Globalization and E-Commerce: Growth and Impacts in Germany

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SUMMARY

- With regard to integration and e-commerce usage Germany started late like most countries, although the current and evolving ICT infrastructure as a potential driver for e-commerce is excellent. One reason for this might be the economic policy of the early 1990s which was focusing on traditional heavy industry sectors to develop the eastern German states after reunification.
- Germany has a high quality and extensive public and private transport infrastructure such as rail, air and route infrastructure supporting e-commerce, both B2B and B2C. Moreover, Germany is centrally located in Europe which enables it to play an important transport role in the European region as a major hub for both MNCs and national companies.
- In comparison to the start-up phase of B2C, e-commerce with pure Internet-based firms such as amazon.com, today the market is driven by traditional enterprises and catalog sellers using e-commerce technologies in Germany.
- E-commerce development in the important B2B sector is still mainly based on EDI connections. The proposed level of business activities on electronic markets or Internet-based EDI such as XML/EDI has not yet reached its full potential.
- After the diffusion of high-speed Internet access like ISDN or DSL, Germany enjoys more ISDN telephone lines than any other country.
- Germany possesses a large number of well educated and relatively wealthy population strata which is an important prerequisite for successful e-commerce activities. On the other hand, the German education system has to be modernized to cope with the challenges of the growing e-society.
- The declining and aging of German society will be one of the most important hampering reasons in the near future for sustainable economic growth. Political immigration activities such as the Green Card program are still to restrictive to attract foreigners in larger numbers.
- Invention activity in some areas of information and communication technology (ICT) has shown signs of improvement. Starting from a low level, patent activity in the mobile communications and Internet fields has been growing faster in Germany than anywhere else in Europe.
- More than 80 % of the GNP is created in mid-sized companies (*Mittelstand*) which traditionally is considered as more flexible and innovative than large enterprises. The majority of these SMEs (small and medium-sized enterprises) have Internet access. Looking at Internet penetration, German SMEs are at the top together with SMEs in Scandinavian countries.
- Germany follows the innovation model “be the best imitator of successful developments” and within this course exploits the competitive advantage achievable through integration. After e-commerce technologies have proven successful, Germany caught up in developing its relevant infrastructure and is now gaining more momentum.

INTRODUCTION

A sustainable and significant economic growth driven by e-commerce solutions is yet not measurable in Germany, as the length of time during which e-commerce was introduced is too short to bring about sufficient observable data. On the other hand, a significant increase in information and communication technology (ICT) diffusion is observable at industry, as well as the individual firm levels.

Three important factors can be identified as necessary prerequisites for e-commerce activities. First, a creative, skilled and e-commerce-willing personal is most important for the successful usage of e-commerce, followed by organizational changes and modern technical infrastructure. This paper shows that Germany has a large e-commerce potential in all these factors but nevertheless started late to develop its new economy in comparison to other countries.

Germany, the third largest industry in the world and the largest in Europe, exercises a peculiar path into e-commerce. On one hand, 82 million highly educated people being squeezed into a comparatively small land create an enormous demand towards adopting the new ICT in order to increase ease and comfort of life; yet, on the other hand, especially in a nation which traditionally "enjoys" relatively high government regulatory levels, restricting certain amenities and general comforts of life (e.g., the number of hours stores may stay open) that are widely practiced and accepted in numerous other industrialized nations.

Restrictions in easily adopting the new technologies stem from comparatively high regulatory levels in Germany. The education sector, for instance, did not adapt quickly enough to the increasing needs towards modern ICT systems and applications resulting in a shortage of skilled workers and hampering a faster adoption of new technologies. Moreover, Germans enjoy a high level of social and work security, enabled, e.g., by labor laws that guarantee employees a large degree of participation in decisions changing their work environment, which, in turn, also slows down change processes at the beginning of a technology life cycle.

Germans have cultivated an attitude of acting as the "best imitator" when innovations have proved successful elsewhere in the world. Looking at e-commerce, Germany enjoys important infrastructural prerequisites for such a strategy: An excellent communications technology infrastructure and, in general, highly skilled workers with a high level of work ethic (i.e. being comparatively hard-working and working on-time) who are capable to adapt to changing needs rather quickly and thoroughly. Moreover, more than 80 % of the GNP is created in thousands of mid-sized companies (*Mittelstand*) which traditionally is considered as more flexible and innovative than large enterprises. The huge number of mid-sized companies also provides considerable risk diversification. All-in-all, Germans take an economic lead when a new technology proves successful. Even further: In the process of imitating innovations German firms exploit their capabilities to integrate complex systems and processes, thus creating a competitive advantage.

Over the last few years the information and telecommunication technology industry in Germany has developed, due to strong deregulation and liberalization efforts, into a fast growing and increasingly important industry. Worldwide, Germany now belongs to the top group of countries with a high-quality telecommunications infrastructure, as well as high penetration and usage levels. Telecommunication prices have been falling over the last few years mainly due to heavy competition in this market. Fast and cheap Internet access is becoming more widely available in Germany.

The Federal Republic of Germany and its local states have heavily invested in raising the awareness and established funding programs to improve the diffusion and penetration of e-commerce and related initiatives as a means to pave Germany's way towards the information society. The intention is to continue with these activities geared towards industry, public administration and the general population over the next years. These government efforts are supported by emerging private sector initiatives.

Summing-up, Germany possesses both, e-commerce enablers and barriers in the B2B and B2C areas. In the B2C sector e-commerce is strongly driven by the highly skilled and educated population which is already familiar with PCs, the Internet and several foreign languages. The second B2C enabler is the relatively high income level which is equally well distributed allowing a relatively high standard of living for nearly all social layers. The main inhibitor in this area might be the still relatively high Internet access costs, especially in comparison to the Scandinavian countries. The main drivers of e-commerce use and diffusion in the B2B sector are strong international competition and globalization of the export-oriented German industry together with a large number of innovation-friendly SMEs. The most important reasons hindering larger use of e-commerce are the lack of a better service mentality and the overall wait-and-see attitude of German employees.

NATIONAL ENVIRONMENT

Population and Demographics

The German population faces almost all the same economic, societal and technology problems as other industrialized western nations. The German age distribution is somewhat lop-sided for the aged. This societal obsolescence will continue and the fertility rate is steadily declining. The number of inhabitants in Germany will continue to decrease until 2010, whereas in the USA the population increases. In terms of consumer buying and the growth of the web economy, the proportion of the relevant age group of the 15-49 year olds will decline in all countries (Zerdick et al., 2001).

In recent decades, Germany has become an immigration country of a new type, i.e. no classical immigration country in the common sense like the US or Australia. Among theses immigrants are especially well educated information technology (IT) specialists who are needed in Germany to close the workforce gap in the IT and related sectors and industries. To attract theses important people for a sustainable economic growth a new immigration policy (use of a Green Card type system) for foreign IT specialists started on August 1, 2000. Until April 2002 only 8,556 foreign professionals used the Green Card regulation to enter the German labor market due to less attractive conditions in comparison to the US Green Card. The main reasons for the relatively small success rate are language problems and the five year restricted permission to stay in Germany.

Total population

In 1998, 82 million people lived in Germany. In the years after German unification in 1989 the population grew continuously due to a high immigration rate and has been declining since 1995. Germany's population will decline in this decade to roughly 78 million inhabitants (prognos,

2001). Together with the increase in the age of the population, one of the biggest problems for the German economy is the recruiting of young experts in all industrial sectors, not especially in the ICT sector alone.

A lower population base means fewer consumers and, together with the aging phenomenon, fewer employees will be in a working age range. As a consequence, the use of e-commerce services and consumption may be increasing in Germany as many people will be retiring who also are well educated and many of them are likely to experience physical difficulties to move around.

TABLE 1

Demographic overview and urbanization

Demographics	Population 2000[a]	Urban population (% of total) 2000[b]	% older than 65 years 1999[d]	% under 15 years 1999
Germany	82,175,800	87.50	15.84	15.66
France	58,800,000	75.60	15.65	18.89
Italy	57,298,000	67.00	17.22	14.51
UK	59,766,000	89.50	15.74	18.79
EU15	376,749,918	79.54	15.97	16.83
United States	275,129,984	77.20	11.85	21.20

[a] Source: International Telecommunication Union, World Telecommunication Indicators. Geneva: International Telecommunication Union, March 2001. The data for population are mid-year estimates.

