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Publication Date

2001-11-01



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November 2001

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This study is part of the Globalization of E-Commerce project of the *Center for Research on Information Technology and Organizations* (CRITO) at the University of California, Irvine. This study has been supported by a grant from the U.S. National Science Foundation (CISE/IIS/CSS).

Summary

- The early development of B-to-C e-commerce over the Minitel — a user-friendly, cheap, and low speed digital network designed for text-based information exchanges implemented on the telephone network — and the strong development of EDI in specific industries, contrast with the late take-off of e-commerce over the Internet in France.
- This late take-off corresponds with the late take-off of the Internet in France. French companies did not immediately identify the Internet as the technological platform of e-business and the Information Society, because Minitel remained efficient for a long time, the telecommunications infrastructure was efficient, and the French IT industry was focused on traditional network architectures.
- In addition, the French macroeconomic climate did not favor a rush into Internet technology until 1997. France had to modernize its economic structure to adapt to more global competition, and especially to the European integrated market. French firms accommodated their organization and business methods to a highly competitive environment, while they were used to regulated markets. Decision-makers were, therefore, not focused on the issue of digital technology and the rise of a "New Economy."
- By late 1997, the French government began a strong initiative to stimulate the adoption of the Internet and the development of e-commerce. Several structural policies were implemented in 1999 to favor the diffusion of the Internet.
- France was behind, but a catch up effort occurred because French firms were already open to the use of IT; the experience of the Minitel had resulted in a dense network of on-line specialists and information service providers; and governmental policy was quite efficient.
- In comparison to the U.S., France is behind and is still trying to catch up, due to the delay of their efforts. In addition, the French "New Economy took" off only a few months before the explosion of the "Internet Bubble" that occurred in the French financial market, as well as in the U.S.
- E-commerce is developing in France, but it is managed by traditional companies that acquired the start-ups. The French are strongly investing in e-commerce, but do not believe it will rapidly change economic structures and performance. Return on investment is expected to be long in coming, and overall investments are expected to be high because the organizational change that must accompany e-commerce is costly.
- Internet-based B-to-C e-commerce is still in its infancy, even though many B-to-C e-commerce services migrated from Minitel. The dominant model is expected to be "brick-and-mortar," operated by the traditional supermarkets or specialized chains that will use the Internet to provide their customers with additional and customized services. On-line ordering combined with home delivery — i.e., fully digitized sales — is not expected to be the dominant form of B-to-C e-commerce.
- B-to-B e-commerce does not currently rely on the Internet. It mainly deals with the management of ex-post operations in transactions and leads to a greater integration of business partners. In the future, the development of global marketplaces could lead to more competition in procurement. However, it will mainly involve standard products and services.

- B-to-B e-commerce readiness varies widely among industries and between large and small firms.
- French information service providers are expected to be successful in the on-line French-based information service market, because they will benefit from their experience on the Minitel market.
- In summary, France's early adoption of Minitel and EDI was both a stimulus and an inhibitor to Internet-based e-commerce; it hindered the adoption of the Internet, but it also enabled a rapid catch up. Moreover, in some respects, being a latecomer enabled France to avoid some of the mistakes made by other countries.

Introduction

E-commerce started in France in the early 1980s when the Minitel system (Videotext) was broadcasted. Due to the active diffusion policy of the French government and France Telecom (the monopolist Public Telecommunication Operator), 84 percent of French businesses were operating at least one Minitel in 1990—up from 39 percent in 1985, and around 100 percent today. Moreover, one-third of the population was able to access Minitel. By the late 1990s, the number of users of the Minitel system was 35 million, a little more than half of the French population, sustaining the development of active B-to-C and B-to-B e-commerce markets (Faverie, 1998).

During its infancy (1983-1987), Minitel was mainly dedicated to non-professional uses, but soon B-to-C e-commerce emerged, especially with the development of pornographic and dating services. Diffusion of information by governmental agencies was also very active, as were services provided by the press (Flichy et al, 1991). Due to the "Kiosque" system¹ that enabled micro-payments, barriers to entry in these markets were very low.

By the mid-1980s, with the increasing diffusion of Minitel and the development of new tariffs (enabling information service providers to charge higher prices, or not charge at all), a completely new set of B-to-B services developed. They ranged from professional services such as confidential letters and financial analysis, to a whole set of transactional services (e.g., ordering systems in the construction industry and freight exchange systems in the transportation industry). Three types of services developed: database access, relationship management with clients (ordering and after sale services), and enhanced services (e.g., a financial loan management system dedicated to special categories of commercial firms like realtors or car dealers). These services were quite well adapted to industries in which small businesses dominated, because small businesses were operating archaic information systems (if they existed at all) mainly dedicated to accounting and wage management. Minitel was, therefore, not interfering with complex integrated logistic management, marketing, or ordering systems. Large companies were using more sophisticated systems, based on dedicated data networks or leased lines to access information service providers (Brousseau, 1991).

