. In fact, the uptake has been so low that the banks are contemplating closing the system.

Identrus™ LLC and SWIFT on TrustAct. Identrus is a provider of global e-commerce trust systems that delivers validation and warranty protection for B2B e-commerce.

SWIFT (www.swift.com) and Identrus™ LLC (www.identrus.com) have entered into an alliance to offer a joint solution to facilitate B2B trusted communication. Based on Identrus' identity trust services and Swift's messaging capability, financial institutions all over the world can help their corporate customers identify trading partners, trust their communications implicitly, and protect themselves in the event of a dispute.

Swift's Internet-based messaging service, TrustAct, enables banks to provide secure delivery and receipt of messages that businesses exchange on the Internet. In addition, TrustAct keeps a log of business-to-corporate business messages and provides full non-repudiation. This non-repudiating evidence, together with the Identrus system's non-repudiation of digital signatures, is essential for audit trails or dispute resolution.

In June 2002, Nordea agreed with the e-market place for the forest industry, PapiNet (www.papinet.org), to use TrustAct. Hereby, Nordea integrates banking into e-business flows of the global forest industry. PapiNet was initiated by the forest industry to facilitate standards of communication and commerce.

PapiNet is the global initiative to develop, maintain and promote the implementation of global electronic transaction standards for the paper industry. The purpose is to facilitate the flow of information and facilitate computer-to-computer communications among all parties engaged in the buying, selling, and distribution of forest, paper and wood products. The set of standards is referred to as the PapiNet standard. The standards include common terminology and standard business documents (e.g. purchase orders, shipping notices, and invoices).

Nordea and PapiNet have modelled a solution to integrate security and banking services into the business-process messaging of the global paper industry. The joint solution provides cost reduction potential for PapiNet members due to integrated financial and business-process messaging, simplified dispute resolution, and global Internet-initiated payments provided by the bank of their choice. The solution builds on Identrus PKI security and Swift's TrustAct messaging infrastructure. It covers the entire value chain from order to settlement.

The various e-business initiatives for Nordea have proven to be a large success, as illustrated in the following numbers for 2002:

- 3,300,000 e-customers of the 9.7 million private customers (34%)
- 110 million Internet log-on per year
- 125 million Internet payments per year
- 5+ million calls per month – and 85% of the calls stay in the IVR

With its more than three million Internet users in mid 2002, the Nordic Nordea bank, which covers all of Scandinavia, had approximately the same number of Internet users as Bank of America, but has more Internet transactions than any other bank in the world (Interview with e-Business director Jens Galatius Nov. 2002).

Also, the numbers show that Nordea is well ahead in the transformation from a traditional bank to a click-and-mortar bank.

One of the most interesting future challenges lays in mobile payment systems where there are potential new entrants to the market for payment systems (i.e. the Telco's). To address this issue and assist banks, an international forum has been created. Mobey Forum is a global, financial industry-driven forum with over 30 members. Mobey Forum's mission is to encourage the use of mobile technology in financial services. Nordea is one of the founders of Mobey Forum. The common denominator for all Mobey Forum members is their commitment to accelerating the take-off of user-friendly mobile financial services by promoting open, non-proprietary technology standards for services like payment, remote banking and brokerage.

Nordea believes that mobile net-terminals will play an increasing role because it is personal and trusted. Everyone will have a terminal, it is always ready at hand, and with the advent of three G UTMS networks, it is always on. It will eventually be connected to the Internet all the time. It can be a card reader for one-hand operated e-bank-logons and card payments. Bluetooth and similar technology make it ideal for machine-to-machine interaction.

There is divergence of opinions on Telco's future interest in, and ability to provide efficient payment services in competition with banks. Nevertheless, it is an increasing threat for banks that value network partners as Telco's - who previously provided all types of communication access, and are now engaging in providing payment solutions to customers – a threat that is not only prevailing on the B2C market, but also on the B2B market.

Payment methods related to mobile phones can broadly be classified into two categories: e-money (pre-paid cards as well as network-based electronic money) and "conventional" electronic

payment systems (i.e. bank account transfers) through wireless access, where new electronic access to otherwise conventional payment mechanisms is provided. Payments by mobile phone further contribute to blurring the distinctions between the participants in payment systems (banks, non-bank financial institutions, telephone companies, Internet access providers) (Arbussá, 2000).