[b] Source: World Bank Group, WDI Data Query located at http://devdata.worldbank.org/data-query/. WDI definition: Urban population is the midyear population of areas defined as urban in each country and reported to the United Nations. It is measured as a percentage of the total population.

Another factor to consider is the Green Card regulation. The existing immigration policy is far too restrictive and, therefore, unattractive for urgently needed foreign specialists. Until now the regulation only allows ICT specialists to enter Germany, but the need for a more qualified workforce with ICT knowledge exists in every service and industrial sector. Since these qualified e-commerce developers and users are not found, the stage of the diffusion curve of an e-commerce infrastructure and use in firms at an early adopter stage seems to be somewhat behind considering where the stage on the curve could be.

The number of households is growing in all countries, especially in the US. The proportion of single households is also growing and has its highest amount predicted in Germany with 36.1 % in 2010 (TABLE 2).

More and more Germans live a single life. Reasons for this trend in family-structure are age-conditioned shifts, i.e. since the 1970ies a low marriage rate, later marriage and a rising divorce rate may be observed. A survey conducted by GFK analyzed the proportion of Internet users and buyers in single households. Observing the online shopping behavior per household, nearly one third of all Germans are single, but buy nearly as often through the Internet (24.1 %) as two-person households (24.5 %) and contribute more to the total e-commerce sales than a four-person household (20.4 %) in the first quarter 2001 (GFK, 2002).

TABLE 2

Percent of Single-Households: Forecast 2010

Single-Households (in %)	1998	2002	2004	2010
Germany	35.3%	28.6%	30.5%	36.1%
France	29.5%	30.0%	30.1%	30.3%
Italy	22.8%	23.0%	23.1%	23.5%
UK	28.4%	28.7%	28.7%	28.9%
EU15	28.5%	28.8%	29.0%	29.5%
United States	25.2%	25.5%	25.7%	26.3%

Source: prognos. Number of inhabitants: Forecast inclusive of migrations (resident population), 2001

Urbanization and Population Density

After World War II and the division into two countries, the former German Democratic Republic (East Germany) experienced a declining population over the last fifty years and especially after unification in 1989, i.e. people mainly emigrated to Western Germany. As a consequence, the new *Länder* in former East Germany are less populated than western states. The population density for all of Germany after reunification fluctuates around 230 people per square kilometer (StatB, 2001, p.44).

Such high population density is attractive for e-commerce development and supports it, as there are advantages for establishing a compact e-commerce infrastructure. Although installing a telecommunication infrastructure in densely populated settings is costly, a solid customer base is available. In less populated areas it would be also costly to provide such an infrastructure as greater distances from household to household would have to be overcome. In any case, the underlying infrastructure on the B2B and B2C sides is largely in place (e.g., high-speed networks, fiber optic networks, cable systems, etc.).

Age distribution

The number of old and very old inhabitants in Germany is rising while the number of younger people is declining. At the same time, the segment of population in an employable age is getting older as well. Currently, out of an average of 100 inhabitants, 21 Germans are children or young persons, 56 are in an employable age between 20 and 60 years and 23 are older than 60. Forecasts expect that in 2050 that more than one third of the population will be over 60 years of age. Only 16 % will be younger than 20 years (Zerdick et al., 2001).

Facing this challenge, more and more German web sites provide content for older users. The digital media report of Jupiter MMXI Europe counted 12.5 % users older than 50 years using the Internet regularly (February, 2001). Of special interest are sites with information about lifestyle, news, travel or estates. These so-called *silver surfers* are becoming more and more important for German online firms (Jupiter MMXI, 2002).

TABLE 3

Age Distribution

Year	Population in Mio.			Age Distribution in%			
	Western Germany	Eastern Germany	Total	Under 18	18-40	40-60	60 and older
1970	61.00	17.07	78.07	21.3	23.7	17.5	15.6
1990	63.73	16.02	79.75	15.3	27.2	21.0	16.3
1998	68.16	14.02	82.16	15.6	25.7	21.9	18.9

Source: Statistische Bundesamt Jahrbuch 2001, p. 58

Economy

As a leading industrial country and as the world's second largest trading nation, Germany is deeply integrated in the global economy. Nevertheless, Germany's GDP growth rate was in fact on a high GDP level, one of the lowest inside the European Union in the last decade. Despite the strong chemistry, machinery and automotive industries with high increasing productivity and turnover rates the German economy discovered rather late the field of e-commerce as important input factor for productivity (RWI, 2001).

GDP

The positive economic effects brought about by the ICT-development in the last several years influenced the economies of all industrial nations but especially the US. The constantly growing economic output in the US in spite of the lower economic output in Europe leads to a higher GDP growth rate in the US. Germany was not able to pick-up this trend like the US.

The economic output engine for Germany was activated from the export and especially US markets. Together with the now diminishing recession the GDP in Germany is also under pressure.

Economic growth

Germany's sustained economic growth in the last years is primarily based on exports. Due to the closely connected and globalized economy Germany was not able to extricate itself from the world-wide recession, so for 2001 the GDP growth rate was approximately one percent. This has direct effects on the labor market which is still strongly regulated by trade unions rights and resulting negotiations. Slow economic growth implicates a low demand on the workforce. This is, together with the restrictive and over-regulated workforce market, an inhibitor fostering a higher unemployment rate.

Germany is the biggest consumer goods market in Europe and therefore of considerable interest economically, but especially for e-commerce purposes. In particular its central economic geographic position in Europe, the considerable size of the German market and the high income of citizens makes Germany most notably interesting in continental Europe for e-commerce purposes.

TABLE 4

Average GDP growth 1995-2000

Growth of GDP per year	1995	1996	1997	1998	1999	2000
Gross domestic product in billion $	2,449.8	2,328.9	2,118.4	2,167.1	2,121.2	1,870.4
Growth of GDP based on previous year in % without exchange rate effects	N.A.	1.80	2.23	3.22	2.45	2.55

Source: Statistisches Bundesamt Jahrbuch 2001, p. 30. GDP in real annual prices.

Unemployment

The absolute number of unemployed people rose from 3.612 million in 1995 (9.4 %) to 3.963 million in December 2001 (9.6 %). In June 2002 3.95 million or 9.5 % were unemployed (BfA, 2002). The labor market programs like the government-financed, so called *second labor market* have hidden the real unemployment rates somewhat, but nothing changed significantly with regard to structural employment problems, particularly not in Eastern Germany. This second labor market is an employment-creation measure funded by the federal employment office.

Areas with high unemployment are certainly not of central concern in terms of targets for e-commerce-based sales. On the other hand, these areas may be ripe for government and private sector-based assistance and incentives in terms of the location of new e-commerce firms, as distance at first glance at least is not an issue. Maybe there are opportunities in bringing about an entrepreneurial spirit for the formation of new e-commerce-based firms in those areas.

Openness to foreign trade and investment

Worldwide, Germany is behind the US the leading export nation and the US is the most important foreign country for export flows from Germany outside the European Union. Consequently, and since the globalization of most markets, Germany is strongly dependent on the US market. A recession in the US leads to a recession in Germany. In 2000 Germany exported goods to the US amounting to $ 72.2 billion. Nearly as important was France with $ 68.2 billion in front of the UK with $ 52.7 billion (StatB, 2001, pp. 298-300).

Imports and exports (foreign trade) are of prime importance for Germany. Due to its excellent manufacturing industry and its famous “Made in Germany” brand image Germany’s exports were continually higher than its imports in the last several years (StatB, 2001, pp. 24-26).

On the other hand, Germany is not only a master in exporting goods but offers many opportunities for investment. A notable point is that there is no specific investment law in Germany. Foreign investors are treated the same way as German investors. Especially since reunification the need for investment has risen enormously. Foreign direct investments in Germany are in comparison to other EU countries relatively high. In the last four years, investments increased from a relatively low level in 1997 to over $ 165.6 billion in 2000. An important reason for this development is the attractiveness for foreign investments in the new *Länder* which were often co-funded by the German government. Given that Germany already enjoys the highest proportion of all direct investments among European countries, this might hold true as well for the e-commerce and ICT areas (FCFIG, 2001a).

Wealth

GDP per capita and income distribution

After the USA and Japan, Germany is the third largest economy and the largest economy with a GDP of roughly $ 2,100 billion in 1999 (see TABLE 5). Interestingly, the German social system and socio-capitalist market economy leads to a relatively high proportion of income share for the poorest with 8.20 %.