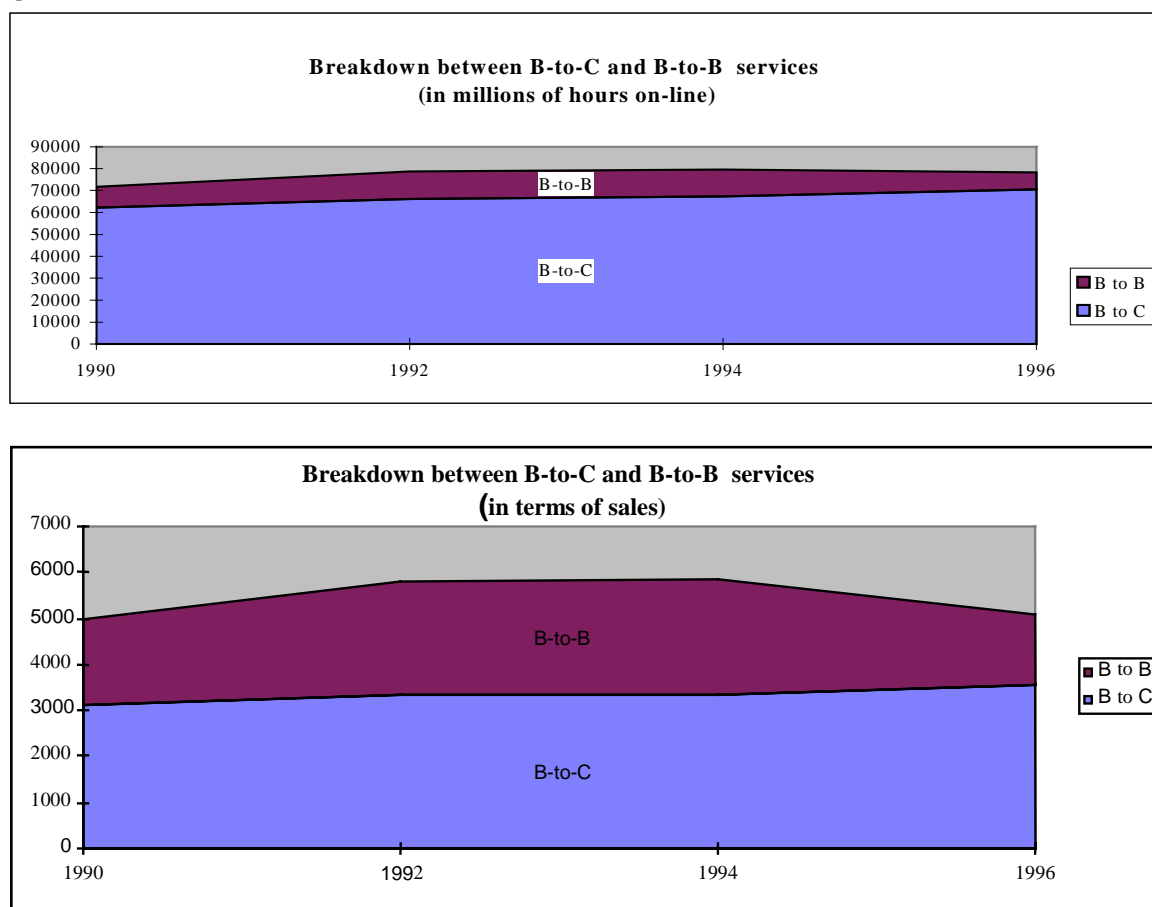
In addition, the spread of free Minitel terminals within the population enabled large and small companies to develop an important number of B-to-C services (around 25,000 services since

¹ Part of the telecommunications charges are paid by the telecommunications operator to the information service provider; telecommunications charges, whether they correspond to the communication or the information services, are charged to customers on their France Telecom bill.

1995) ranging in the same three categories (database access, on-line and sales support services, and on-line information services). The most popular services include banking-at-home, ticketing and travel reservations, specialized information services (finance, health, travel and touring, etc.), and on-line ordering (mail-order companies)².

Until 1992, these new services developed at an impressive pace, but since then, the market has become stable (Figure 1) for several reasons. First, consumers' habits did not completely change, resulting in ceiling limits. For instance, mail order companies were able to rapidly take 15 percent of their orders on-line, but that percentage was never increased. Second, the Minitel system was too antiquated to enable high-speed communication (especially images) and to support inter-computer exchanges of information (2,400 bauds). Third, by 1997, the Internet became a strong competitor (Faverie, 1998).

