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Globalization and E-commerce: Environment and Policy in Germany

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SUMMARY

- Due to its economic power as the largest economy in Europe and third largest in the world, Germany is predetermined to play an important role in the field of e-commerce.
- After the improvement and diffusion of high-speed Internet access like ISDN or DSL, Germany enjoys more ISDN telephone lines than any country; also the highest DSL per capita ratio, in Europe.
- Germany possesses a large, highly educated and relatively wealthy population strata, which is an important prerequisite for successful e-commerce activities. Due to foreign language skills in the German population (every pupil has to learn English; a large number have basic knowledge in French or Spanish, too), the language barrier to use international Web sites is small. Moreover, the German education system puts increasing emphasis on ICT skills.
- Invention activity in some areas of information and communications 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. This could be viewed as an early indicator of strengthening the mobile e-commerce sector in Germany and may be interpreted as an important effort in catching-up with the overall e-commerce development.
- More than 80% of the GNP is created in mid-sized companies (*Mittelstand*), which traditionally are 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.
- The central position of Germany as a hub to Europe together with the excellent public and private transport infrastructure is a competitive advantage to attract foreign investments.
- 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 has caught up in developing its relevant infrastructure and is now gaining more momentum.

INTRODUCTION

Germany, the third largest industrialized country in the world and the largest in Europe, exercises a peculiar path into e-commerce. On one hand, nearly 83 million highly educated people being squeezed into a comparatively small land create an enormous demand toward adopting the new information and communication technologies (ICT) in order to increase ease of life, especially in a nation that traditionally "enjoys" a high regulation level, e.g., restricting the number of hours stores may stay open. The pull effect of a large economy is increased when looking into neighboring countries also using the German native tongue (and to some extent adopting the culture, such as Austria and Switzerland) or at least wide-spread knowledge of the German language (e.g., Scandinavia, Netherlands). This increases the wider population set to almost 120 million people. Thus, Germany is and likely will always be on the economic forefront to adopting e-technologies, although it will not be "the driver" of such adoption.

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

Since World War II, Germans have cultivated a "best imitator" attitude 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 people with good work ethics (i.e., being comparatively hard-working and working on-time) who can adapt to changing needs quickly. Moreover, more than 80% of the GNP is created in thousands of mid-sized companies (*Mittelstand*), which traditionally are considered as more flexible and innovative than large enterprises. The large number of mid-sized companies also provides considerable risk diversification. All-in-all, Germans take an economic lead when a new technology proves successful. Further, in the process of imitating innovations, Germans have exploited their capabilities to integrate complex systems and processes, thus creating a competitive advantage. This generally occurs when Germany has caught up technologically with leading-edge nations and this is the case with e-commerce. In fact, Germany has caught up in many e-commerce areas in the last two years. For instance, it has an excellent network infrastructure and it is expected that Germany will make a great leap forward in e-commerce. An early indicator is the increase of invention activity in some areas of information and communication technology, which outruns the average in other countries.

Moreover, Germany is densely populated with efficient road and railway networks, and enjoys a high level of competition, especially for consumer goods, even without any electronic media, e-business offers. Applications have to be especially advantageous to overwhelm traditional markets just a few minutes away. We hypothesize that traditional market efficiency will boost e-commerce development and adoption.

Over the last few years, the ICT 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 drastically over the last few years mainly due to heavy competition in this market. Fast and cheap Internet access is becoming widely available in Germany. In comparison to the U.S. and Scandinavia countries, Germany has been able to close the “electronic gap” in recent years.

The Federal Republic of Germany (FRG) and its local states have heavily invested in raising awareness and funding programs to improve the diffusion and penetration of e-commerce and related initiatives, as a means to pave Germany’s way toward the information society. The intention is to continue with these activities geared toward industry, public administration, and the general population over the next years. These government efforts are supported by emerging private sector initiatives, the most relevant one being Initi@tive D21 (discussed later).

Germany faces a unique situation in still "digesting" the reunification of 1989. The former German Democratic Republic (GDR), located in the east, was economically in ruins and receives a fairly large amount each year to improve important infrastructures. However, after more than 10 years, there is no serious indication that eastern Germany is developing a self-supporting economic upswing, which also affects e-commerce, both in the east and overall in Germany.

This report focuses on the e-commerce-relevant environment and policy impacts in the e-commerce field. It will address German policy and its potential impacts on the so-called “brick and mortar”, as well as on the virtual infrastructure. Private and public investments as potential factors for growth and development will be addressed, as well as the efforts by public programs and announcements of the European Commission, Federal Republic and federal states to support the electronic penetration in all aspects of life in an information society.

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 high standard of living for nearly all social layers. The main inhibitor might be a relatively low tendency of Germans to buy on-line, followed by 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 the 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 greater use of e-commerce overall are the lack of a better service mentality and the overall wait-and-see attitude of German employees.

As we will see, Germany is, due to its import- and export-oriented economy, heavily involved in international economic cycles and therefore has to deal with all kinds of imponderability in all markets. Globalization will increase the necessity of fast and efficient cross-border cooperation.

NATIONAL ENVIRONMENT

Population and Demographics

The German population faces almost all the same economic, societal and technology problems as other industrial western nations. The German age distribution leans toward a growing age population (Table 1). The number of inhabitants in Germany, and Europe, will continue to decrease until 2010, whereas in the U.S. the population is increasing. In terms of consumer buying and the growth of the Web economy, the proportion of the relevant age group of 15-49 year olds, will decline (Zerdick et al., 2001).

In recent decades, Germany has become an immigration country. Its social and cultural diversification will be shaped by international migration for 40 years either into a redefinition of the German identity, or into the full acceptance of cultural pluralism (BIB, 2001).

Integrating these immigrants is both a challenge and an opportunity for German firms to expand their business since most immigrants are well-educated. Among these immigrants are especially well-educated information technology (IT) specialists, who are badly needed in Germany to close the workforce gap in the IT and related industries. A new immigration policy (use of a Green Card type system) for foreign IT specialists started on August 1, 2000. By 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 U.S. Green Card. The main reason for the relatively small success rate are language problems for Indian or other English speaking IT specialists.

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, but has been declining since 1995. In the long-term Germany is predicted to have a significant reduction in population, as well as an aging population. Forecasts for 2050 are showing a reduction of the population to 70 million people.

TABLE 1
Demographic Overview and Urbanization

Demographics	Population 2000 ^a	% Urban population 2000 ^b	% older than 65 years 1999	% 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
United Kingdom	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.

As Table 2 shows, Germany's population will decline in this decade to roughly 78 million inhabitants. 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 information and communication technologies (ICT) 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 people retire who are well-educated, and likely to experience physical difficulties to move around.

TABLE 2
Development of Inhabitants: Forecast 2010

Population (in thousand)	1998	2002	2004	2010
Germany	82,181	80,839	80,127	78,631
France	58,723	59,171	59,483	59,782
Italy	57,563	56,951	56,634	55,840
United Kingdom	59,086	59,037	59,053	58,925
EU15	374,617	373,243	372,632	370,195
United States	268,922	272,415	275,770	280,652

Source: Prognos. Number of inhabitants: Forecast inclusive migrations (resident population), 2000.

Another factor to consider is the Green Card regulation, which is still under discussion. In view of roughly four million jobless people, 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 U.S. The proportion of single households is also growing and has its highest amount predicted in Germany with 36.1% in 2010 (Table 3).

TABLE 3
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%
United Kingdom	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), 2000.

More and more Germans live a single life. Reasons for this trend in family-structure are age-conditioned shifts. Since the 1970s, a low marriage rate, later marriage and a rising divorce rate may be observed. A survey conducted by Gesellschaft für Zahlungsverkehr (GfK) analyzed the proportion of Internet users and buyers in single households. Observing the on-line 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). It is difficult to make predictions based on these developments vis-à-vis e-commerce.

Urbanization and Population Density

After World War II and the division of Germany into two countries, the former German Democratic Republic (East Germany) experienced a declining population. After unification in 1989, 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 (Table 4).

Such population density is attractive for e-commerce development, 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 also be 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 business-to-business (B2B) and business-to-consumer (B2C) sides is largely in place (e.g., high-speed networks, fiber optic networks, cable systems, etc.).

TABLE 4
Population Density in Germany

	1995	1996	1997	1998	1999
Population in 1000	81,661	81,896	82,052	82,029	82,087
Population per km ²	229	229	230	230	230

Source: Statistisches Bundesamt: Statistisches Jahrbuch 2001: Bevölkerungsentwicklung, p. 44.

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. This trend has existed for nearly a hundred years and not only continues, but increases in dynamics in the next several decades.

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 indicate that in 2050 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).

TABLE 5
Age Distribution

Year	Population in Mil.			Age distribution in %			
	West Germany	East Germany	Total	Under 20	20-29	30-59	60 and older
1950	50.34	18.38	68.72	30.4	14.1	40.9	14.6
1970	61.00	17.07	78.07	30.0	12.9	37.1	19.9
1990	63.73	16.02	79.75	21.7	16.7	41.2	20.4
1998	68.16	14.02	82.18	21.4	12.3	43.9	22.4

Source: Statistische Bundesamt, Jahrbuch 2000, p. 58

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 on-line firms due to their familiarity with the Internet (Jupiter MMXI, 2002).

A different view of the structure of this aging society is presented in Table 6. The percentage of people with an employable age stagnated or even declined in the past five years. This trend will continue for the population group, which is older than 60 and is increasing continually.

TABLE 6
Population According to Selected Age Groups in Germany

Population according to selected age groups	1995	1997	1998	1999
Total (in 1000)	81,817	82,057	82,037	82,163
<20 years (in 1000)	17,629	17,661	17,584	17,530
<20 years (in %)	21.5	21.5	21.4	21.3
20 to 30 years (in 1000)	11,460	10,489	10,060	9,746
20 to 30 years (in %)	14.0	12.8	12.3	11.9
30 to 60 years (in 1000)	35,519	35,980	36,031	36,006
30 to 60 years (in %)	43.4	43.8	43.9	43.8
>60 years (in 1000)	17,209	17,927	18,362	18,881
>60 years (in %)	21.0	21.8	22.4	23.0

Source: Statistisches Bundesamt, Fachserie 1, R 1, 1999, p. 31.

Economy

As a leading industrial country and as the world's second largest trading nation, Germany is deeply integrated in the global economy. In recent years, however, the conditions for national political actions have fundamentally changed due to globalization of markets, and they will continue to change. For e-commerce, this implies that an open market exists for firms to hire employees, of course, but firms face legal requirements in terms of running the firm due to the formal representation of employees, typically through unions. German unions take on a considerably stronger role in a firm's well-being when compared to the U.S.

GDP

The positive economic effects brought about by the dramatic ICT development in the last several years, influenced the economies of all industrial nations, especially the U.S. The constantly growing economic output in the U.S., in spite of the lower economic output in Europe, led to a higher GDP in the U.S. in 1998. Germany was not able to pick up this trend like the U.S. New consumer and investment indices predict a downward trend for 2001 and the first half of 2002.