TABLE 5

Wealth and income distribution

	GDP in billions US$ 2000	GDP per capita 2000[a]	Share of income or consumption, richest 20% 1987-1998	Share of income or consumption, poorest 20% 1987-1998[b]
Germany	1,866.12	22,708.86	38.50	8.20
France	1,280.17	21,771.62	40.20	7.20
Italy	1,070.82	18,688.63	36.30	8.70
UK	1,416.09	23,693.92	43.00	6.60
EU15	7,792.53	20,683.55	38.40	8.29
USA	9,962.65	36,210.70	46.40	5.20

[a] *Source: International Telecommunication Union, World Telecommunication Indicators. Geneva: International Telecommunication Union; March 2001. GDP per capita is calculated by dividing GDP in United States dollars by the mid-year estimate of population obtained from the United Nations.*

[b] *Source: United Nations Development Programme, Human Development Report 2000. New York & Oxford: Oxford University Press, pp. 169-172. Dates for the data vary by country from 1987 to 1998.*

The poorest social layers in the UK or the USA, however, are dramatically poorer. Together with a lower rate of income share, the 20 % of the richest people achieved in comparison to other countries a relative broad income share in Germany.

In other words: The situation in Germany is somewhat unusual in that in general rich people earn a relatively lower share of income whereas poor people in Germany earn a relatively higher share of income in comparison to most other countries with the exception of Italy (TABLE 5). This leads to a relatively prosperous middle-class layer with enough money to use the services e-commerce is offering in the B2C sector.

Potential E-commerce participants

Germans are relatively conservative adopters of new technologies in comparison to US citizens, i.e. with regard to PC or Internet adoption, where a time-lag is observable (see TABLE 12). More specifically, Germans tend not to adopt a technology until it has proven its usefulness. In the beginning of the Internet the early adopters were young males between 15 and 24 years of age which were using the Internet for entertainment and e-mail. Then more and more commercial and service content entered the Internet and all other age groups discovered the Internet as a useful and powerful tool for information retrieval and purchasing of goods. In comparison to

other European countries with fewer inhabitants Germany is, with the exception of the Scandinavian countries, at the top of overall Internet use together with the UK (TABLE 6).

TABLE 6

Internet user by gender in % of total population in Germany, France and UK, 1999-2001

Internet user by gender in % of total population		06/ 1999	06/ 2000	06/ 2001
Germany	Male	46.00	46.00	51.00
	Female	29.00	29.00	36.00
France	Male	14.00	24.00	29.00
	Female	16.00	16.00	21.00
UK	Male	46.00	46.00	52.00
	Female	30.00	30.00	38.00

Source: Euro.net Welle 4-8, NFO Infratest InCom, 2001

Industry Structure

The federal statistical office (Statistisches Bundesamt) provides in its annual reports the number of enterprises and sales figures belonging to different economic sectors. Of particular importance and interest for e-commerce are the following sectors: Manufacturing, wholesale and retail trade, transport and communication, financial intermediation, possibly public administration, health, and personal service activities. One could argue that all of these just mentioned sectors show clear potential (at least partial) for e-commerce applications.

Sectoral distribution

The German economy is still largely characterized by its dominating manufacturing and industrial sectors. Especially the automotive and chemical industries have considerable importance for the German GDP and labor market.

The primary sector agriculture, forestry and fishing have with 1.2 % of GDP in 2000 no significance for Germany as a service-oriented nation. The secondary sector (or industrial sector with manufacturing and the building industry) with altogether 30.1 % of GDP is especially that part of the economy which is strongly export-oriented. Together with commerce, transportation and catering (17.2 %) this section also contributes to the secondary sector (StatB, 2001, p. 31).

The tertiary or service-orientated sector includes the finance and civil service, as well as all private business and service providers such as banks, telecommunications and assurances. This sector with roughly 51 % is the dynamic base for e-commerce services and Internet distribution. It is assumed that this figure would be higher when including internally offered services within firms which are not represented. It remains to be seen if the civil service with e-administration and e-government initiatives will be an active ICT enabler for the German economy. This brief analysis of the German GDP shows considerable potential for e-commerce applications and market expansions, especially as the service sector is so large.

The information and telecommunication sector has developed to an important factor and contributes to GDP with 5.7% with its PC and mobile end devices and services in 2001 (StatB, 2001). The leading ICT companies are not only offering their technologies but also use them intensively.

Firm size and industry structures in key sectors

A firm's size and its relevance for an economic sector differ strongly. TABLE 7 shows the total number of SMEs and large enterprises within the economic sectors.

In the very important manufacturing sector, e.g., 0.97 % are large enterprises, but they hold a share of 70.2 % of all sector sales. This distribution is similar to other sections where the number of SMEs is in fact high, but they do not play a comparably important role like the large enterprises. Large firms have no choice but to embrace e-commerce applications in many aspects and processes of the extended enterprise. This includes IT-related innovations in e-procurement, customer relationship management, as well as electronic supply chain management. Very often e-commerce applications are the immediate targets of large firms in which cost-savings and efficiency gains can be made. Moreover, in order to achieve competitive advantage over their competitors, large firms have no choice but to overlay nearly all processes they engage in with e-commerce practices (ZEW, 2001).

TABLE 7

Distribution of enterprises[a] by size of enterprise in selected economic sectors, 1999

Economic sectors	Number of enterprises by size of enterprises					
	Small (annual sales up to $ 535,000)		Middle(annual sales from $ 535,000 up to 53,500,000)		Large (annual sales of $ 53,500,000 and more)	
	Number	%	Number	%	Number	%
Manufacturing	193,759	66.19	96,112	32.83	2,852	0.97
Construction	243,682	75.72	77,906	24.21	216	0.07
Wholesale and retail trade, repair of motor vehicles, goods	553,355	74.86	183,400	24.81	2,399	0.32
Transport, storage and communication	104,243	81.64	23,222	18.19	217	0.17
Real estate, renting and business activities	646,104	87.37	92,751	12.54	690	0.09
All economic sections	2,355,771	81.62	523,438	18.14	7,059	0.25

Source: Statistisches Bundesamt located at http://www.destatis.de/download/fist/abs_99.xls , own calculations.

[a] *Only enterprises with annual sales of $ 17,780 and more*

Small firms similarly, have to embrace e-commerce. Typically a *Mittelstand* (SME) firm is a supplier to one of the large firms just mentioned. Large firms increasingly dictate how these smaller firms must structure themselves such that the larger firms can conduct e-business with them. This strong pressure forces the *Mittelstand* (SME) to be innovative on a persistent and ongoing basis (MIND, 2002).

Industry concentration

The mainstay of the German economy is the manufacturing industry. In 1999 roughly 40,300 industrial enterprises in Germany employed close to 6.3 million people. Only about 1.7 percent of industrial enterprises are large companies with more than 1,000 employees; nearly three quarters are firms with fewer than 100 people on the payroll. Thus the great majority of industrial enterprises in Germany are of small or medium size, i.e. the so-called *Mittelstand* (FCFIG, 2001b).

Importance of foreign MNCs

TABLE 8 shows again that Germany is due to its market size, central position in Europe, high quality infrastructure and member of the Schengen Agreement and the Euro zone highly attractive as a base to enter not only the German market but also as a base for all other countries in Europe. This should position Germany strategically well in order to serve for e-commerce firms as a European base. In that sense, it seems that Germany may enjoy an initial strategic competitive advantage.

TABLE 8

Number of foreign affiliates of selected countries, latest available year

Country	Year	Foreign affiliates
Germany	1998	12,042
France	1998	9,494
Italy	1997	1,769
UK	1998	2,683
USA	1997	19,103

Source: United Nations Conference on Trade and Development: World Investment Report 2001, New York, 2001, p. 239.

Infrastructure

Germany's national infrastructure, the physical as well as the virtual infrastructure, is known for its overall excellence, especially in western Germany. The optimal mix of private and public facilities leads to an enormous balanced growth after World War II in West Germany and is also an important factor for e-commerce growth in the new economy.

Transportation infrastructure

Germany has a 40,826 km long railroad network which is of high importance especially for the transport of passengers. Very high speed trains or intercity express trains with speeds up to 240 km/h on high speed rail routes connect all bigger cities.