To conclude, although banks nowadays continue to be at the centre of the retail payments system in Europe, the role of financial intermediaries in the provision of payments systems is changing. Since electronic payment technologies require large fixed investments and often networks that exhibit significant economies of scale, we are witnessing a process of alliances among firms that intervene in payment systems. These alliances are not confined to banks or other financial institutions, but include technology vendors and telecom operators as major participants.

IMPACT ON EFFICIENCY, INDUSTRY STRUCTURE AND COMPETITION

With regard to the impact on industry structure, the two large banks in Denmark (Danske Bank and Nordea) are still supporting most of the joint banking system for all banks in the country, including the joint debit card (Dankort) based on magnetic-strip technology. All banks in Denmark have also joined forces to launch a chip-based Dankort by mid 2004. The fact that all banks in Denmark share a common infrastructure for many banking applications (Dankort, ETF, securities etc.) makes it extraordinarily inexpensive for new players to enter the market.

Furthermore, the joint infrastructure for the whole industry, and the joint development of e-commerce/e-business applications for the smaller banks are two strong factors mitigating against major changes in the industry structure (first and foremost mergers), in spite of the very large technology related economies of scale.

Increased price transparency has often been hailed as one of the key effects of the Internet. It has been argued that customers are now in a much better position to compare prices of the different banks on services such as loans, securities and deposit interests. That is the case, even though banks in general try to avoid price comparisons and direct price competition. The fact is that customers have used this transparency only to a very limited extent to get better deals or to change to pure Internet banks. Brand (and bank) loyalty seems to be very high, and the few pure players only have less than 5% of the customers, even after massive advertising campaigns, both offline and online. A major contributing factor to customers not changing to Internet banks has been that the same services are available from the brick-and-mortar banks.

If we look at the business impact of doing business online for individual banks, we can turn to the results of the GEC-survey reported in Tables A-2 and A-3 in Appendix A. Here we have provided the figures for the percent of companies indicating impacts of doing business online in the ten countries for the small finance and large finance institutions, respectively. It is characteristic that the Danish financial institutions (including banks, insurance and other financial institutions) have not been able to harvest the benefits to the same extent as financial institutions in the other countries participating in the international survey.

Accordingly, the overall picture is not very positive for Danish financial institutions. In the survey we have identified ten largely positive dimensions for impacts of doing business online, and although it is meaningless to calculate an average of the ten dimensions, it is clear that only a third of all finance institutions surveyed have reported such positive impacts on the ten different dimensions.

In order to analyze the data a little further, the percent of Danish institutions which have reported an impact on the individual dimensions are shown in the Table 3, where the dimensions are organized in descending order. It is noteworthy that the largest number of institutions reporting a (positive) impact is found on dimensions like ‘improved customer impact,’ ‘competitive position improved,’ and ‘internal processes more efficient.’ For these ‘high impact’ dimensions, close to half of the institutions report a positive influence, as we would expect.

For the middle impact group, the dimensions like ‘coordination with suppliers,’ ‘staff productivity increased,’ ‘sales increased,’ ‘sales area widened,’ and ‘procurement cost decreased,’ approximately a quarter of the institutions report a positive change. For this group of dimensions, it is surprising and even problematic that less than a quarter of the institutions report on an increase in staff productivity and increased sales. It seems clear that either we have a case of an exaggeration of benefits from e-business vendors or a case of Danish financial institutions being extraordinarily poor at exploiting opportunities.