Economic Growth

Germany's sustained economic growth in the last year was primarily based on exports. Due to the closely connected and globalized economy, Germany was not able to extricate itself from the worldwide recession. In 2001, GDP growth rate was approximately 1%. This has direct affect on

the labor market, which is still strongly regulated by trade union rights. Slow economic growth implies low work force demand. This, together with the restrictive and over-regulated work force market, make an inhibitor fostering a higher unemployment rate. Other countries like the U.K. or the U.S., have a more liberalized work force market and due to this, have a lower unemployment rate.

TABLE 7
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: Statistisches, Jahrbuch 2001, p. 30. GDP in real annual prices.

Germany is the biggest consumer goods market in Europe and therefore, of considerable interest economically, and 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 notable in continental Europe for e-commerce purposes.

Unemployment

The absolute number of unemployed people rose from 3.612 million (9.4%) in 1995 to 4.16 million (10%) in January 2002 (Table 8 and BfA, 2002). 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.

One could argue that a pool of labor is available once e-commerce takes off. This may not be the right labor pool in terms of e-commerce skills, but if e-commerce applications trigger demand for new and additional products and services, this labor pool could benefit from these developments. On the consumption side, however, these unemployed people are less likely customers and clients of e-commerce firms and services, as they do not have the income to participate.

TABLE 8
Unemployment Ratio in %

Unemployment ratio in %	1995	1996	1997	1998	1999
Germany	9.4	10.4	11.5	11.1	10.5
France	11.6	12.3	12.5	11.8	11.2
Italy	12.0	11.8	11.7	11.8	11.4
United Kingdom	8.1	7.3	5.5	4.7	4.3
United States	5.6	5.4	4.9	4.5	4.2

Source: Media Forecast: Zerdick, Axel, et al.: Die Internet-Ökonomie: Strategien für die digitale Wirtschaft, 3. Edition, Berlin, 2001, p. 310.

The unemployment figures in the area of the former GDR are about 15-20%. In the area of the old FRG, only regions near the border with the former GDR have high unemployment figures of up to 15%. The southern states of Hesse, Baden-Württemberg, and Bavaria show areas with unemployment ratios under 7%.

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 for locating new e-commerce firms. It is certainly unlikely that these regions will benefit from a strong invasion of manufacturing firms any time soon. Women are greatly affected by high unemployment rates. In eastern Germany, more than 50% are unemployed, and in some regions, more than 60%. Here, assistance and incentive programs by the public and private sectors that earmark e-commerce programs designed for women, in general, and also for women entrepreneurs, are conceivable.

Openness to Foreign Trade and Investment

Worldwide, Germany is behind the U.S., the leading export nation, and the U.S. is the most important foreign country outside the European Union for export flows from Germany. Consequently, Germany is strongly dependent on the U.S. market. A recession in the U.S. leads to a recession in Germany. Brokers at the German Stock Exchange (DAX) in Frankfurt are looking closely at all developments of indices and market forecasts on the U.S. consumer market and react to changes immediately. In 2000, Germany exported goods to the U.S. amounting to \$72.2 billion. France was nearly as important with \$68.2 billion, and the U.K. 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. Table 9 depicts the foreign trade figures for the last five years. The import value increased in 2000 due to high oil prices and the weak exchange rate of the Euro to the dollar. At the same time, beginning economic output problems lead to a declining export surplus from +0.45% in 1999 to -19.22% in 2000.

TABLE 9
Foreign Trade, 1996 – 2000

Foreign trade 1996 – 2000	1996	1997	1998	1999	2000
Imports in million \$ PA	448,304	446,116	478,500	475,932	500,638
Change of Imports based on previous year in %	3.94	11.84	7.26	5.04	22.34
Share of imports of the GDP in %	19.25	21.06	21.88	22.44	26.77
Exports in million \$ PA	512,289	513,406	546,974	545,707	549,105
Change of Exports based on previous year in %	5.26	12.63	7.49	4.43	17.03
Share of exports of the GDP in %	22.00	24.24	25.24	25.73	29.36
Export surplus in million \$ PA	63,985	67,290	68,475	69,776	48,467
Change of export surplus based on previous year in %	15.52	18.20	9.02	0.45	-19.22

Source: Statistisches Bundesamt: Statistisches Jahrbuch 2001, pp. 24, 26, own calculation.

Germany's import and export partners are similar. Fifty-two percent of imports and 56% of exports were conducted with EU nations in 2000. With NAFTA (North American Free Trade Agreement) countries, ASEAN (Association of South East Asian Nations) countries and EFTA (European Free Trade Association) countries Germany did business reflective of 18% imports and 19% exports. Roughly one third of foreign trade was conducted with non-associated countries, like the former COMECON (Council for Mutual Economic Assistance) states Russia, Poland or the Czech Republic and with oil exporting nations from the near east such as Kuwait (StatB, 2001).

Germany offers many opportunities for investment, particularly because there is no specific investment law in Germany. Foreign investors are treated the same way as German investors. The need for investment has risen enormously since reunification. This is reflected in a tangible increase in the volume of capital imported from other countries. Firms from anywhere in the world could establish themselves in Germany by investing and offering e-commerce services, or conducting e-business.

Foreign direct investments in Germany in comparison to other EU countries are relatively high. In the last four years, investments increased from a relatively low level in 1997 to over \$165.6 billion in 2000. Germany was able to attract more foreign capital than the U.K. An important reason is the attractiveness for foreign investments in the new *Länder*, which are often co-funded by the German government. Germany then appears to be well-positioned to establish itself in the field of e-commerce. 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

After the U.S. and Japan, Germany is the third largest economy with a GDP of roughly \$1,900 billion in 2000 (see Table 10). The GDP per capita in Germany is after Switzerland the second highest in Europe. Interestingly, the German social system and socio-capitalist market economy leads to a relatively high proportion of income share (8.20%) for the poorest 20% of the population. The poorest social layers in the U.K. or the U.S. are dramatically poorer. The richest 20% achieved broad income share (38.50%) in Germany, but lower than the U.S., U.K., or France. In other words, the situation in Germany is somewhat unusual because in general, rich people earn a relatively lower share of income, whereas poor people earn a relatively higher share in comparison to most other European countries with the exception of Italy (Table 10). This leads to a relatively prosperous middle-class layer with enough money to use the services e-commerce is offering in the B2C sector.

TABLE 10
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
United Kingdom	1,416.09	23,693.92	43.00	6.60
EU15	7,792.53	20,683.55	38.40	8.29
United States	9,962.65	36,210.70	46.40	5.20

^a *Source:* International Telecommunication Union, World Telecommunication Indicators. Geneva: International Telecommunication Union; March 2001. ITU definition: the data are current price data in national currency converted to United States dollars by applying the average annual exchange rate [from the International Monetary Fund (IMF)] to the figure reported in national currency. 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.

Potential E-commerce Participants

Germans are relatively conservative adopters of new technologies in comparison to U.S. citizens, with regard to PC or Internet adoption. More specifically, Germans tend not to adopt a technology until it has proven its usefulness. The early German 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 U.K. (Table 11).

TABLE 11
Internet User by Gender in % of Total Population in Germany, France and U.K., 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
United Kingdom	Male	46.00	46.00	52.00
	Female	30.00	30.00	38.00

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

The gap between male and female Internet users is still substantial. This may be explained by the higher rate of Internet workplaces that are traditionally male domains. It may also be the case that males show a greater affinity to computer and Internet use than females. It would be reasonable to speculate that similar behavioral patterns may be observable with regard to e-commerce applications and overall use.

TABLE 12
Internet User by Age in % of Total Population in Germany, 1999-2001

Internet user by age in % of total population		06/ 1999	06/ 2000	06/ 2001
Country	Age			
Germany	15-17	61.00	60.00	66.00
	18-24	66.00	66.00	71.00
	25-34	56.00	56.00	63.00
	35-44	45.00	45.00	56.00
	45-54	38.00	38.00	47.00
	55 and more	9.00	13.00	15.00

Source: Euro.net Welle 4-8, NFO Infratest InCom, 2001, p. 190.

Table 12 gives a more detailed view besides the gender-based Internet use and age. As expected, the groups 15-24 years of age, are the main users of the Internet due to the Internet being a necessary and regularly used tool to support work at school, university or elsewhere. Interestingly, users in the retirement age are beginning to discover the Internet as a tool to communicate with their younger relatives. They have time, are well-educated, and have the money to spend a lot of time on-line (Internet use is metered rather than flat rate). After the younger generation described above, this older generation is the most important consumer group for the Internet economy. High wages, early retirement and free time make the older population an interesting and growing user group. As e-commerce firms might identify target groups, it appears that these two distinct age brackets would serve as prime targets.

A higher proportion of the population has Internet access in western Germany (44.7%) than in eastern Germany (36%) as of June 2001. Even after more than 10 years of reunification, there is still a substantial technology gap in private households, not only in terms of Internet access, but also between western and eastern states. For e-commerce firms and applications, overcoming this gap may be a substantial challenge. On the other hand, numerous potential technologies, at least on the B2C side exist that would permit users to gain high-speed access (e.g., ADSL, ISDN).

The leading Internet states are the better equipped and economically powerful states of Baden-Württemberg and Hesse, together with the city or metropolitan states, Berlin, Hamburg and Bremen. This leads to the assertion that highly aggregated regions with concentrated levels of economic activity and population density, do correlate positively with high Internet usage. This is a view that predicts that states or regions with an optimal setting of brick-and-mortar infrastructure, as well as virtual infrastructure, have better economic development positions. These circumstances seem to apply also in the e-economy or e-society age. Consequently, e-commerce firms are likely to be located in target market regions with a dense brick-and-mortar, as well as virtual infrastructure. It is observable that in metropolitan regions, the successful traditional shops seem to assure that Internet-based shops offer goods and services of just the same or even better quality. From this perspective, traditional firms seem not to be a barrier at all, but due to high levels of prevailing competition, they will indirectly increase the quality of on-line services.

Besides age and location, Internet use depends strongly on the user's education level. With an increase in literacy, the regular use of the Internet increases as well. A survey conducted by NFO World Group (G+J, 2001) refers to young people as a response group about their Internet use and

final degree. In fact, most respondents had a secondary school graduation Certification Level I, but the highest Internet usage were people with higher education levels. These groups with high education levels were equal to the group of superior wage earners in the past. With the continued decrease of Internet access costs more and more people are able to enter the Internet, so its character and content are changing from an exclusive information channel to a broad entertainment and commercial tool for every social layer.

Industry Structure

The federal statistical office (Statistisches Bundesamt) provides annual reports with the number of enterprises and sales figures belonging to different economic sectors. Of particular importance 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.