Germany has a high quality road network of municipal, regional, state and federal roads amounting to a total of 656,140 km (in 1998). Its superb national *Autobahn* system of very well planned and designed roads permitting high-speed movement of vehicles is almost legendary.

Based on these strong transportation backbones the German transport sector with such major firms as German Parcel, UPS or Deutsche Post AG can provide a one day guarantee or even faster for all postal deliveries.

Package delivery systems are very important for many e-commerce firms in both B2C and B2B applications. Such package delivery firms may become important, even strategic partners of these firms as it is the only economical way to deliver packages reliably and timely.

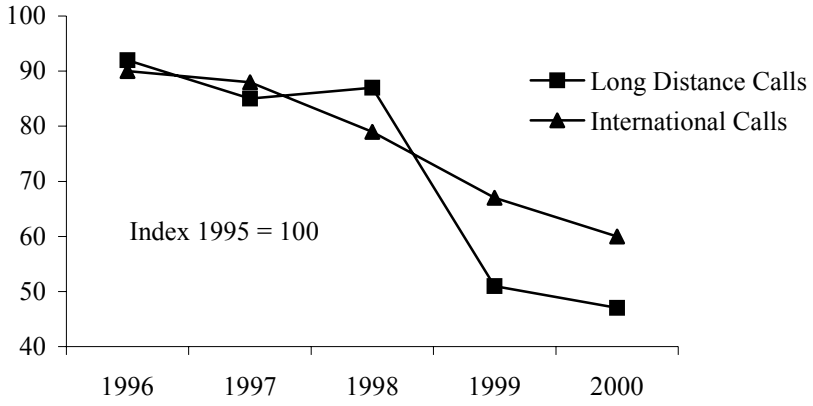
Telecommunications infrastructure

Since 1998 the telephone customer can choose among different carriers for each call by call or pre-selection. The prices for national long distance connections declined over 90 % in the last three years. With some packages, all calls within Germany on Sunday, e.g., are free. Even for local connections (the last mile to the customer), which are still not really liberalized, prices declined by a smaller factor (see FIGURE 1).

The regulatory authority and the private carriers are working hard to break down this *de facto* last monopoly of the German Telecom. On October 10, 2001 a German court ordered German Telecom to open the local phone networks for its competitors.

FIGURE 1

Development of prices for long distance and international calls, 1996-2000



Source: Federal Commissioner for Foreign Investment in Germany: Germany: Gateway to Europe, p. 15, based on German Federal Statistical Office, EITO, BBfAI.

The conventional telephone network in Germany is still growing but not as dynamic as mobile connections. Germany has more ISDN connections than any other country in the world. Nearly every fourth ISDN-connection is in German households or enterprises (TABLE 9).

For high speed Internet access not only analog telephone lines or ISDN connections are available but also high speed (e.g., over DSL) connections which are getting more and more popular. Germany was one of the first countries where DSL was available. With 2.1 million DSL connections in Germany, six of 100 households had DSL access, more than in any other country in Europe in 2001 (RegTP, 2001).

TABLE 9

Telephone lines per hundred inhabitants

Per 100 inhabitants	1995	1996	1997	1998	1999	2000
Germany	51	54	55	57	59	62
France	56	57	58	58	58	59
Italy	43	44	445	46	46	47
UK	50	52	54	55	57	59
USA	63	63	66	69	71	72

Source: EITO: Telephone lines

Besides old or new digital telecommunication technologies German households are furthermore wired by cable television. As shown in TABLE 10, more people than in any other European country are reachable over this channel. With digital set top boxes it is possible to use the cable television connection for Internet access. In contrast to the UK or Italy, 30 German television channels are free so there is no need to subscribe to pay television. How much these individuals are willing to pay for Internet service is difficult to say, as no results of such research are available.

TABLE 10

Telecommunication infrastructure in 2000

	Telecom investment as % of GDP[a]	Main phones lines per 1,000 population	Cell phone subscribers per 1,000 population	% Digital phone lines	CATV subscribers per 1,000 population[b]
Germany	3.16	601.15	585.88	100.0	247.03
France	0.26	580.17	494.09	100.0	45.24
Italy	0.81	473.89	737.25	99.0	1.05
UK	0.57	582.39	669.56	100.0	56.89
EU[c]	1.22	546.46	624.78	98.04	115.83
USA	0.29	699.74	397.91	91.6	252.13

[a] *Source:* International Telecommunication Union, World Telecommunication Indicators. Geneva: International Telecommunication Union; March 2001. ITU definitions: Telecommunications investment refers to the annual expenditure associated with acquiring ownership of property and plant used for telecommunication services and includes land and buildings.

[b] *Source:* International Telecommunication Union, World Telecommunication Indicators. Geneva: International Telecommunication Union; March 2001. ITU definitions: CATV subscribers refer to households which subscribe to a multi-channel television service delivered by a fixed line connection. The per capita values are calculated using the estimated mid-year population value.

[c] European Union excluding Luxembourg

The early adoption of GSM (Global System for Mobile communication) as mobile transmission standard might lead to a European m-commerce success story.

The global telecommunication capabilities, as well as overall installation with end-devices have been improved significantly in 2001. Especially mobile phones had an exponential growth in Germany in the last years. With more than 56 million mobile users and a penetration rate of 69 % Germany ranks in international comparison in front of the US (46 %). In 1999 Germany was with only 28 % behind all of the other industrial nations (TABLE 11). This dynamic of the mobile market in Germany will diminish, yet national experts are predicting 102 mobile phones per 100 inhabitants in 2003 (EITO, 2001).

The penetration of mobile devices increased significantly with the rollout of pre-paid telephone cards without a monthly base fee. In 2000 most new customers chose this variant, especially younger people. This user group is also responsible for the dynamic growth of non-voice data communication, the so-called short message service or SMS. The regulatory authority estimates that more than 15 billion SMS messages were transmitted in Germany in 2000. With this enormous use Germany leads these services. TABLE 11 shows the fast development of mobile end devices in different countries.

TABLE 11

Mobile telephone users

Per 100 inhabitants	1997	1998	1999	2000	2001
Germany	10	17	28	59	69
France	10	19	27	49	60
Italy	20	35	49	73	89
UK	14	22	29	68	79
West Europe	13	25	29	N.A.	N.A.
USA	17	23	32	39	46

Source: EITO, IDATE: telephone lines, 2002

IT infrastructure

Similar to the demand for mobile end-devices the growth in demand for multimedia PCs with Internet connections has been growing steadily. The penetration rate for PCs grew in Germany to 34 % in 2000. EITO reports 30 million Internet users or 36.85 % of German population in 2001. An important factor for the diffusion of PCs are the declining prices for Internet access which decreased in 2000 on average by about 35 %. These developments are highly desirable as preconditions on which to build e-commerce applications and practices. Broadband-based and affordable accesses to the Internet, as well as affordable pricing of PCs are essential and highly desirable aspects for e-commerce development and take-off (EITO, 2001).

Germany's diffusion rate for PCs per thousand is the highest in comparison to other large countries in Europe but still behind the penetration rate of the Scandinavian countries (TABLE 12). This suggests that a high demand can be expected in the near future.

TABLE 12

Important IT infrastructure indicators

	IT as % of GDP, 2000[a]	PCs per 1,000 population 2000[b]	IT Hardware production, US $M 2000[c]	IT Hardware Exports, US $M 1999[c]
Germany	3.48 %	336.35	12,000.72	12,430.98
France	3.66 %	304.76	7,134.88	9,604.06
Italy	2.10 %	139.45	5,753.55	3,481.56
UK	4.10 %	301.17	16,166.73	19,527.42
EU[d]	3.33 %	263.59	60,516,60	90,644.18
USA	4.56 %	585.18	88,488.62	38,488.00

[a] *Source:* International Data Corporation, The 1999 IDC Worldwide Black Bock, IT is defined as "the revenue paid to vendors (including channel mark-ups) for systems, software, and/or services.

[b] *Source:* International Telecommunication Union, World Telecommunication Indicators. Geneva: International Telecommunicatin Union, March 2001.

[c] *Source:* Reed Electronics Research, The Yearbook of World Eletronics Data, 2000. Survey, UK

[d] EU here includes the members of the European Union excluding Luxembourg.

The Internet

The density of Internet adoption and use is measurable through different indicators, e.g., through the number of national Internet hosts. The OECD counted in Germany 32.3 Internet hosts per 1,000 inhabitants in July, 2000. In absolute figures Germany took with 2.6 million Internet hosts place three after the UK and Italy.