For the low impact group, the dimensions ‘procurement costs decreased,’ and ‘inventory costs decreased,’ was only identified in a few institutions

Table 3: Impact of Doing Business Online for Danish Finance Institutions

	Small Danish finance	Large Danish finance
Customer service improved	59.6	44.7
Competitive position improved	42.6	38.0
Internal processes more efficient	47.9	37.3
Coordination with suppliers improved	22.0	41.9
Staff productivity increased	18.7	26.8
Sales increased	33.3	10.6
Sales area widened	25.3	13.4
Procurement costs decreased	18.3	13.6
Inventory costs decreased	0.5	13.3
International sales increased	0.5	6.5

If we are comparing the difference in impact reported by the large and small Danish finance institutions, it is interesting to note that contrary to what one would expect, the overall picture is one of a higher proportion of the small institutions, which are reporting a positive impact. The largest difference is what we would identify as the most important dimensions (the first three in Table 2 plus the dimension ‘sales increased’). This is even more interesting if we look at the global sample. Here it is evident that the general picture is that a higher number of large institutions are benefiting. We believe that this is a clear implication of the joint infra-structure in the Danish banking sector, where the smaller institutions are utilizing joint development and joint operations facilities.

If we look a little more in detail in the tables reported in Appendix A (Tables A-2 and A-3), we find the interesting result that the countries where the largest number of financial institutions

report huge benefits from doing business online, are from the three developing countries of Brazil, Mexico and China. We believe that this is explained by the relative large change from old systems to doing business online.

This change has not been so dramatic either in small or in large Danish financial institutions. Accordingly, we would like to suggest that the key reason why only one-third of Danish financial institutions report a large positive impact from doing business online is that Danish banks, due to the high level of automation from the 70's, constantly have been updating their systems/business processes before the introduction of Internet banking was fairly efficient. This is also corroborated by the fact that the technology deployment is very high in Danish financial institutions. Accordingly, increased staff productivity and increased (international) sales when introducing Internet-banking for customers on a large scale, was not as high as for countries where the relative level of technology deployment and efficiency in business processes was at a much lower level.

CONCLUSION

The analysis above has dealt with Danish financial institutions in general (the quantitative data from the GEC survey including banks, insurance and mortgage institutions) and more specifically with the banking industry and two Danish banks, the Nordea Bank and Lån & Spar Bank.

The analysis showed that the Danish banking industry is fairly centralized compared to other countries (the two largest banks have approximately 75% of the market). The rest is shared among the almost unbelievably high number of 180 small banks. The existence of the many small banks is only possible because the banks outside the top five share three banking centers for development and operations, and because the joint infrastructure with ATMs, EFT, securities etc. is available for all Danish banks.

In the early days of the 60's and 70's, banks were very much sheltered from competition and tightly regulated. This caused them to compete very early through the introduction of IT, sometimes even acting as global guinea-pigs. The joint infrastructure also meant that Danish banks in general were more highly automated than almost anywhere else. One could say that in the late 80's and early 90's, Danish banks were state-of-the-art globally. Danish banks had perfected the business processes using the most advanced technology combined with a large distribution net of branches also equipped with the latest in technology.

When the Internet came along, Danish banks were not very keen on jumping onboard the new technology. A few smaller banks like Lån & Spar were very active in pioneering the use of the technology for enhancing customer service and reducing operational costs. But the two large banks, Danske Bank and Unibank (which later merged into Nordea) were hesitant to start cannibalizing their existing value chain and competing on unfamiliar turf. In that sense they were lagging behind large competitors like Meritta-Nordbanken in Finland/Sweden. However, when the pure Internet banks gained ground in 1999/2000, policies were changed in the brick-and-mortar banks. After the merger of Unibank with Merrita-Nordbanken to become the Nordea, the

largest financial institution in the Nordic Countries, it had one of the largest numbers of Internet-customers anywhere, with its 3.3 million customers online.

Danish banks and financial institutions are in the absolute top internationally, when it comes to the number of institutions having the technology. However, Danish finance institutions are only on par with the leaders internationally, when it comes to supporting customers in 'online service such as filling out applications, filing claims, paying bills and transferring funds,' 'access to account information' and the provision of online tools for research and planning.' Subsequently, Danish finance institutions are mostly on par with the global sample when it comes to harvesting the benefits from being online. Here there are major challenges ahead such as utilizing the right channelling to customers, establishing 'what-you-see-is-what-I-see' with customers (bank clerk communication on each other's screen), and straight through processing including automatic credit scoring.

Even though some of the larger and even smaller institutions are world-class when it comes to sophistication and utilization of Internet and other online applications especially for customer self-service, there are a large number of financial institutions, who have not yet in a serious manner taken the necessary steps to enabling their business online.

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