Figure 1: B-to-B versus B-to-C Minitel Services



Sources: Faverie, 1998.

However, the Minitel experience facilitated the creation of a new industry of on-line services. Many of the current, successful Internet-based start-ups migrated from Minitel to the Internet. Large companies and governmental agencies began to transform their Minitel services into Internet services by the late 1990s.

² Twenty percent of the population shopped on-line regularly or occasionally in 1999, and 35 percent are projected to do so by 2001 (EU—10 average was 14 percent, and is projected to be 28 percent). (Source: EcaTT, 2000.)

EDI took off in the late 1980s. Again, France Telecom played an important role in the popularization of EDI, but the main developments remained in the hands of user industries and of specialized service companies like General Electric Information Services (GEIS). The major efforts occurred in industries in which implementing just-in-time processes was essential. In the automotive industry, a strong standardization effort under the Groupement pour l'Amélioration des Liaisons dans l'Industrie Automobile occurred, and under the Organisation de Données Échangées par TéléTransmission en Europe at the European level³. The automakers and their suppliers not only standardized communication protocols, but they standardized business processes as well (Brousseau, 1994). The same occurred in the distribution industry. In 1999, FF 800 billion (Euros 122 billion) was exchanged via EDI, 62.5 percent in the distribution industry, and 25 percent in the automotive industry (Observatoire du Commerce et des Échanges Électroniques, 1999). EDI is, therefore, heavily concentrated in two industries, while dozens of projects were launched in other industries.

The concentration of EDI in commercial transactions within two industries does not mean that EDI did not develop in other industries. In fact, especially for sizable companies, EDI is quite intensively used in France (even in the manufacturing industries). However, in large part, EDI is not used to order on-line. EDI is mainly used to support the management of cooperative processes between industrial or commercial partners, and to exchange documents with banks and public agencies (see Table 1 and Figure 2, which point out that 76 percent of French firms use EDI with business partners, while only 35 percent take orders on-line).

It should be noted that banks and public agencies (especially when it comes to the management of employees' wages and subscription to the public social security system) were strong supporters of the development of EDI exchanges. However, French banks developed a specific funds transfer and compensation system that remained incompatible with the developing EDI systems among non-banks for a long period. This clearly inhibited the development of B-to-B on-line payment, since firms had to manage different systems to process commercial operations (orders, acknowledgment of receipts, invoices, etc.) and banking operations. Figure 2 clearly shows the low level of development of on-line payment as compared to on-line ordering.

TABLE 1: EDI in the French Industry⁴, 1999
(Percent of businesses performing EDI exchanges)

Type of EDI Exchange	Size by number of employees					Total
	20 to 49	50 to 99	100 to 249	250 to 499	> 500	
With business partners	29	39	47	60	76	36
Within the company among remote locations	10	16	21	31	40	15
With government and public agencies	11	14	20	26	34	14
All three above scenarios	36	47	57	69	82	44

Source: Feuvrier & Heitzmann (2000b).

The development of the Minitel, and later of the EDI technologies, led to the emergence of e-commerce practices long before the rise of the Internet. Even if many applications migrated from these former platforms to the new one after 1997, French e-commerce practices continue to be significantly based on the Minitel and EDI technologies. Figure 2 shows that

³ GALIA: Committee for the enhancement of links within the automotive industry (www.galia.com). ODETTE: Committee for the organization of EDI in Europe (www.galia.com).

⁴ Manufacturing businesses with more than 20 employees, except the agro-food industry.