TABLE 13

Basic e-commerce facts

	Secure servers per 1,000,000 popula-tion 2000[a]	Secure servers with strong encryption per 1,000,000 population 2000[a]	B2B trade in US$M 2000[b]	B2C trade in US$M 2000[b]	% E-Commerce Sales of GDP 2000[b]
Germany	6.07	4.60	15,171.02	3,185.51	0.98%
France	2.67	1.25	6,170.95	1,119.60	0.57%
Italy	1.77	1.10	5,544.70	841.43	0.60%
UK	10.25	6.33	13,815.62	3,873.00	1.25%
EU[c]	4.98	3.18	53,734.62	11,735.30	0.84%
USA	28.30	25.11	118,457.20	44,084.29	1.63%

[a] *Source:* Netcraft. http://www.netcraft.com.

[b] *Source:* IDC, Internet Commerce Market Model, Version 8.1 (2002).

[c].The EU includes here the members of the European Union excluding Luxembourg.

A more reliable indicator of the accessibility of modern Internet infrastructure for e-business is the total number of secure socket layer (SSL) servers. In 2000 Germany operated six SSL servers with low and roughly five with high encryption per one million inhabitants (TABLE 13). More than $18 billion e-commerce sales were reported in 2000 in Germany, more than in any other European country. And, furthermore, Germans are very active using the Internet for online purchasing.

The absolute number of Internet users in Germany is high. More than 30 million citizens were able to use the Internet in 2001 (TABLE 14).

TABLE 14

Internet-user

In millions	1998	1999	2000	2001	2002
Germany	9.639	12.263	22.900	30.194	35.685
France	4.144	6.508	10.283	16.396	19.015
Italy	2.099	3.605	11.000	16.881	23.543
UK	8.552	12.918	17.000	24.942	31.204
Western Europe	36.362	52.532	94.401	135.835	168.195
USA	78.845	106.135	132.374	153.262	169.500

Source: EITO 2002, p. 453

The Internet access costs declined after the liberalization of the telecommunication market in 1998. The online prices for a call-by-call Internet connection fell to $0.88 at off-peak time and $1.06 at peak time. In comparison to the Internet access costs for 40 hours at off-peak time in 2000, provided by OECD ($58.41), 40 hours at off-peak time cost $21.12 at the beginning of 2002 in Germany (RegTP, 2002, p. 21).

Human Resources

General education levels

In 1999, 12.705 million pupils received instruction from roughly 722,195 teachers in Germany. Germany's Basic Law guarantees everyone the right to self-fulfillment and the right to freely choose his or her school (free of charge) or place of training as well as his or her occupation or profession. It is guaranteed by law that every region in Germany enjoys an equivalent level of education. As an industrial country that is short of raw materials, Germany is largely dependent on a skilled labor force and therefore invests $83.9 billion in education in 1999. This is equivalent to 13.9 % of public expenditures. (BMBF, 2001, p. 45).

But Germany has to cope with different educational and work force market problems. As the controversial OECD research project PISA 2000 (Program for International Student Assessment) has shown, German pupils are under-performing in comparison to other countries in topics such as reading, mathematic and natural science (OECD, 2001). As a consequence, the Federal Ministry for Education promises to improve the German education system.

IT skills

EITO calculates with a growing demand for ICT specialists in Germany from 2.5 million in 1999 to 4.2 million in 2003 (EITO, 2001, p. 87). The forecasts expect a constant existing gap for the next several years where the demand will be higher than the supply. In 2000 alone German industry had created more than 750,000 work places in this area. But due to actual development in the new economy it can be expected that enterprises, but especially start-ups, are likely to lay off their employees rather than to recruit new ones.

All forecasts are based on expectations of a rapidly growing IT market and do not display the temporarily declining developments of the last few months. The recession led to a large number of job layoffs in the finance and banking sectors. At the same time the total amount of job advertisements in the IT sectors are declining (EITO, 2002, pp 38-41). E-commerce firms or especially IT intensive firms such as in the finance and banking sectors intending to roll out e-commerce applications will need to study their situation and future direction carefully. One could speculate that delays of such efforts are increasingly likely, at least until an upswing is observable again in the ICT and e-commerce business.

Financial Resources

The financial sector in Germany is offering together with programs the government offers for start-ups, as well as existing enterprises a large variety of readily available low interest loans, as well as government grants. Entrepreneurs can count on capital with low interest rates subsidized by state and federal programs. A very popular way of financing young entrepreneurs is venture capital, especially in the ICT sector together with the possibility of issuing stocks, as well as initial purchase offers (IPO's) in the new market segment NEMAX on the German stock exchange. These financial resources available from private and public funds are very attractive features for newly founded firms and young entrepreneurs in the e-commerce world. These seem to be highly attractive features in order to get an e-commerce business started and have business growth financed.

Payment mechanisms

Aside from the still rather popular way of paying cash in Germany, debit cards as well as credit cards are widespread. The most common credit card in Germany is the Eurocard – a cooperation partner of Mastercard - but due to high transaction costs for merchants and restaurants and the fact that debit cards are widespread most customers pay with debit cards instead of paying with credit cards. For this reason the number of Eurocards in Germany (see TABLE 15) is significantly lower in comparison to France or the UK. Due to the relatively low penetration of credit cards in Germany, in comparison to other European countries, online payment with a credit card is also low. This might hinder a faster development of e-commerce, especially when online shops do not provide additional payment methods.

The German credit card market is divided into four payment systems with Eurocard as market leader (52 % market share) followed by Visa (38 % market share) and lower market share percentages of American Express (8 %) and Diners Club (2 %) (EURO, 2001).

TABLE 15

Number of EUROCARD – MasterCard Credit Cards and merchants in selected Countries, 2001

Country	Number of Eurocard – MasterCard (in 1,000)	Number of merchants accepting Eurocard	Number of transac-tions (in 1,000)	Volume (in $ 1,000)
Germany	9,559	386,597	187,311	15,513,991
France	12,515	600,000	1.491.002	66,066,992
Italy	3,932	911,620	40.552	3,556,279
UK	17,087	635,379	548.542	50,154,389

Source: Europay International, http://www.europay.com .

Consumer Preferences and Attitudes

The Internet in general is first of all used as an information channel in Germany. Due to this the most often used services were e-mail (73.9 %), search engines (63.2 %) and news channel and services in 2001 (G+J, 2001).

But also the B2C e-commerce use is growing in Germany, yet only 56.4 % of all Internet users have had experiences in buying online in 2001. More than 75 % of all users have searched products and compared prices on the Web and are buying the products they want then at the cheapest or nearest brick-and-mortar store. The reasons for not buying online are two-fold: There are those who are worried about security and those who perceived no benefit in ordering online. Especially trust is an important problem for Internet start-ups. Many old-economy firms or well introduced e-commerce enterprises like Amazon are able to attract more customers not only due to brand name effect but due to higher trust in the known merchant (Gartner Group, 2000).

Those online users buying over the Internet are mainly interested in products of homogenous, highly standardized or known quality which are easy to ship (NFO, 2001, p. 284). Interestingly, books are the most popular product bought online. In Germany, the book market is highly regulated. Due to the fixed prices for books buyers cannot, in comparison to in-store shopping, earn any rebate on German books. Only buying foreign books form the UK or the US, e.g., is cheaper in spite of placing the order at a book shop.

Less important for online customers are the highly restricted closing times in Germany which do not allow merchants to stay open after 8 p.m. on weekdays, on Saturday evening after 4 p.m., on Sundays or at night in general. Most Germans feel no need yet for stores that are open 24 hours. The later closing times in the recent past demonstrated that in general no additional customers arrived during these added later hours. Due to these developments, the current restrictive closing times (when compared, e.g., to the U. S.) are not felt as a burden and should therefore not be viewed as a driver nor special enabler for e-commerce.

Many potential online customers stopped prematurely the actual order process. Important barriers for most customers were complicated ordering processes or uncomfortable payment methods and choices. Without a credit card or not willing to send the credit card number for security reasons, actual buying is not possible for those when only credit card payment as a payment method is offered. The most often used payment method in Germany is sending an invoice which was used by over 60 % of online customers. In contrast, credit card payment was only used by 30 % of customers (NFO, 2001, p. 286). 37 % of all Internet users conducted online banking which is

equal to 15 million bank accounts in the beginning of 2001. No other country in Western Europe is using online banking as often, i.e. the average of all European countries was 17 % (GfK, 2001).