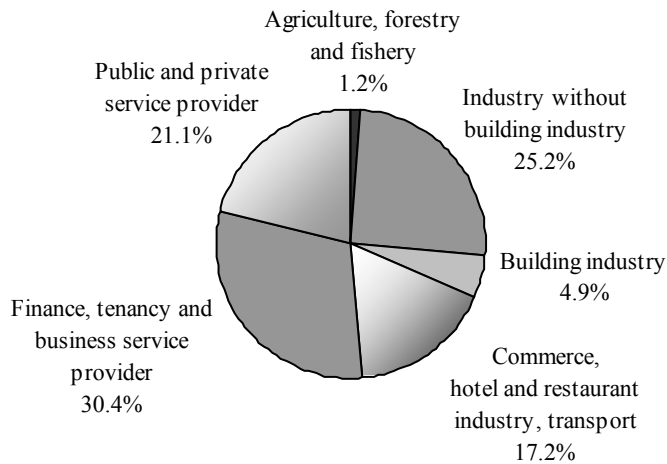
Sectoral Distribution

The German economy is still largely dominated by its manufacturing sector. The automotive and chemical industries especially, have considerable importance for the German GDP and labor market.

The primary sector—agriculture, forestry and fishing—with 1.2% of GDP in 2000, has low significance for Germany as a service-oriented nation (Figure 1). The secondary sector (manufacturing plus the building industry) with 30.1% of GDP is that part of the economy which is strongly export-oriented. Commerce, transportation and catering with 17.2% of GDP also contributes to the secondary sector.

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% of GDP 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. 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 expansion, especially as the service sector is so large.

FIGURE 1
Sectoral Distribution of GDP, 2000



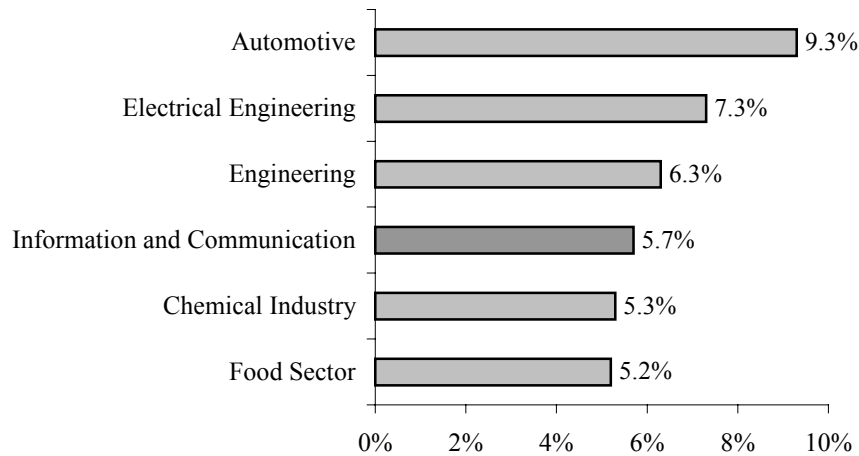
Source: Statistisches Bundesamt: Statistisches Jahrbuch 2001, p. 31

It is nearly impossible to identify any sector that is not forced to be competitive on the national and international market. All important economic areas and industry sectors feel the need and pressure to use e-commerce and to restructure their processes in an electronic or automated way. In many ways, firms have no choice but to embrace e-commerce.

A more detailed view is provided in Figure 2 where the different GDP segments of the most important industries are shown. The information and telecommunication sector has developed to an important factor with its PC and mobile end devices and services. The leading ICT companies are not only offering their technologies to other firms, but also use them intensively.

Besides the ICT sector, industries, like automotive and finance, are leading users of e-commerce technologies. The automotive industry, for example, has invested a large amount of their R&D capital in e-business activities since the early 1990s. A recent survey shows that 31.7% of German automotive manufacturers, suppliers and distributors had a consistent firm-wide e-business strategy in 2001 (Fricke et al. 2002).

FIGURE 2
Important Industry Sector in Percent of GDP, 2001



Source: VDMA, BITKOM and Statistisches Bundesamt, 2001

Firm Size and Industry Structures in Key Sectors

A firm's size and its relevance for an economic sector differ strongly, as shown by Table 13, which shows the total number of SMEs and large enterprises. Table 14 classifies all sales by size of enterprises.

In the very important manufacturing sector, for example, large enterprises equal only .97%, but they account for 70.2% of all sector sales. This distribution is similar in other sectors and indicates that although the number of SMEs is high, but they do not play a comparably important role. Large firms have no choice but to embrace e-commerce applications in many aspects of the extended enterprise. This includes IT-related innovations in e-procurement and 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 13Distribution of Enterprises¹ 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 or 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.

TABLE 14Distribution of Sales² by Size of Enterprises in Selected Economic Sectors, 1999

Economic sector	Sales 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)	
	\$1000	%	\$1000	%	\$1000	%
Manufacturing	34,701,958	2.3	410,903,879	27.5	1,048,069,524	70.2
Construction	42,039,664	17.2	161,343,765	66.0	41,207,347	16.9
Wholesale and retail trade, repair of motor vehicles, goods	85,776,661	6.4	569,848,338	42.6	682,567,319	51.0
Transport, storage and communication	13,589,043	6.4	65,344,548	30.7	134,094,626	63.0
Real estate, renting and business activities	73,742,661	15.9	229,871,605	49.5	160,523,894	34.6
All economic sections	320,510,464	7.7	1,563,275,872	37.5	2,286,337,593	54.8

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

Small firms similarly, have to embrace e-commerce. Typically, a *Mittelstand* (SME) firm is a supplier to one of the large firms, which increasingly dictates how these smaller firms must structure themselves to conduct e-business with them. Even more importantly, when smaller firms are not e-commerce-ready, larger firms often are not interested in doing 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 (FCFIG, 2001b).

¹ Only enterprises with annual sales of \$17,780 and more

² deliveries and other performances

Importance of Foreign MNCs

TABLE 15
Number of Foreign Affiliates of Selected Countries, Latest Available Year

Country	Year	Foreign affiliates ³
Germany	1998	12,042
France	1998	9,494
Italy	1997	1,769
United Kingdom	1998	2,683
United States	1997	19,103 ⁴

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

Table 15 shows that Germany is a strong base for foreign investment, with 12,042 foreign affiliates. It is second only to the U.S., ahead of France and well ahead of the U.K. and Italy. This should strategically position Germany to serve as a European base for e-commerce activities of foreign affiliates. Moreover, Germany may be a pioneer for numerous e-commerce applications and practices, as the conditions are right to start in Germany first, and then begin to roll-out these applications and practices throughout Europe. In that sense, it seems that Germany may enjoy an initial strategic competitive advantage.

The impacts of foreign MNCs on German SMEs and the diffusion of e-commerce are illustrated in the following case study, which provides information about a typical e-commerce transmission process from IBM to a larger mid-sized German SME in the machine industry—ARBURG GmbH. In recent years, IBM Germany has followed a strategy of supporting SMEs to better exploit ICT. IBM consulted and helped ARBURG to install and run the host system (WebSphere) together with the connection to the in-house network.

ARBURG was founded in 1923 to manufacture precision medical instruments. The company is located in the rural Black Forest region (in the southwest local state, Baden-Württemberg), which is famous for ingenuity in SME delivering its products to large companies along the Rhine River, or to the metropolitan area of Stuttgart where DaimlerChrysler and Porsche and the headquarters of IBM Germany are located. ARBURG still is a family owned business (a common characteristic of German SMEs). During its history, the innovative company successfully changed its production from precision medical instruments to flash lights for photographs to injection moulding machines.

Today ARBURG has a workforce of 1,900 people with sales and service offices in 21 countries, serving customers in 48 countries. ARBURG was one of the early adopters of Internet technology trying to reduce communication costs and to increase serviceability (e.g., by remote monitoring of systems in the field and planning the replacement of product parts via networks).

³ Figures represent the number of foreign affiliates in an economy as defined by national governments. Deviations from the definition adopted in the World Investment Report are noted below.

⁴ Data from 1996: Represents a total of 13,108 banks and non-banks affiliates in 1996, whose assets, sales or net income exceeded \$1 million and 5,551 banks and non-banks affiliates in 1992 with assets, sales and net income under \$1 million, and 534 United States affiliates that are depository institutions. Each affiliate represents a fully consolidated United States business enterprise, which may consist of a number of individual companies.

More than 1,000 PCs are in use throughout the company providing technical data processing (engineering support, bills of materials, operations sequencing) and accounting, controlling and other business applications. The ARBURG ICT network handles more than 800,000 transactions per day. ARBURG provides a central hosted shopping cart solution for spare parts with a 3% rebate for its foreign branches customers using the on-line shop. Since 2001, ARBURG offers catalog data as commerce XML (cXML) or CSV files for its customers to enable them to do semi-automatic order processing. Furthermore, remote monitoring of the moulding machines is partly possible via the Internet. But first of all, Internet services improve the worldwide availability of product information to provide customers with fast access to the necessary information for ordering. Due to the focus on highly individual and customized spare parts support in the after sales market, ARBURG does not yet plan any participation in a public electronic marketplace.

Human Resources

General Education Levels (literacy, secondary and tertiary enrollment)

In 1999, 12.7 million pupils received instruction from 722,195 teachers in Germany. The Basic Law guarantees everyone the right to self-fulfillment and the right to freely choose a school (free of charge) or place of training, as well as occupation. 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 heavily in education—\$83.9 billion in 1999. This is equivalent to 13.9% of public expenditures. The total education budget rose continually in the last five years from \$75.47 billion in 1995 (BMBF, 2001, p. 45).

Despite the emphasis in education, Germany has to cope with special educational and work force market problems, the need for education of more ICT professionals, and a substantial gap in the current ICT workforce.

The number of graduates qualified to enter higher education will decrease in the next several years from 291,400 in 1999 to 289,000 in 2015, due to the declining fertility rate in the early 1980s. For future economic development, the German economy needs more young professionals in the ICT sector. Besides the Green Card initiative, a massive program for better IT-oriented education, and more PC and LAN equipment in schools and universities have been started.

The organization EITO has analyzed the supply and demand of IT and E-Business specialists in the fields of ICT, E-Business and call centers. ICT specialists are persons working in the IT or in the ICT industry itself. The EITO researchers expect a demand of nearly 3 million ICT- and E-Business specialists against a 2.5 million workforce (in place and available) on the market in 2000 (Table 16). The existing gap will be growing until 2003.

TABLE 16
Demand for IT and E-Business Professionals in 2000 in Western Europe (in 1,000s)

	ICT	E-Business	Call Center	Total
Germany	2,150	581	220	2,951
France	1,750	352	120	2,222
Italy	998	326	80	1,404
United Kingdom	1,906	652	180	2,738
Western Europe	10,397	2,800	1,300	14,497

Source: EITO, 2001 (ICT: Information- and Communication Technology)

A closer view of the ICT sector when divided into sub-industries shows that the highest growth could be observed in the Software and IT-Services sector (46.6%), followed by Telecommunication Services with 30.1%, and with respective growth of 10% plus in the IT-Hardware and Communication Technology production sector (EITO, 2001).

In order to satisfy the demand for ICT specialists the German government had eased the immigration law for a quicker and simpler access to foreign specialists in the national job market (Green Card). Due to the current recession, the Green Card is not as salient as it was just a year ago.