Business Readiness and Environment

More than 89 % of German firms have had Internet access in 2001; more than 44 % used Intranet technologies. Electronic accessibility was provided by 82.5 % (e-mail) and 66.3 % (Internet) in 2001. Furthermore, the Internet access gap between firms in rural and urban areas was closed in 2001. While about 91 % of companies in metropolitan regions were connected, 86.4 % were connected in rural regions. A fast adoption in eastern Germany led to an equal diffusion of Internet and e-mail in 2001 (Empirica, 2001).

German firms were also able to catch up in comparison to the US in both B2B and B2C online distribution in all product and services categories. 23 % of German enterprises conducted at least 5 % of their business online, only topped by US firms with 30 % in 2001. Especially in comparison to Finland where the proportion of online-capable firms was higher than in Germany had a higher ratio of B2C business intensity.

An even better development could be observed in the German B2B online development. Ahead of US firms (32 %), 38 % of German firms made at least 5 % of their B2B commerce online. Nearly the same picture was observable on the online procurement side.

German firms were also on top concerning m-commerce applications. In 2001 9 % of all responding firms provided any m-commerce services, more than in Finland (7 %) or the US (5 %).

But not only large German enterprises offer e-commerce services. In fact, the important German mid-sized companies (SMEs), the *Mittelstand*, were also at the forefront using the Internet and its possibilities. German SMEs were behind Austrian and together with the Nordic countries in front of using the Internet (EC, 2001).

Senior Management familiarity with IT

The German economy could be dissected into industries with some distance to ICT (e.g., primary sectors such as agriculture or forestry), ICT-related industries (e.g., the automotive, finance or even chemical and pharmaceutical industries) and modern and innovative start-ups which are mostly residing in the service sector. Depending on the sector the IT familiarity increases in the named order.

While senior management in the primary sector such as agriculture or forestry was not much influenced in e-commerce developments early on, it lacks the necessary knowledge in comparison to firms in the industrial sector, where, e.g., the automotive or finance industries have today CTOs or CIOs on their boards, respectively. Theses traditional firms are impacted by globalization effects and realized that IT and e-commerce activities are of essential and strategic importance. On the other side, the outsourcing of IT departments as a consequent cost reduction in former times (when IT was seen as an enabling but not as a strategic technology) hinders some firms to gain the full benefit of e-commerce today. Due to these developments re-integration projects were introduced to implement e-commerce and Internet activities.

Reasons for the lack of a broader IT knowledge base might be the age of some top managers and the still missing language skills of some of them. But this group of senior managers of the “be-

fore-IT-area" is declining due to the generation change. Conversely, the familiarity with IT and e-commerce in German top management is steadily increasing but follows also the reluctant "wait-and-see" behavior of German society. Especially after the new economy bubble burst the willingness to spend money for expensive IT projects sunk temporarily.

Enterprise EDI infrastructure

Since the first EDI implementations in the late 1960ies in Germany companies are increasingly aware of the strategic importance of EDI for B2B communication. However, EDI is not as widespread as many had expected. Presumably, nowadays only 5 % of all companies who could benefit from EDI actually use it, mainly due to the considerably high costs for implementing the EDI system (Smith, 1996). In addition, there is the problem of deciding which specific EDI standard to implement and thereby not be compatible to other standards, although the EDIFACT standard clearly dominates in Germany. Thus, there is normally no uncertainty about which EDI standard to use, but nearly each industry is using its own EDIFACT subset so companies are afraid to be locked-in into a standard that is expensive and possibly not usable with partners of other industries. Nevertheless, inside an industry, EDI is heavily used in Germany, but until now mostly only by large firms.

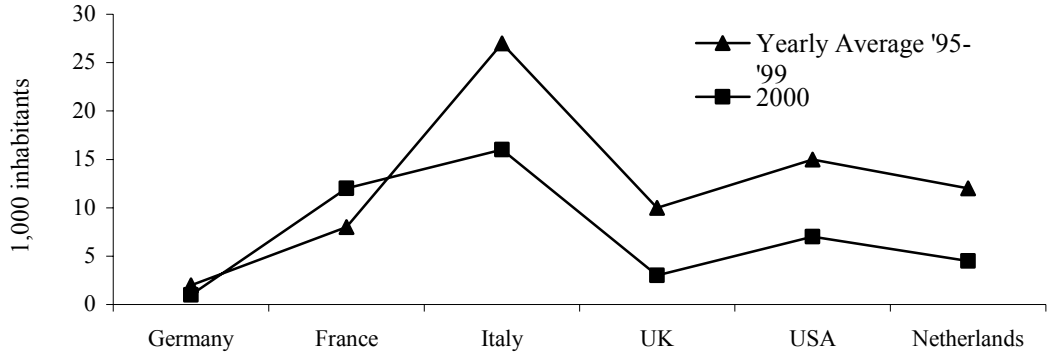
EDI is primarily applied with important customers. About 52 % of the German enterprises and about 75 % of US enterprises use EDI technology to transfer structured business data in 1999 (IWI, 1999). On average, German enterprises use EDI with 21 % of their business partners, while it is 30 % in the US. With these business partners 38 % of the revenue is realized in Germany and 40 % in the US.

Unionization

FIGURE 2 shows the number of working days lost due to strikes by workers. When compared to France, Italy, the UK, the Netherlands and the US, Germany reports the lowest number of days lost. This reflects the overall good working and cooperative relationships between labor and management in Germany.

FIGURE 2

Working days lost to strikes per 1,000 inhabitants



Source: Federal Commissioner for Foreign Investment in Germany: Germany: Gateway to Europe, p. 14, based on BBfAI.

NATIONAL POLICY

Policy Institutions

Information about the most important political institutions on the federal level is provided in TABLE 16. Due to the high variety of different projects and funding only the most famous initiatives are shown. Most e-government projects are still in the test phase or relatively new, like the e-form service which was launched in March 2002. In spite of the importance of e-health in other countries e-health in Germany is at the very beginning.

TABLE 16

E-commerce related political institutions and important projects in Germany

Federal Ministry of Economics and Technology[a]	*Federal Ministry of Education and Research*[b]	*Federal Ministry of the Interior*[c]	*Federal Ministry of Finance*[d]	*Federal Ministry for Health*[e]
Responsible for all federal SME and EDI related e-commerce projects: - SME IT competence center - Co-funding of e-commerce projects at SME	Responsible for all federal e-education and re-research related topics: - Schools into the Internet - BAFÖG-online (federal student subsidies program)	Responsible for all e-government and e-administration projects: - e-procurement - e-form server (www.bund.de)	Responsible for tax related e-government services: - ELSTER (electronic income tax declaration)	Responsible for all e-health related topics. Projects: - e-telematics - e-patient file - e-recipe
Most projects and funding are co-operations with the EU and the local states	BAFÖG online was launched at November 2000	e-form server was launched at March 2002	Since 2001, approx. 400,000 users yet	Not yet released

[a] *Source:* http://www.bmwi.de/Homepage/English%20pages/index.jsp

[b] *Source:* http://www.bmbf.de/en/index.php3

[c] *Source:* http://www.eng.bmi.bund.de/frameset/index.jsp

[d] *Source:* http://www.bundesfinanzministerium.de

[e] *Source:* http://www.bmgesundheit.de/engl/english.htm.

Enabling policies

The German federal government and the local states launched a series of initiatives addressing both the increasing number of ICT specialists (undergraduate education, re-direction of training programs) and attracting high-profile ICT specialists from Europe and the rest of the world, especially India. The federal employment office launched a program to help young unemployed to enhance their ICT capabilities and their attitude towards self-employment.

Regional projects in the local states provide support for ICT and e-business interested SMEs, as well as help for young start-ups with ICT training and subsidies. Most federal states run their own ICT Competence Center Network to enable not only SMEs in urban regions but overall in

the state. The federal government provides subsidies especially in regions to industries having structural problems or regions with few high quality and state-of-the-art industrial facilities like Eastern Germany. The European Community offers investment incentives together with subsidies for Eastern Germany. These incentives, in turn, should attract foreign MNCs to build up subsidiaries in these regions (FCFIG, 2001a). In the long run, this should provide favorable conditions and a strong economic incentive to start or expand e-commerce businesses.

E-commerce policy

E-commerce firms are by German law required to pay the German value added tax (VAT), if the firm's plant is located in Germany (has *nexus*) or if the product's origin is Germany. Therefore both traditional catalog sellers and new e-commerce traders have to follow the same standards. To protect Internet suppliers from criminal or technical procedures German federal law provides some protection and relief. If the Internet merchant or business has taken every prudent precaution, occurrences that are out of the control of this merchant or business [e.g., technical problems such as the breakdown of a server or criminal undertakings (e.g., hacking by outsiders)], are protected through the law and the Internet merchant or business cannot be held accountable. Together with the revised signature and trade law and the phasing out of the rebate law which regulated merchants' rebate patterns, the German government has improved the e-commerce trade conditions to be competitive on global markets.

The e-government initiatives are centrally coordinated by the Federal Ministry of the Interior in contrast to the private e-commerce initiatives led by the Federal Ministry for Economic Affairs. Therefore, the e-government projects in Germany are uniform at the federal levels but vary from state to state and city to city administrative units. Due to relatively low IT penetration in those governmental facilities the provided services are in comparison to other European countries, especially in rural regions, at a fairly low level. With the exception of online services in the field of mailing taxation declarations (nearly 100 % availability) further electronic services are far away from the European average. Many document- and paper-based processes are not yet ready for electronic transmission. Short of funds and mostly lacking IT skills, public servants are hampering the improvement of public administration which often is an inhibitor for private business. Larger trade firms with completely integrated EDI systems are required to supply paper-based transactions to cope with customs, for example, although the necessary EDI-based customs message standards exist since several years (EC, 2001).

READINESS

Germany has silently become something like a European e-commerce power house. After the first five years of unification Germany's interest and politics was focused on rebuilding the East German infrastructure to bring the new local states to internationally comparative levels and standards. This ambitious challenge absorbed political and economic attention in Germany. But everyday challenges like improving e-commerce readiness factors have gained more and more importance and momentum in the last years.

E-Commerce enablers

The most important e-commerce enabler in the B2C sector is the highly educated and skilled human resource as a broad base of well-informed Internet users and potential online customers.

This will also positively influence the workforce shortfalls in the ICT industry, as well as in application industries in the near future. Together with the relatively high income level of German wage earners, education and wealth are the most important e-commerce enablers, both of which are realized in Germany.

The main drivers of e-commerce use and diffusion in the B2B sector are the strong international competition and globalization of the export-oriented German industry. The close international trade connections increase the speed of diffusion of standardized electronic transactions. This trend is not only observable within large firms but especially in the strong and innovation-friendly German SMEs *(Mittelstand),* which is of high importance for ICT technology diffusion in Germany.

A naturally given factor of importance is the geographic position of Germany in the center of Europe which means not only short distances inside Germany due to the excellent network infrastructure but also short physical distances to all the other European countries and markets. The assumption, that in view of modern telecommunication physical distance is loosing its importance, is true concerning digital goods. But physical distance is still of high importance for distributing physical products. The central position of Germany as a hub within Europe together with the excellent public and private infrastructure attracts foreign investments. This means efficient connectivity to e-commerce markets in Europe based on German infrastructure. A further reason for MNCs to enter Germany is the social peace and continuity in the cooperation between management and unions.

Further important e-commerce enablers are the high availability of high-speed Internet technologies like DSL or ISDN. Germany has the highest density of ISDN in the world and lower telecommunication costs compared to a lot of peers.

Summing up, the social interest and willingness to take an active part in the developing "the e-society" is increasing. Germany has not only entered the catch-up phase compared to the *first-adopter* innovation schema but in many areas already caught-up and is now gaining a competitive advantage in Europe and in the world. As shown earlier, nearly all age groups are using the Internet today. Most of them do so not only from their business or office but also from home.

E-Commerce inhibitors

The main hindering reason, due to the prevailing low-risk-mentality of many German customers, German B2C vendors have to cope with, is the relatively low rate of online sales. Especially online payment methods are not very popular, even the uses of credit cards are perceived as being unsafe.

In the B2B sector, the lack of service mentality and lack of self-empowerment attitudes are the most important inhibitors of a rapid implementation of e-commerce solutions. The lack of service mentality is observable as an insufficient, customer-orientated behavior. Lack of self-empowerment means the missing willingness to primarily take care of one's own problems by oneself, resulting in the common attitude to ask for or demand solutions provided by society or the government.

Further inhibitors are the restrictive market regulations, as can be observed, e.g., in the book and pharmacy market. Another inhibitor for e-commerce might be the German government in the

future. Inhabitants sometimes wonder about the difference between public announcements and reality. A long-term inhibitor of e-commerce may be the shrinking population in the next decade.

DIFFUSION OF E-COMMERCE

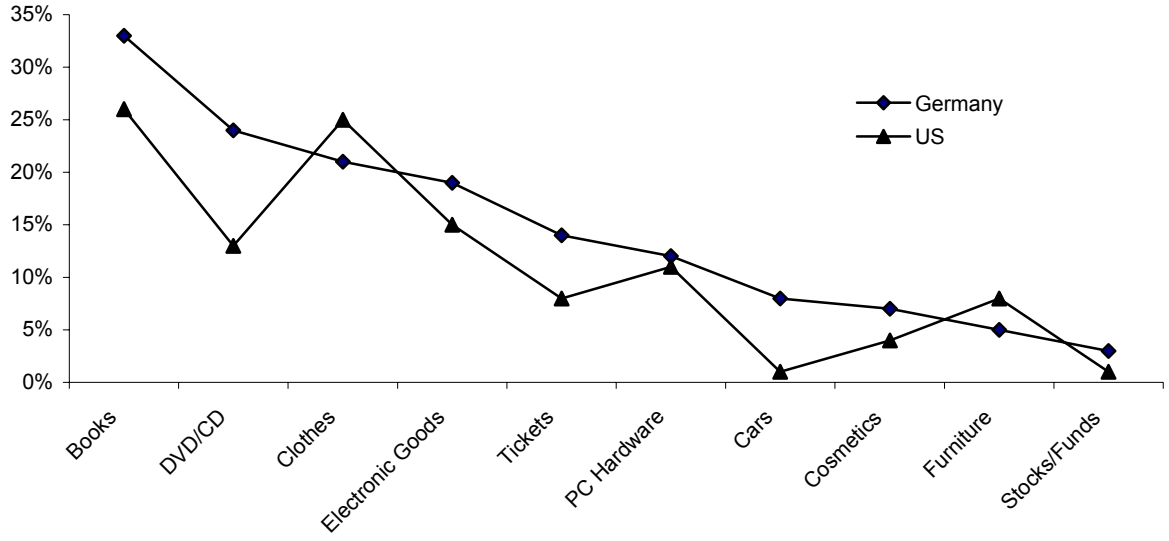
The diffusion and usage of E-commerce is growing in Germany. The percentage of Internet users of the total population grew from 28 % in 2000 to 42 % in 2002 (46 % of German males and 36 % of German females are online). 33 % of German Internet users plan to shop online until the end of 2002 which is more than in the US with 29 % (TNS, 2002).

The usage of E-commerce

The diffusion of e-commerce in Germany in the B2C area increased substantially in the last few months. In spite of the relatively high concerns about risks ordering online the number of German online shoppers was with 26 % of total population rather high in June 2002. Germany takes the third highest position in online shopping behind the US and Korea. More than 11 % of the German population or 26 % of all Internet users bought online in May 2002. 50 % of all Internet users buying online spent up to $100, furthermore 34 % paid between $100 and $300 and after all 7 % spent more than $1,000 in March 2002 (TNS, 2002).
The most popular online shopping products in Germany are books with 33 %, followed by DVD and CD-ROM with 24 % and clothes with 21 %, electronic products (19 %) and tickets (14 %) (see FIGURE 3).
The main hindering reasons for not buying online are the distrust in online security and the lack of credit card usage, followed by the missing shopping event when buying online in comparison to physical shopping in stores.