IT Skills

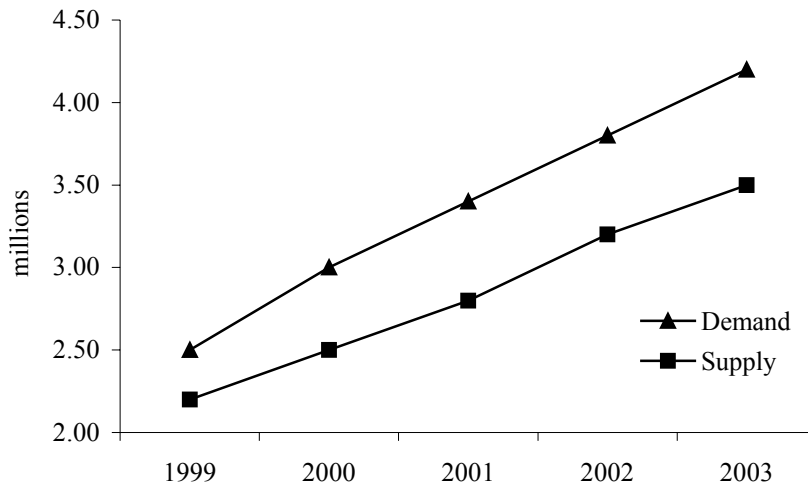
EITO calculates a growing demand for ICT specialists in Germany from 2.5 million in 1999 to 4.2 million in 2003 (EITO, 2001). The forecast shown in Figure 3 shows a constant gap for the next several years where the demand will be higher than the supply. In 2000 alone, German industry had created more than 750,000 ICT work places. Due to the dot com meltdown, however, it can be expected that enterprises, especially start-ups, are likely to lay off their employees rather than to recruit new ones.

Figure 3 provides a rough estimate of the German ICT job market. Solid figures about the real size are not available as definitions about what an ICT job really is, differ; and forecasts also differ.

The forecasts in Table 16 and Figure 3 are based on expectations of a rapidly growing IT market and do not account for the declining developments of the last year. The recession together with the attack on the World Trade Center, on September 2001, 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. These realities are being faced similarly in the U.S. and may impact all industrialized nations to a degree. E-commerce firms or especially firms 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 there is an upswing again in the ICT and e-commerce business.

The slowdown in new ICT projects in the German economy in 2001 has probably put the demand for ICT professionals back to a more reasonable level. However, even if the skills shortage seems to be a less critical issue today, as the German market recovers, the shortage will probably reappear.

FIGURE 3
Demand and Supply of German IT-specialists in Million 1999-2003



Source: EITO, 2001 (ICT: Information and Communication Technology), p. 87

Infrastructure

Germany's national infrastructure environment (the physical, as well as the virtual infrastructure), which involves a mix of public and private facilities, is known for its overall excellence, especially in western Germany.

The main categories of infrastructure discussed here are transport, telecommunication, energy and the virtual infrastructure of PC-diffusion, Internet adoption and enterprise infrastructure.

Transportation Infrastructure

Germany has a 40,826 km long railroad network that is important 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 is well known for its high quality road network of municipal, regional, state and federal roads amounting to a total of 656,140 km in 1998. Its 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. After privatization of Germany's former monopolist Deutsche Post AG (then as part of the German PTT), the company still holds two-thirds of the postal market but loses more and more in competition with other niche service providers.

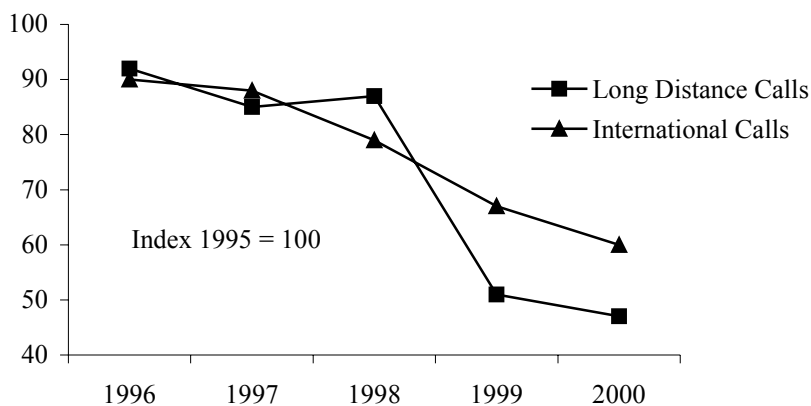
Package delivery systems are very important for many e-commerce firms in both B2C and B2B applications. Such package delivery firms may even become strategic partners of these firms, as it is the only economical way to deliver packages reliably and timely. Such strategic partnerships take on an important role within the order-fulfillment process, as the competition has driven delivery prices down for parcels. This is an important aspect to stay competitive for e-commerce firms in that the customer often has the option to buy the same product locally. Being able to offer a competitive price that in part is due to lower shipping costs may give e-commerce firms a competitive advantage.

Telecommunications Infrastructure

Since 1998, the telephone customer can choose among different carriers for each individual 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, are free. Even for local connections (the last mile to the customer), which are not really liberalized, prices declined by a smaller factor (see Figure 4).

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 to its competitors. Together with this decision and the fast deregulation since 1998, Germany is one of the first countries in Europe with a substantially free market for telephone carriers.

FIGURE 4
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, located at <http://www.foreign-direct-investment.de/gateway112001.pdf>, based on German Federal Statistical Office, EITO, BBfAI.

The early adoption of GSM (Global System for Mobile communication) as a mobile transmission standard might lead to a European m-commerce success story. A high penetration rate together with still existing demand for mobile end devices, made new frequencies necessary. To satisfy the market the regulatory authority auctioned off more channels in the 1,800 GSM frequency band.

In July 2000, the frequencies for the third mobile standard generation were auctioned to build up an UMTS (Universal Mobile Telecommunications System) infrastructure for high-speed mobile access and telephony. Europe and Germany have a competitive advantage in the field of mobile commerce and hope to accelerate this trend with an early entrance using the new standard. The German UMTS auction brought \$45.69 billion for the Federal Republic. A small percentage of this money was used to improve the IT equipment at universities (RegTP, 2002, p. 21).

The global telecommunication capabilities, as well as overall installation with end-devices, have been improved significantly in 2000. Especially mobile phones had an exponential growth in Germany in the last years. With more than 48 million mobile users and a penetration rate of 58% Germany ranks in international comparison in front of the U.S. (40%) and even Japan (47%). In 1999, Germany was behind all of the other industrial nations with only 28% penetration (Table 19). 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 conventional telephone network in Germany is still growing, but not as dynamically 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. With 23 ISDN and another 36 analog telephone connections per 100 capita, Germany is leading (Table 17) in Europe. Forecasts predict continued growth, including more than a 50% increase in ISDN connections in Germany in 2003.

TABLE 17
Telephone Lines per Hundred Inhabitants (ISDN & ANALOG)

Per 100 inhabitants	1995	1996	1997	1998	1999
Germany	51	54	55	57	59
France	56	57	58	58	58
Italy	43	44	45	46	46
United Kingdom	50	52	54	55	57
EU15	49	50	51	53	54
United States	63	63	66	69	71

Source: EITO: Telephone lines

DSL connections are getting more and more popular for high-speed Internet access. Germany has 11 connections per 1,000 households, more than in any other country in Europe in 2000.

German households are also wired by cable television. As shown in Table 18, more people than in any other European country are reachable over this channel.

TABLE 18
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
United Kingdom	0.57	582.39	669.56	100.0	56.89
EU ⁵	1.22	546.46	624.78	98.04	115.83
United States	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 that 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.

With digital set top boxes it is possible to use the cable television connection for Internet access. In contrast to the U.K. 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.

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 19 shows the fast development of mobile devices in all countries. Many German not only have several mobile phones, but also mobile phones with the latest technology and features such as WAP (Wireless Application Protocol), GPRS (General Packet Radio Service), HSCSD (High Speed Circuit Switched Data) or current, Bluetooth functionalities. For this reason, most mobile users are solid potential m-business consumers because they are already equipped with the right technologies and thus have access to the latest content and services available with their mobile phones. With the IrDA-interface (Infrared Data Association) of laptops and mobiles easy access to the Internet is possible and becoming more and more a normal way of checking e-mail or stock portfolios. Together with more functionality like calendars, MP3 player, game pad or dictating machine, more useful applications will attract more mobile users. Interestingly, different from the English expression “mobile phone”, in the German language the term “handy” is normally used for mobile phones to express the perceived usefulness of the technology.

⁵ European Union excluding Luxembourg

TABLE 19
Mobile Telephone Users

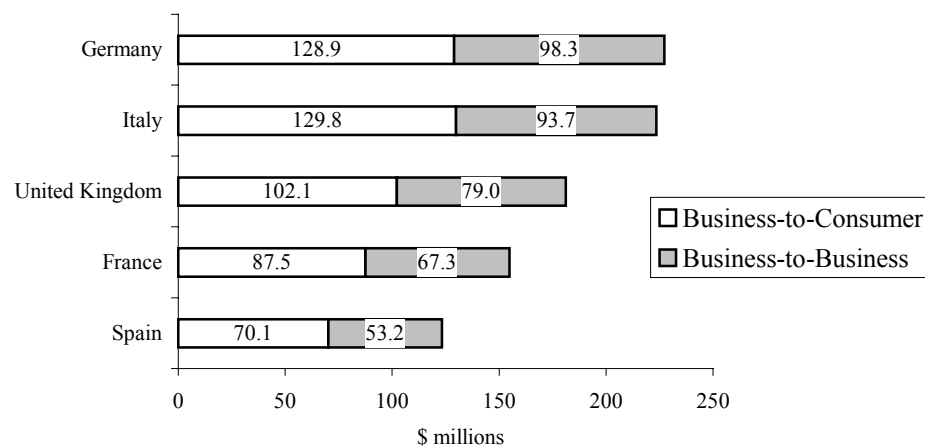
Per 1000 inhabitants	1996	1997	1998	1999	2000
Germany	7	10	17	28	48
France	4	10	19	27	41
Italy	11	20	35	49	61
United Kingdom	12	14	22	29	52
West Europe	8	13	25	29	N/A
United States	17	23	32	39	N/A

Source: EITO, IDATE: telephone lines, 2001

All of these mobile communications developments suggest that the future looks especially good for m-commerce applications in Germany. M-commerce may be viewed as a subset of e-commerce and both areas are likely to become tightly integrated. Germany is well-positioned with regard to m-commerce in general.

Figure 5 shows that despite high mobile call prices in Germany (when compared to Italy or Japan), the German m-commerce market with SMS and location-based services amounted to more than \$222 million in 2000. On the B2C side, consumer services generate an important amount of revenue with on-line chatting and gaming. The B2B side is beginning to grow after several new services for traveling sales people or logistics and telemetry allow for useful areas of application.

FIGURE 5
The Largest Mobile Internet Commerce Sales in Europe, 2000



Source: Federal Commissioner for Foreign Investment in Germany: Germany: Gateway to Europe, p. 24, located at <http://www.foreign-direct-investment.de/gateway112001.pdf>, based on BITKOM, EITO.