FIGURE 3

Percentage of online shoppers buying these categories online (ranked by German top 10)



Source: TNS Interactive – Global eCommerce Report, http://www.tnsofres.com (last access: 03/07/2002)

The increasing demand on online distribution and shopping in Germany is observable in the B2C and B2B sector. In both cases Germany has picked up in comparison to other countries. In the B2C area Germany takes a leading position in Europe and the second place behind the US in 2001. Nearly one quarter of all online selling firms sold more than 5 % of their sales online (23 %) in 2001. In the B2B area German firms are leading in comparison to the US, UK or Finland. 38 % of them sold more than 5 % of their total revenue online in 2001 (Empirica, 2001, pp. 37-39).
Besides this strong usage of online distribution online procurement is also growing in Germany. 49 % of all enterprises have experiences with online procurement and buy more than 5 % of their MRO products online. But the intensive usage of e-commerce depends still on the size of enterprises. While online sales are more or less offered by all sizes of firms, online procurement is more common among larger enterprises due to the small economies of scale and minimal cost reductions for SMEs with low sales volume per transaction (Empirica, 2001, pp. 41-47).
In spite of the positive development of online sales in the last few years only 1.6 % or $5 billion of German B2C retail turnover was generated over the Internet in 2001. Although the still continuing increase of online sales is declining, a doubling growth rate of online turnover such as in the past years is not expected. While pure online shops dominated e-commerce in the very early phase in 1996 today traditional multi-channel retailers are the most successful online shop providers such as Tchibo, Metro or catalog sellers such as Otto, Quelle or Neckermann. Otto is behind amazon.com the largest e-commerce retailer with $1.7 billion sales in 2001 and expected $2 billion in 2002. In parallel to the B2C e-commerce German enterprises strengthened their B2B activities. Due to this development the German B2B market has a higher potential for online sales and procurement (FAZ, 2002).

E-Commerce production

Due to the high costs of labor in Germany the production of IT equipment and hardware has been exported to low-wage countries. Germany's enterprises such as Siemens are cooperating with foreign partners such as Fujitsu to produce hardware in low-wage countries or gave up production completely with famous exceptions such as AMD or Infineon, producing heavily subsidized processors in eastern Germany. Furthermore, German enterprises took an important position in some significant market niches such as the production of semiconductor products for embedded systems. More important for the e-commerce industry in Germany are software companies such as SAP or Software AG. Most of them are specialists on enterprise resource planning software or data warehousing. In addition to these global players Germany enjoys a large number of smaller "software smiths", supplying SMEs with materials management software.

SOCIAL AND ECONOMIC IMPACTS

After the introduction of the Internet, its first usage started with universities and large enterprises and infiltrated all areas of life in Germany. Due to the ongoing automation of technical processes and the reduction of information asymmetries the usage of ICT and e-commerce is accompanied by fundamental economic, as well as social changes. German banks, e.g., are reducing their branch network since more and more people are using online banking. Furthermore, German banks are focusing on their core business and source out their IT departments. As a consequence more employees are being laid off than new jobs created in the new economy. Unemployment on

the one hand and a lack of e-commerce specialists on the other hand are the new challenges for society. To cope with that situation ICT education programs for adults and students were established.
Competition on the labor market was not the only one that increased. Due to the transparency of information and available services prices not only in the telecommunication or energy markets declined but also the prices for foreign books and pharmaceutical products from abroad decreased as well. The increasing competition for German book shops and drugstores will also lead to business closings. As this transformation process gains momentum, it suggests, possibly, new emerging forms of society such as distributed work (teleworking) or ubiquitous computing in Germany. In comparison to the impacts of e-commerce on society the impacts on the economy such as just-in-time delivery are more or less already realized.

Firm level impacts

German enterprises, both large ones and SMEs, have finished the start-up phase of e-commerce and e-business integration and are evaluating now the pros and cons of these developments. The first drop-outs are observable when e-commerce business models failed to be successful, but overall the optimization phase is now in progress. The targets such as increase of profitability or sales volume, as well as more customer-orientated services are now focal points after the experimenting phase. Current e-commerce and ICT driven projects try to increase the workers satisfaction which is not primarily a strategic business goal.
The necessary business process changes for a successful usage of e-commerce and the following impacts on traditional operations are a challenge especially for SMEs. As a consequence e-commerce strategies were implemented sporadically or even lacked any strategy. Existing strategic goals a characterized by cost and rationalization reasons such as outsourcing. Focusing on one-sided technical aspects of e-commerce the organizational side was not restructured in the necessary way. As a consequence, a broad diffusion of ICT and e-commerce techniques is observable but not inevitably a deep penetration in existing business processes (Interorg, 2002). This circumstance explains the time lack of changing business processes in Germany in comparison to the US, based on the yet mentioned “wait-and-see” mentality.

Industry level impacts

German industry was able to adopt ICT and e-commerce solution very fast in the last decade and takes now a leading position in the world. Nevertheless, the depth of integration and the maturity of e-commerce are not yet as far developed. The usage of cooperative business models, e.g., becomes more and more important in order to be competitive on an international level. Especially national supply or value chains have to compete against foreign competitors. Important forms of ICT enabled working methods such as distributed work (teleworking), video-conferencing or inter-organizational project coordination is not yet completely realized, with maybe the exception of the German automotive industry (Fricke et al., 2002).

National level impacts

On the macroeconomic level e-commerce has certainly influenced both, i.e. society and the economy. The development of new distribution channels and new ICT products has positively

increased the consumption behavior which led to new levels of employment in spite of the slow-down of the economic cycle in the entire economy. The ICT development in Germany was less dynamic in the last decade than, e.g., in the US or Finland. Nevertheless, the German economy was strongly concentrated and bounded on the economic effects of the German unification. Due to this the ICT growth started late in the second half of the 1990ies by accumulating a higher ICT-based penetration in the economy. Since then an increase in productivity was observable which was not only based on the integrated economy but also on the strength of the European common market, as well as the deregulation efforts in the telecommunication and postal sector and the ongoing privatization of former state-owned monopolies. The structural reforms together with the positive e-commerce effects were responsible for a relative stable but still low growth rate of the GDP.
Different from the US the German statistics do not yet measure a significant correlation between the increase of productivity in the services sector and the increase of ICT and e-commerce. This might have two reasons: the diffusion time lag and the still missing data of the official German statistical bureau. First measurable e-commerce effects are mirrored in current publications, i.e. dating back no longer than 2001 and 2002.

IMPLICATIONS

Germany enjoys all the necessary prerequisites to be a leader in the so called new economy (skilled workforce, IT-infrastructure, efficient economy and transportation system, etc.). Besides these excellent, potential factors the social component and the willingness to change traditional business processes seem to hinder the breakthrough towards new forms of business. On the other hand, there seem to be some indicators for a changing, more ICT orientated behavior in society, but until now a increasing growth rate of productivity in all sectors, based on ICT and e-commerce, is not yet measurable. Germany possess, e.g., the largest online buying community in the B2C sector outside the US.

In order to increase the speed of diffusion and usage of IT and e-commerce the former government policy, which mainly focused on infrastructural investments in the public and private sectors, must be changed towards a more sophisticated policy which combines human being requirements and IT (such as IT education programs for adults or intuitive useable and standardized Internet services). First steps were made in the education system with new vocational jobs such as ‘informatics merchant’ (Informatikkaufmann) or specialist in system integration or with the initiative D21 “Schools into the Internet”, but to reach all parts of society politicians will have to create projects outside the school system.

As the German case has shown the growth and diffusion of e-commerce depends not only on the availability of the technology, but also on social components. Research has more carefully taken into account the socio-economic components when analyzing the adoption and diffusion process of innovations. Interdisciplinary research projects constituted with information systems researchers, as well as social researchers have to analyze the needs and benefits of IT and e-commerce users to create valuable business and socially meaningful services.

Although e-commerce existed before the Internet, through EDI for example, e-commerce was expected to spread more rapidly with the Internet because of its openness, lower costs, wider availability and greater network effects as compared to private networks. Nevertheless, the observable paths of diffusion developed differently, as has been shown, in Germany than in the US.

The importance of e-commerce in both economy, as well as society makes it mandatory to investigate the necessary prerequisites for successful usage of all kinds of e-commerce solutions, as well as a methodological framework to measure relevant indictors. In the final analysis a central goal here is to develop a general understanding of e-commerce diffusion and a contribution to network effect theory. It seems that traditional decentral coordination models are not able to explain the adoption decisions of globally interconnected customers and business partners. The diffusion and market penetration strategies of suppliers often underestimate the meaning of external network effects. As a consequence, significant rates of economies of scales are unused in the field of e-commerce.

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