Power Line Infrastructure: Internet Access and Energy Availability

A reliable energy supply is an important factor for a growing service-orientated national economy as ICT networks and server farms are energy intensive to run. A breakdown, like in California in January 2001, with more than 2 million customers and parts of Silicon Valley without electricity leads to enormous economic losses and therefore locations with reliable, low

cost energy supply will be more and more important for decisionmakers in deciding where to build up their e-business. The German Institute for Economic Research expects no such break downs for the German powerline network. The German and in fact, the European highly interconnected energy pool is significantly larger than the actual demand for electric power, but the availability of ideal business locations with large power line connections are not unlimited. In 2000, the server farms located in Frankfurt, needed more energy than the Frankfurt airport, Europe's largest cargo and second largest passenger airport. Besides Germany, only the U.K., Finland and Sweden have totally opened their power market in Europe.

The German high voltage networks are especially dense in western Germany, but even after 10 years of reunification, the former GDR and the areas around its border have a less developed energy infrastructure. Another power-related e-commerce issue is power line-based access to the Internet. The energy provider RWE (Rheinisch-Westfälische Elektrizitätswerke) offers a new technology that allows connecting all end-devices in firms and households over electricity power sockets in test installations available in a few German cities. The RWE power net offers high-speed Internet access over power line-modems with a maximum transmission rate of 2 Mbps. Aside from ISDN or ADSL, this is the fastest access for private households in Germany. A further possibility is the use of existing power lines in homes to build a LAN and to realize an intelligent home system with remote access to central heating, alarm systems, etc. With the full deregulation of the energy market and permission of the regulatory authority for telecommunications using the needed frequencies, RWE hopes to roll out the technology in all of Germany.

IT Infrastructure

Similar to the demand for mobile devices, the demand for multimedia PCs with Internet connections has been growing steadily. The penetration rate for PCs rose to 40% in 2000 in Germany. EITO reports 25 million Internet users, which is an increase of about 70% in comparison to 1999. An important factor for the diffusion of PCs is the declining prices for Internet access, which decreased on average by about 35% in 2000. These developments are highly desirable as preconditions on which to build e-commerce applications and practices. Broadband based, affordable access to the Internet, as well as affordable pricing of PCs are essential and highly desirable for e-commerce development (EITO, 2001).

As Table 20 indicates, the diffusion of PCs shows a strong increase in recent years. Most PCs in private households have Internet access, but this main way of connecting to the World Wide Web will not be the only way in the future.

TABLE 20
Diffusion of PCs in 1000s

In 1000s	1995	1996	1997	1998	1999
Germany	3,220	4,513	5,763	9,872	13,980
France	1,080	1,931	2,944	4,637	6,330
Italy	1,040	1,474	2,289	5,990	9,690
United Kingdom	1,200	2,270	3,646	6,963	10,280
EU15	8,424	13,468	21,885	39,308	55,660
United States	N/A	22,300	26,500	36,169	49,397

Source: Inteco, ASTRA-SES, MPT

In Germany, some analysts expect that universal mobile telecommunications (UMTS) and corresponding end-devices will become common. These developments will be of considerable importance for e- and m-commerce. UMTS is one of the major new “third generation” (3G) mobile communications systems being developed within the framework defined by the ITU and known as IMT-2000. UMTS shall play a key role in creating the mass market for high-quality wireless multimedia communications (EITO, 2001). This market will be worth over U.S. \$1 trillion to mobile operators over the next 10 years. The implications of UMTS are that it will be the first step to the wireless information society, delivering high-value broadband information, commerce and entertainment services to mobile users via stationary, wireless and satellite networks. In the long run, this will speed up convergence between telecommunications, ICT, media and content industries to deliver new services and create fresh revenue-generating opportunities for both the m- and e-commerce industries.

Germany’s diffusion rate for PCs per thousand is the highest in the comparison to other large countries in Europe (Table 21), but still behind the penetration rate of the Scandinavian countries (not shown). However, the PC diffusion rates in the eastern German states are still lower than in the western states. This suggests that a high demand can be expected in the near future.

TABLE 21
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
United Kingdom	4.10	301.17	16,166.73	19,527.42
EU ^d	3.33	263.59	60,516.60	90,644.18
United States	4.56	585.18	88,488.62	38,488.00

^a *Source:* International Data Corporation, The 1999 IDC Worldwide Black Book, 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 Telecommunication Union, March 2001.

^c *Source:* Reed Electronics Research, The Yearbook of World Electronics Data, 2000. Survey, U.K.: Reed Electronics Research, 2000.

^d Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

The Internet

The extent of Internet adoption and use is measurable through different indicators, such as the number of Internet hosts, secure servers and Internet users. Germany had 32.3 Internet hosts per 1,000 inhabitants, or a total of 2.6 million Internet hosts in July 2000 (OECD, 2001).

A more reliable indicator of the accessibility of Internet for e-business is the total number of secure servers. Germany operated six secure servers with low, and roughly five with high encryption per one million inhabitants in 2000 (Table 22).

TABLE 22
Secure Servers

	Secure servers per 1,000,000 population 2000	Secure servers with strong encryption per 1,000,000 population 2000 ^a
Germany	6.07	4.60
France	2.67	1.25
Italy	1.77	1.10
United Kingdom	10.25	6.33
EU ^a	4.98	3.18
United States	28.30	25.11

Source: Netcraft. <http://www.netcraft.com>. Strong encryption is defined as having a key length greater than 40 bits (systems limited to a 40-bit key are classified as 'weak' since it has been shown that messages encoded using a 40-bit key with RC4 can be broken in about a week by a good computer science student using facilities available in a good computer science lab).

^a Only countries included in the 44-country sample are used in the classification. The EU includes here the members of the European Union excluding Luxembourg.

The absolute number of Internet users in Germany is high, with more than 30 million citizens using the Internet in 2001 (Table 23).

TABLE 23
Internet-users

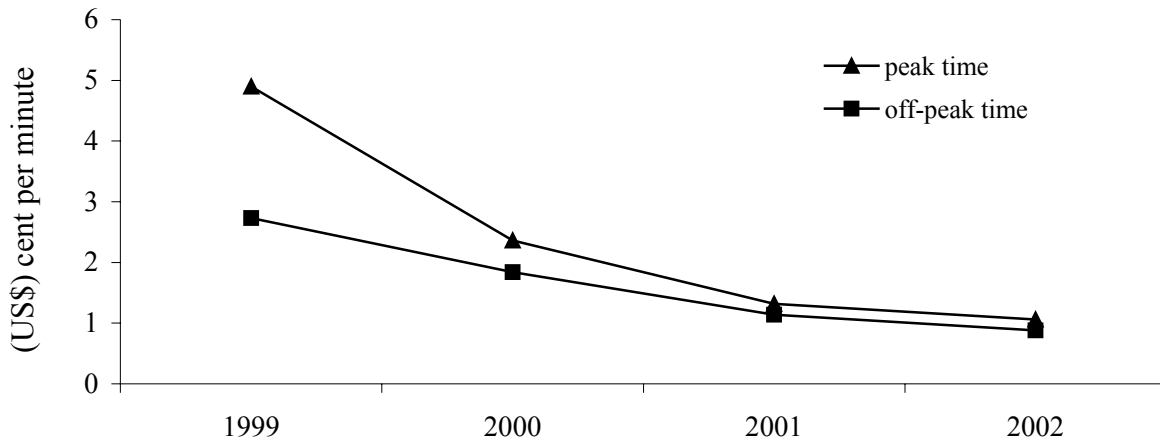
In millions	1998	1999	2000	2001	2002*
Germany	9.639	12.263	22.900	30.194	35.685
France	4.144	6.508	10.283	16.396	21.003
Italy	2.099	3.605	11.000	16.881	22.178
United Kingdom	8.552	12.918	17.000	24.942	29.527
Western Europe	36.362	52.532	94.401	135.835	167.158
United States	78.845	106.135	132.374	153.262	169.500

Source: EITO 2001, p. 512, with forecast 2002*

The percent of homes with Internet access was 14% in Germany in 2000, making Germany ranked third in Europe (EITO, 2001, p. 419).

Figure 6 shows the declining Internet access costs after the liberalization of the telecommunication market in Germany in 1998. The on-line prices for a call-by-call Internet connection fell to \$0.88 at off-peak time and \$1.06 at peak time in 2002. Also, Internet access costs for 40 hours at off-peak time fell from \$58.41 in 2000, to \$21.12 at the beginning of 2002 (OECD, 2001).

FIGURE 6
Internet-by-call Access Costs per Minute



Source: Regulatory Authority for Telecommunications and Posts: Germany: Annual Report 2002, p. 21, Bonn, Germany

Enterprise EDI Infrastructure

Since the first EDI implementations in the late 1960s 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. 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 and for VAN services (Smith, 1996). The EDIFACT standard clearly dominates in Germany. Thus, there is 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. In spite of the existence of EDIFACT, a harmonized standard for all industries and countries is still missing. Nevertheless, EDI is heavily used in Germany, but until now mostly by large firms.

With the fast evolution of ICT in all economic sectors in Germany, the strong increase in the Internet, deregulation in the telecommunication markets, and stronger global competition, EDI is needed more and more in B2B connections. Due to the possibility to economize on communication costs, companies are considering the Internet for their EDI communications and data transfer.

A recent survey shows that EDI is primarily applied with important customers (IWI, 1999). About 52% of the responding enterprises in Germany and about 75% in the U.S. used EDI technology to transfer structured business data in 1999. On average, German enterprises used EDI with 21% of their business partners, while U.S. enterprises used EDI with 30% of their partners. These business partners accounted for 38% of the revenue of the German enterprises using EDI and 40% of the U.S. enterprises revenue.

Commercial/Retail Infrastructure

The trade or commercial landscape in Germany is characterized by ongoing concentration at the wholesale and retail level. The number of retail affiliates is falling and the number of shopping centers is increasing (Table 24). It is expected that these concentrations, in general, will gain efficiencies and increased market-share and will increasingly use e-business and e-commerce applications and practices. Both large firms as well as *Mittelstand* firms will need a tighter integration internally, as well as externally (on the supply side, as well as on the customer side). It is becoming more and more difficult to draw clear delineations where a focal firm begins and ends, as firms have become extended enterprises including several tiers of suppliers and possibly several tiers of customers.

TABLE 24
Selected Retail Data

	1998	1999	2000	2001	
Number of enterprises ^a	444,543	441,363	N/A	N/A	
Sales ^b (in billions \$) ^c	408	394	346	339	
Number of employees	Total	2,837	2,869	2,886	N/A
(in 1000) ^d	Full time	1,435	1,424	1,424	N/A
	Part time	1,434	1,413	1,402	N/A
Shopping Centers ^e	Total	249	264	279	300
	Total area (in 1000 sq m)	8453.5	8854.0	9212.2	9712.0

^aSource: Only enterprises with an annual sales of \$18,500 and more: Source: Statistisches Bundesamt: Umsatzsteuerpflichtige Unternehmen, located at <http://www.destatis.de/basis/d/fist/fist011.htm> .

^bSource: Retail without motor vehicles, gas stations and pharmacies

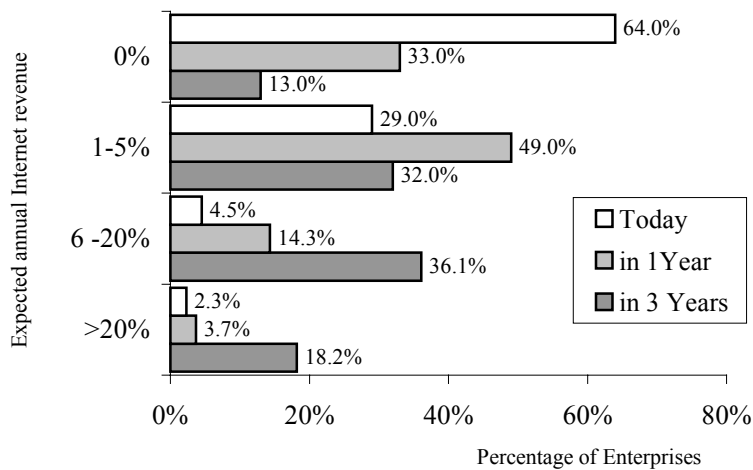
^cSource: Hauptverband des Deutschen Einzelhandels: Entwicklung Einzelhandelsumsatz, located at <http://www.einzelhandel.de/servlet/PB/menu/1001740/index.html> .

^dSource: Retail without motor vehicles, fuel trade, gas stations, pharmacies: Source: Hauptverband des Deutschen Einzelhandels: Beschäftigung im deutschen Einzelhandel, located at <http://www.einzelhandel.de/servlet/PB/menu/1001736/index.html> .

^eSource: Hauptverband des Deutschen Einzelhandels: Shopping-Center, located at <http://www.einzelhandel.de/servlet/PB/menu/1000597/index.html> .

The consulting company, KPMG, conducted a survey in the different retail sectors to analyze the already offered or planned Internet services. Only one-third (36%) of the questioned enterprises are generating e-commerce sales today. As Figure 7 shows, the enterprises expect an increasing revenue development for the next three years. A closer look at the data show that only 0.1% to 10% of total annual revenue was generated over the Internet in 2000. In future years, this might be changing as 14% of answering enterprises expect annual Internet revenue of 25% to 50% of total revenue in 2003.

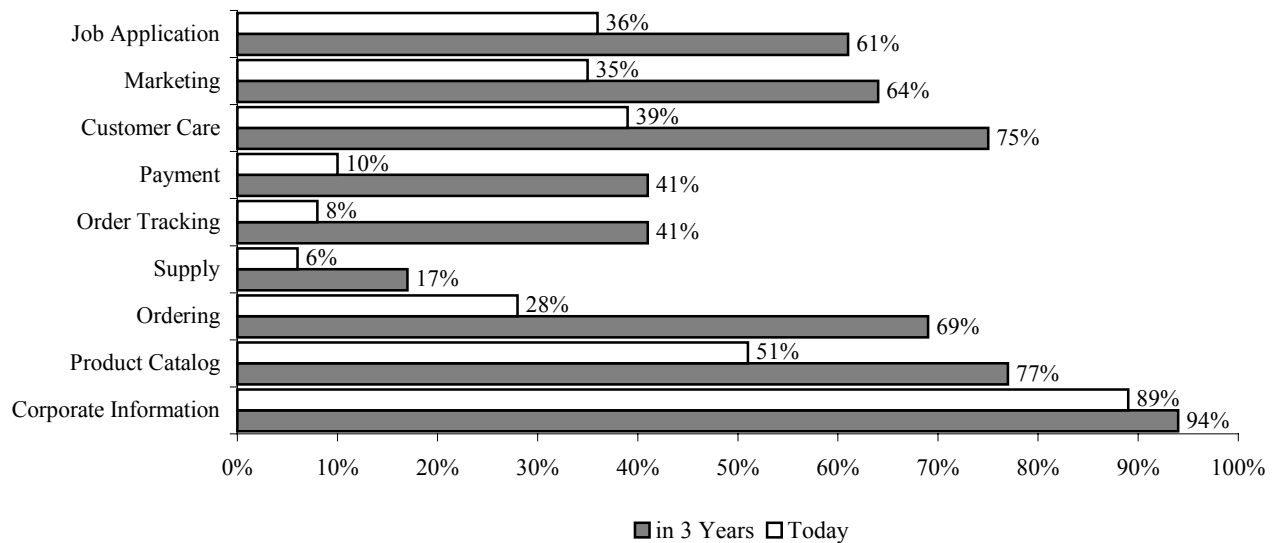
FIGURE 7
E-business Sales Among Surveyed Companies in 2000



Source: KPMG, eBusiness in der Deutschen Wirtschaft, p. 10, 2001

Figure 8 shows existing Internet services and planned services in three years. The survey also revealed that twice as many large enterprises offer Internet services, like on-line ordering or on-line marketing, than SMEs offer. Large enterprises are, in general, better developed and equipped with integrated Internet applications than small and medium-sized enterprises, but the survey expects growing investment by SMEs so this gap will likely close somewhat in the next years.

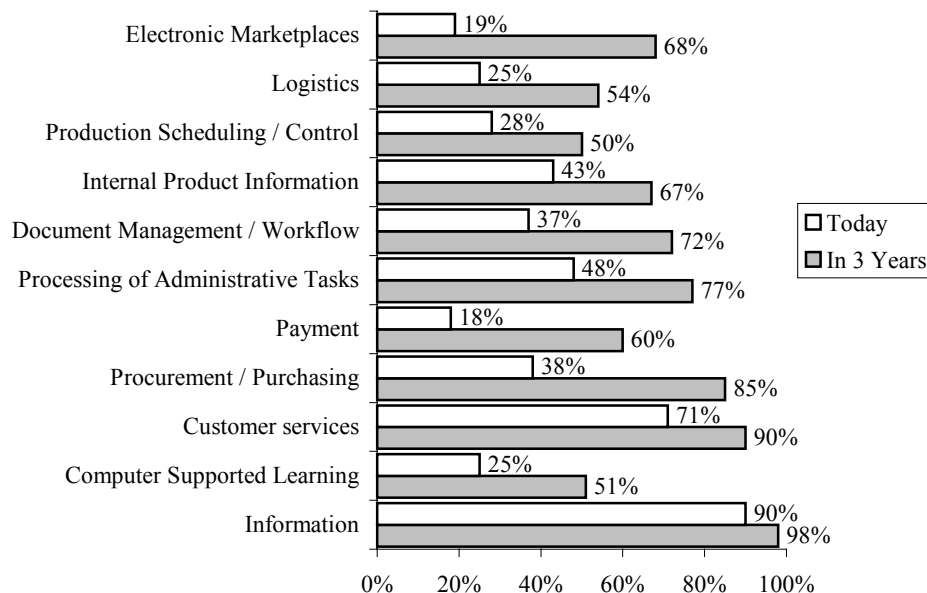
FIGURE 8
e-Business Applications 2000



Source: KPMG, eBusiness in der Deutschen Wirtschaft, p. 9, 2001

Moreover, questions were asked about the use of Internet services in the industrial sectors themselves. Electronic marketplaces are not yet as important in Germany as expected. However, electronic market applications are planned within three years by 68% of respondents, which is equivalent to the highest increase rate in comparison to other e-business solutions during the same timeframe (Figure 9).

FIGURE 9
Internally used e-Business Solutions 2000



Source: KPMG, eBusiness in der Deutschen Wirtschaft, p. 7, 2001

Financial Resources

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

Venture Capital and Stock Issues

The Frankfurt Stock Exchange (trade \$1,902 billions in 2000) lags behind the London Stock Exchange (trade \$3,992 billions in 2000)—the most important in Europe with liquid capital readily available (FCFIG, 2001a).

Payment Mechanisms

Paying cash in Germany is popular. However, debit cards, as well as credit cards, are widespread. The most common credit card in Germany is the Eurocard, a cooperation partner of MasterCard. Due to high transaction costs for merchants and restaurants, most customers pay with debit cards. For this reason, the number of Eurocards in Germany (see Table 25) is significantly lower in comparison to France or the U.K. Due to the low penetration of credit cards in Germany, on-line payment is also low. This might hinder a faster development of e-commerce, especially when on-line shops do not provide additional payment methods.

TABLE 25
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 transactions (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
United Kingdom	17,087	635,379	548,542	50,154,389

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

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), American Express (8%), and Diners Club (2%) (EURO, 2001).

Widely distributed credit cards among potential buyers are an important prerequisite for e-commerce to take off. Potential buyers must be willing to pay on the Internet using credit cards and to trust electronic businesses with their credit card information.

Consumer Preferences and Attitudes

The Internet is first of all used as an information channel in Germany. The most often used services were e-mail (73.9%), search engines (63.2%), and news about weather, music, travel etc. in 2001 (G+J, 2001).

The B2C e-commerce use of the Internet is growing in Germany, with 56.4% of Internet users having one experience in buying on-line in 2001. More than 75% of users have searched products and compared prices on the Web and then are buying the products at the cheapest or nearest brick-and-mortar store. The reasons for not buying on-line are two-fold: security concerns and no perceived benefit in ordering on-line. Trust is an especially important problem for Internet start-ups. Old-economy firms or well-introduced e-commerce enterprises, like Amazon.com are able to attract more customers due to brand name and due to higher trust in the merchant (Gartner Group, 2000).

Buyers using the Internet are mainly interested in products of homogenous, highly standardized or known quality, which are easy to ship (NFO, 2001, p. 284). Books are the most popular product bought on-line. In Germany, the book market is highly regulated. Due to the fixed prices for books, buyers cannot earn any rebate on German books. Buying foreign books from the U.K. or the U.S., for example, is cheaper in spite of placing the order at a book shop.

Less important for on-line customers are the highly restricted closing times in Germany that do not allow merchants to be open after 8 p.m. on weekdays, on Saturday after 4 p.m., or on Sunday. Most Germans feel no need yet for stores that are open 24 hours. The later closing times in the recent past demonstrated that no additional customers arrived during these added hours. The current restrictive closing times (when compared to the U.S.) are not felt as a burden and should therefore not be viewed as a driver or special enabler for e-commerce. A possible explanation could be that most products bought on-line are not service-intensive. Consequently, someone can buy on-line without a salesperson. Individual, explanation-intensive or expensive goods are mostly bought at a store due to the non-standardized products and/or the shopping event experience, which is not the same when buying on-line—with one exception: on-line auctions. The German Ebay, for example, ranks among the top 10 homepages for German Web users. On-line auctions became a very popular sport to sell or buy secondhand products for a low price.

Many potential on-line customers stopped prematurely during the actual order process. Important barriers for most customers were a complicated ordering process or untrusted payment methods. Without a credit card or willingness to send a credit card number, actual buying is not possible. The most often used payment method in Germany is to send an invoice, which was used by over 60% of on-line customers. In contrast, credit card payment was only used by 30% of customers. It seems that a solid marketing campaign needs to be started by the entire e-commerce and credit card industries to install the perception of trust, safety and security within the minds of German consumers (NFO, 2001, p. 286).

An important e-commerce service in Germany is on-line banking and brokerage services. Thirty-seven percent of all Internet users conducted on-line banking, which was equal to 15 million bank accounts in the beginning of 2001. No other country in Western Europe is using on-line banking as often; the average of all European countries was 17%. Most of those having an on-line stock account were checking their share prices daily and traded more often than non-on-line stock holders (GfK, 2002).

Business Readiness and Environment

The German Ministry for Economic Affairs and Empirica Research, a German research firm, presented their survey on e-business readiness of German SMEs in November 2001 (Empirica, 2001). More than 89% of German firms had Internet access in 2001; more than 44% used Intranet technologies. Electronic accessibility was provided by 82.5% (e-mail) and 66.3% (World Wide Web) 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, no matter if the firms were located in western or eastern Germany.

German firms were also able to catch up in comparison to the U.S. in both B2B and B2C on-line distribution in all product and services categories. Twenty-three percent of German enterprises conducted at least 5% of their business on-line, only topped by U.S. firms with 30% in 2001. Only 12% of Finland's firms made at least 5% of their business on-line, even though Finland has

a greater number of on-line capable firms. German companies have implemented E-commerce applications rather fast and were able to supply interesting services and products for customers.

An even better development could be observed in the German B2B on-line development. In front of U.S. firms (32%), 38% of German firms made at least 5% of their B2B commerce on-line. Nearly the same picture was observable on the on-line procurement side.

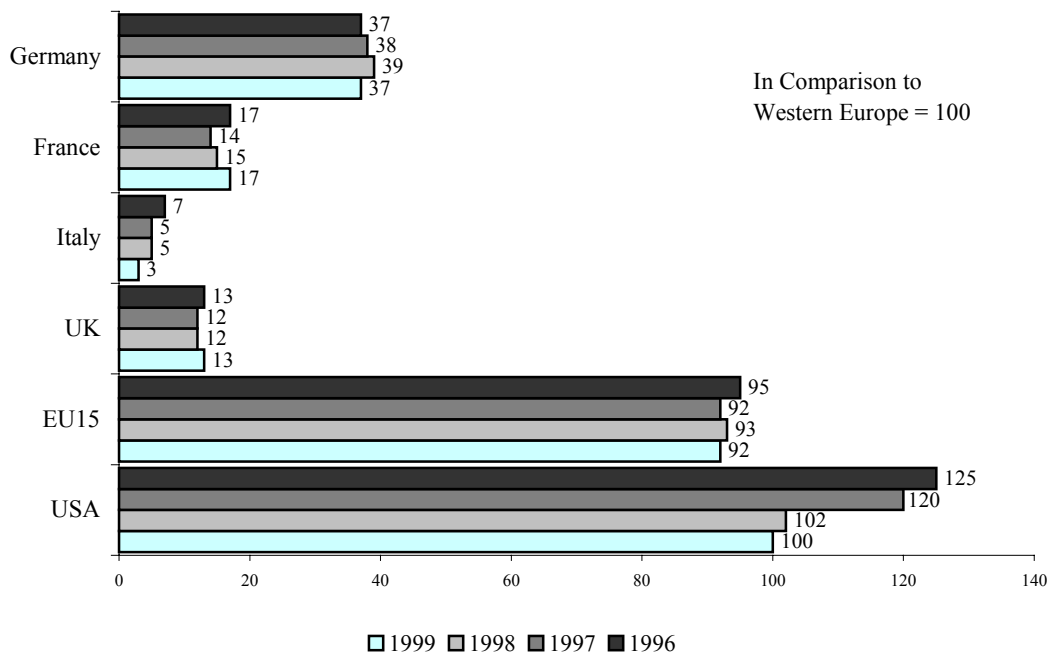
German firms were also on top concerning mobile technology (m-commerce) applications. In 2001, 9% of all responding firms provided m-commerce services, more than in Finland (7%) or the U.S. (5%).

Large German enterprises are not alone in offering 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).

The use of e-commerce in West and East Germany was more or less the same. The eastern firms managed to reach nearly the same level of penetration of Internet homepages (56.5% in East Germany, 62.9% in West Germany). On-line distribution or procurement was almost the same also (on-line procurement in East Germany 52.9%, 48.7% in West Germany). This somewhat surprising result may be explained in that East Germans have a strong desire to catch up with West Germans, and they have no other means to access procurement and seller markets. For firms in the new *Länder*, the greater distance to market could be an important incentive to use e-commerce applications.

Another indicator for the e-commerce readiness is the patent application submission. The R&D development in Germany may be characterized by using the number of ICT patent filings. As shown in Figure 10 during the last few years, ICT patent applications, as a percentage of total IT patents in western Europe, were around 38%. This is the highest contribution of a single country and a strong indicator for the competitive ICT industry in Germany. This figure could be interpreted as something like an early indicator for likely substantial future growth and successful use of e-commerce in Germany, as well as in western Europe as a whole. Due to the close ties between private business on one side, and research institutes on the other side, rapid transfer of knowledge is nearly guaranteed from research to industry and vice versa. This closeness was typical for the historic German innovation system in last 200 or so years when Prussia established a system of technical high schools in the early 1820s. Most major German states quickly followed by establishing polytechnical high schools and universities (Nelson, 1993).

FIGURE 10
IT Patent Applications in Western Europe



Source: European patent office, EPO annual reports

In 1999, western European countries filed for as many patents with the European Patent Office (EPO) as there were patents filed in the U.S. More than one-third came from German companies and individuals. The same picture is reflected in the field of telecommunication patents, where western Europe takes a leading position in patent applications in comparison to the U.S. Many researchers and politicians believe that Europe has a competitive advantage against the U.S. with mobile devices, m-commerce, local area service and wireless local area networks.

To enlarge R&D activities, the Federal Republic of Germany (West) and its federal states started programs and raised funds to speed up technological development.

Entrepreneurial Culture

A new start-up firm's success depends strongly on the market conditions. A survey conducted in 26 nations interviewed 145 persons (bankers, consultants, politicians, economists, and researchers) about their opinions (Sternberg et al., 2001). In international comparison, Germany's public supported infrastructure and programs were better rated than in any other studied country. Furthermore, the German physical infrastructure and venture capital or financial possibilities were rated as excellent. On the other hand, there were some basic conditions related poorly. One such condition is the value perception and overall perception of the German employee's mentality relating to self-motivation and self-employment. In international comparison Germany reached only the seventh place in this survey. Anxiety regarding failure was common in the German population (52.9% of respondents).

There exist significant differences in entrepreneurial behavior in East and West Germany. In East Germany, the start-up rate of new firms is lower and the entrepreneurial atmosphere is worse than in West Germany.

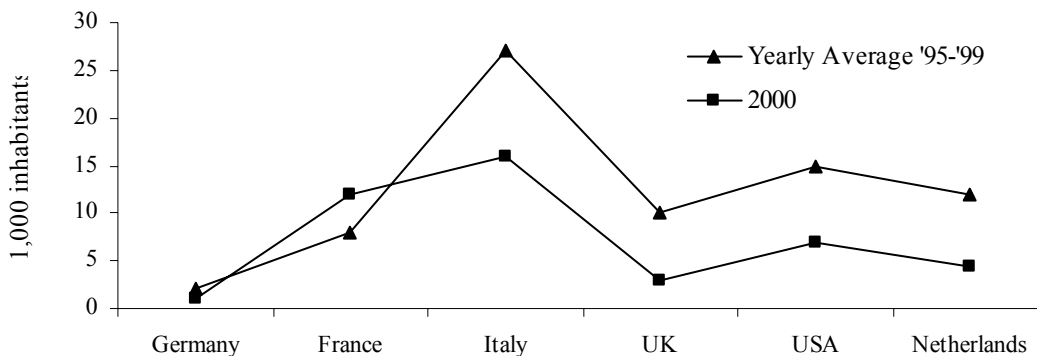
The overall funding possibilities are quite good in comparison to the western European average, or even to the U.S. (Sternberg et al., 2001). This suggests that e-commerce start-up firms or those wishing to expand find favorable conditions in Germany when compared to the rest of Europe, the U.S. and Japan.

The new-economy did not have a great impact on the entrepreneurial environment due to the relatively low number of start-ups vis-à-vis the number of start-ups in the old-economy. Typical e-commerce start-ups are not representative for entrepreneurship in Germany but the developments are encouraged and should improve the positive image of entrepreneurs to attract additional entrepreneurs, start-ups and spin-offs (GEM, 2001).

Unionization

Figure 11 shows the number of working days lost due to strikes by workers. When compared to France, Italy, the U.K., the Netherlands and the U.S., Germany reports the lowest number of days lost. This reflects the overall good working and cooperative relationships between labor and management in Germany.

FIGURE 11
Working Days Lost to Strikes per 1,000 Inhabitants



Source: Federal Commissioner for Foreign Investment in Germany: Gateway to Europe, p. 14, located at <http://www.foreign-direct-investment.de/gateway112001.pdf>, based on BBfAI.

NATIONAL POLICY

Policy Institutions

Information about the most important political institutions on a federal level is provided in Table 26. Due to the variety of 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 only beginning.

TABLE 26**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 SME e-commerce projects	Responsible for all federal e-education and research related topics: - Schools on-line - BAFÖG-on-line (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 on-line launched November 2000	e-form server launched March 2002	Since 2001, approx. 400,000 users	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.bmggesundheits.de/engl/english.htm>.

Enabling Policies

Different telework and e-commerce policies have been implemented in Germany at federal, as well as state levels. The Federal Ministry of Economics and Technology “e-commerce” initiative started in 1996, and still exists. Most of the activities inside the initiative aimed at the creation of an increased awareness of the possibilities of e-commerce. Others were intended to impact international policy developed in certain key areas (cryptology, security, tax) of e-commerce.

In 1998, the Federal Ministry of Economics and Technology established a network of 24 e-commerce Competence Centers in all regions of Germany. The objective is to offer regional information and consulting services for SMEs and to make them aware of the possibilities and opportunities offered by e-commerce. The initiative, “Pilot Projects Fostering Electronic Commerce Application in SMEs”, funded by the Ministry, supports SMEs in development of specific B2B solutions: electronic data interchange, customer and supplier relationships, development and implementation of new e-commerce related business models, and the application and use of digital payment and cryptology procedures, as well as digital signature.

The German constitutional law allows the freedom of speech and journalism in all areas, with the exception of fascistic neo-Nazi content. Therefore, products or content that deny the Holocaust, e.g., are forbidden in Germany and the import of such items or content over the Internet is punishable. The propagation of harmful content like child pornography or seditious activity in Germany, like neo-Nazi ideology, is also forbidden in Germany. Due to open and unlimited access to the Internet, the German government cannot prevent the delivery of such content via foreign servers. For this reason, the German government works closely together with European

and international initiatives, like UNESCO. Deregulation, as a regulatory effort by the government, has been largely accomplished in several key areas—telecommunications, as well as the financial markets have realized. As a consequence, there are no substantive deregulation efforts underway at the present time.

The European Community

European Commission (EC) member countries are required by EC law to follow its directives. The member nations have to make every effort to follow these directives. When noncompliance occurs, legal means exist to enforce such directives in each country. In the following, the most important e-commerce related directives are stated.

The **Electronic Signature Directive**, designed by the EU at the Telecom Council in 1999, for a more flexible, technology-neutral framework for e-signatures, is an important example. It ensures the legal recognition and free movement of e-signatures and certificates. In addition, it provides that electronic signatures have the same legal status as hand-written signatures across the EU's common market.

The **E-Commerce Directive**, adopted in 2000, establishes the *country of origin principle* (with derogation for consumer contracts and unsolicited e-mails), limits the liability of ISPs and telecom operators (caching, hosting, temporary copies, etc.), and recommends output schemes for unsolicited e-mails and legal recognition of electronic contracts. It promotes self-regulation, transparency measures, and out-of-court dispute settlement.

The **Directive of Copyright** and related rights in the European information society was defined in 2001. It aims to regulate the Common Market in copyright and related rights with particular emphasis on products and services (both on-line and physical carriers) in the information society.

There are two **E-Money Directives** for institutions issuing electronic money and rules for careful supervision of these evolving practices. The Directives were designed in June 1999. The aim is to lay down the conditions under which financial institutions can issue e-money. The European Central Bank and the German Federal Central Bank have to certify all e-money solutions as the last resort.

The **Data Protection Directive** entered into force in 1998 but has not yet been implemented in German law. The European Commission plans to take Germany and the other countries to court. The Directive ensures a high level of privacy protection for individuals, as well as free movement of personal data within the EU. It grants data subjects the right to information from data users, to access personal data and to rectify personal data. Data subjects also have a right to opt out of allowing personal data to be used in certain circumstances, such as direct marketing. In a case of sensitive data (medical, financial, race, religion), personal data can only be processed with explicit consent of the data subject. The Directive also ensures that personal data is only transferred to third countries ensuring continued protection under the same high standards. This has led to the *safe harbor arrangement* with the U.S., which was approved by the European Commission in 2000. Under the arrangement, the U.S. Department of Commerce will establish a list of companies guaranteeing adequate protection.

In 2000, the European Commission designed a proposal for a Directive to modify the **rules for applying value-added tax (VAT)** to certain services supplied by electronic means, as well as subscription-based and pay-per-view radio and television broadcasting.

All member states accept the need to improve shortcomings in the rules on *place of taxation* for e-commerce, but are not clear on how this is to be done. An open question is still how non-EU businesses supplying private consumers (B2C) should be treated. As far as the European Commission is concerned, this has to be on the basis of allowing such non-EU business to register and fulfill all obligations through a single tax administration. A physical presence (nexus) in the community is not necessary. This might lead to a diversion of tax revenues from member states with higher VAT.

The ECOFIN Council coordinates economic policy in the EU. The Council is preparing a report for a Directive to set **clear and coherent policy for e-commerce in financial services**.

The Federal Republic of Germany

The federal government of Germany plans, through coordinated measurements with German business, to achieve the information society in a project called D21. The political goals are:

- Increase of Internet usage to a penetration rate of 40% by 2005.
- Multimedia PC equipment for all schools and universities by 2001; achieve international leading position with e-learning software by 2005. The Federal Ministry of Education and Research offers grants for the development of new education software and Internet access for teachers and pupils, up to \$45 million. The federal government and the governments of the local states plan to build up national education servers to provide information reservoirs for pupils in cooperation with an initiative called European School Net.
- Double the number of multimedia enterprises and increase SME usage of Internet technologies.
- Double the number of telecommuting work places until 2002.
- Further education improvement in new IT professions and increase the IT specialists' supply. The Federal government, together with the German Federal labor office, provides IT continuing training programs.
- Buildup of a new high-speed research Net for scientific institutes and universities.

The local states, along with the German federal government, launched a series of initiatives to increase the number of ICT specialists (undergraduate education, redirect 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 the young unemployed enhance their ICT capabilities and their attitude toward self-employment.

The Local States

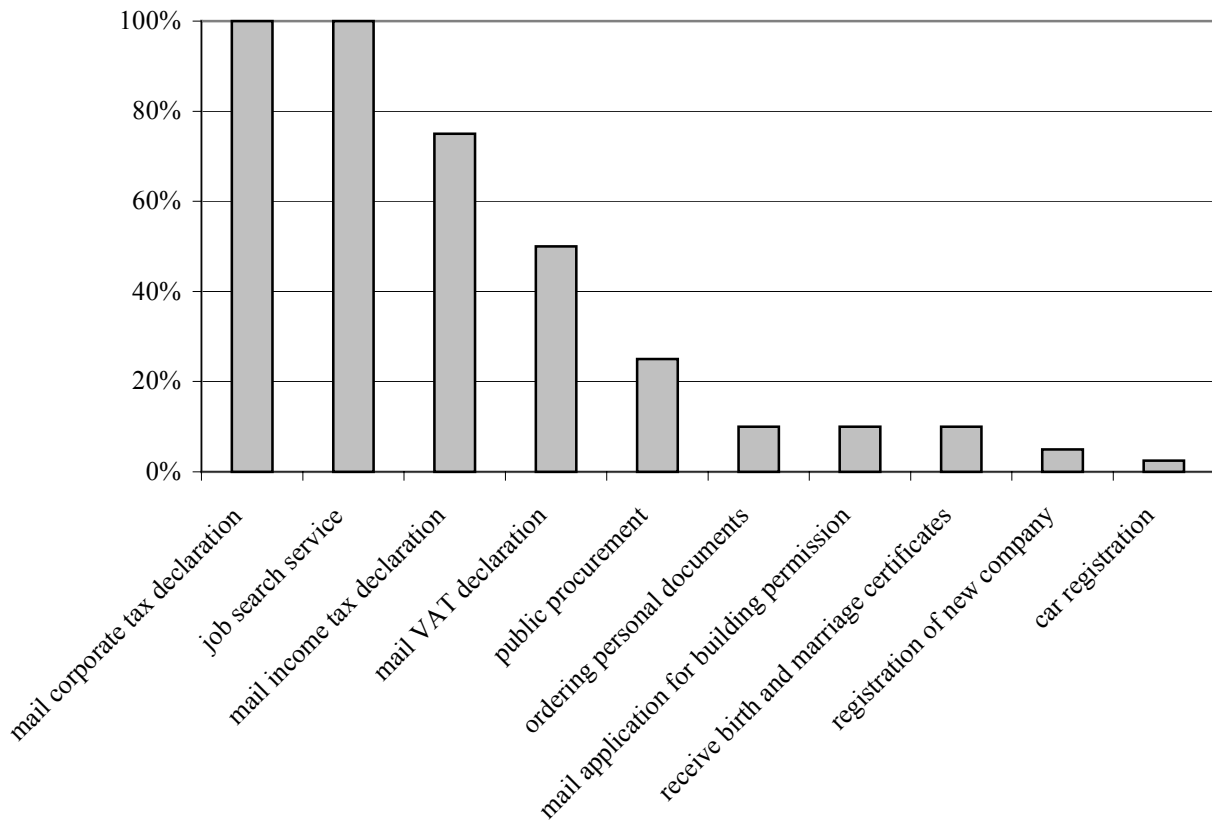
Regional projects in the local states provide support for SMEs interested in ICT and e-business, as well as help for young start-ups with ICT training and subsidies. Most federal states run their own ICT Competence Center Network to enable SMEs in urban regions, and overall in the state. The federal government provides subsidies, especially to industries having structural problems, or regions with few high quality and state-of-the-art industrial facilities, like East 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 the merchant or business [e.g., technical problems, such as the breakdown of a server or criminal undertakings (e.g., hacking by outsiders)], are protected by the law, and the Internet merchant or business cannot be held accountable. Together with the revised signature, the trade law, and the phasing out of the rebate law, which regulated merchants rebate patterns, the German government has improved 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, provided services are at a fairly low level in comparison to other European countries, especially in rural regions, Figure 12 depicts government services offered by the German government and administration. With the exception of on-line 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-bound processes are not yet prepared for electronic transmission. Short of funds and mostly lacking IT skills, public servants are hampering to improve 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.

FIGURE 12
E-government Services Available On-line in Germany 2001



Source: European Commission; Summary Report Web-based Survey on Electronic Public Services

Conclusions

Germany has silently become 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 importance. German firms were able to catch up with leading countries, like the U.S. or Finland over the last two years.

To reach this goal, Germany must be successful and consistent in reconfiguring and improving various environmental operating conditions, like the configuration of on-line trading in a legal framework, as well as in an economic and infrastructural sense. In this arena, regardless of a considerable amount of barriers and inhibitors, a substantial amount of private and public activities in Germany built up excellent conditions for firms to be competitive in global markets.

E-Commerce Enablers

Due to its economic power and being the largest economy in Europe, Germany was predetermined to play an important role in the field of e-commerce with its competitive and internationalized business activities. Germany had still reached a most competitive level even without e-commerce.

The most important e-commerce enabler in the B2C sector is a highly educated and skilled human resource comprising a broad base of well-informed Internet users and potential on-line customers. This will 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 the ICT technology diffusion in Germany.

An important factor is the geographic position of Germany in the center of Europe, which means easy transport inside Germany due to the excellent network infrastructure, but also to all the other European countries and markets. The assumption, that, in view of modern telecommunication, physical distance is losing importance, is true concerning “digital” goods. But physical distance is still a factor for distributing physical products. The central position of Germany as a hub within Europe attracts foreign investments. Every important European business region is reachable in less than two flight hours, and package deliveries inside Germany are delivered in one day or even faster. 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.

In sum, the social interest and willingness to take an active part in 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 is now gaining a competitive advantage in Europe and in the world. 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. The utility of the Internet in all aspects of life, for work or fun, has, together with the maturity of services and products available on-line in Germany, convinced users and customers of the need to use the Internet.

E-Commerce Inhibitors

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

In the B2B sector, the lack of service mentality and 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 without willingness to take care of one's own problems, resulting in the common attitude to ask for, or demand, solutions provided by society or the government.

Further inhibitors are the restrictive market regulations, e.g., on the book and pharmacy market. Also some regulations on using m-commerce apply. A long-term inhibitor of e-commerce may be the shrinking population in the next decade.

Key Factors Influencing e-Commerce Diffusion

Germany follows the innovation model, "be the best imitator of successful developments", and in this course exploit the competitive advantage of integration. After e-commerce technologies have proven successful, Germany caught up its relevant infrastructure and is now gaining more momentum.

To foster these developments, the federal government passed different e-commerce laws, like the e-commerce law for on-line trade and business in 2001. Together with the new signature law (SigG 2001), and the cancellation of the rebate law, dated 1931 (2001), the federal government has passed important and essential laws for e-commerce.

Implications for e-Commerce Diffusion

Germans realize that e-commerce is an indicator for growing international competition, due to increasingly networked economies. They appreciate the value of the Internet (and its successor "global network infrastructure") as a technique to severely reduce transaction costs, and act as worldwide knowledge backbone. The tasks are to better exploit the technologies in these two respects. The relatively voluminous public sector in Germany lags behind private business. The "always on" and "ubiquitous" Internet is steadily growing, but not yet reached in Germany.

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