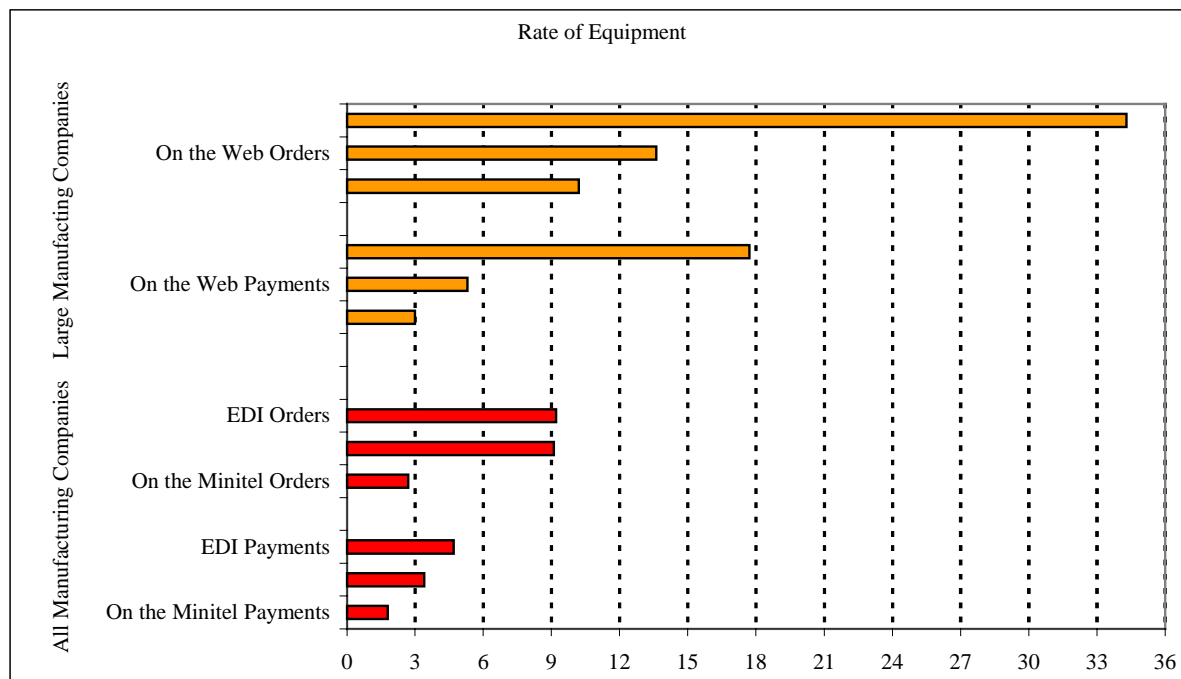
more firms are operating e-business through EDI systems than through websites. Moreover, Minitel is still alive, even for large companies.

It is also interesting to note that large firms use each of the three technologies more intensively. While this does not contradict the conventional wisdom that web and Videotext technologies are easier for small firms to manage than EDI technologies, it clearly shows that large firms have an intrinsic advantage in developing and implementing sophisticated on-line applications because they can afford to pay for the required skills.

Figure 2: The Rise of E-Commerce in France

(Percent of businesses performing on-line operations in 1999)

(Population: Manufacturing businesses with more than 20 employees except the agro-food industry)



Source: Fevrier & Heitzmann (2000b).

The Internet began to become popular in France in 1996, however, nothing evolved until the fall of 1997 when the new Prime Minister, Lionel Jospin, launched a strong governmental action in favor of the Information Society.

As compared to previous public interventions for the telephone industry in the 1970s, Minitel and cable television in the 1980s, and EDI in the 1990s, a new approach was initiated. The French government supported private initiatives rather than directly operating or subsidizing operators. The French government also regulated Internet service providers' (ISPs) conditions of interconnection to fuel competition and low tariffs. It also stimulated initiatives by private companies and local authorities favoring start-ups. However, the main aspect of French policy was promotion. The government tried to convince the business world, its own agencies, and opinion leaders that it was essential for them to enter the Information Society. Thousands of new Internet-based businesses were launched in 1999, and several laws enabling e-commerce were passed that year and in 2000.

National Environment

Demography, Wealth and Economy

France is one of the four most populated countries of the European Union (EU). As in most European countries, its population is rather stable, mostly urban, and well educated⁵. Due to a higher rate of fecundity and immigration, it has a slightly younger population than the average EU member. However, with the extension of life expectation, the population is aging following the European trend. Due to its strong traditions, a greater share of the population still lives in rural areas as compared to other EU countries with the same level of development (Table 2). With the exception of some remote areas in the mountains, most of the French population lives in quite densely populated areas. A good illustration of this is that while cellular telephone networks cover only 70 percent of the French territory, they service about 97 percent of the population.

These features suggest that France is a good candidate for the development of e-commerce. Indeed, the level of literacy, urban development, and average wealth constitute favorable stepping-stones.

Moreover, the increasing share of the senior population is often considered as favorable both because they benefit from above-average incomes (and patrimonies), and because they seek services delivered at home. However, most seniors, except in the upper classes, are computer illiterate, as is the case worldwide, with the bulk of PC and Internet users under the age of 45.

The relatively large size of the territory and its population are also considered to be favorable contributors to the development of e-commerce. The country is big enough to justify the development of remote services, and the population is large enough to cover the fixed costs of the development of sophisticated e-commerce services, such as providing those services in the mother language. French-language e-commerce can easily service Belgium and Switzerland, and with only a little more difficulty, the Quebec Province (Canada) and North and West Africa. At first glance, the development of a "French speaking island" within the Internet could be considered as reducing the positive network externalities that would result from a global and integrated marketplace. However, developing platforms based on the local language is considered essential for the diffusion of e-commerce throughout the whole population. This is why all major e-commerce players worldwide seek to develop multilingual platforms. The rise of a multilingual and multicultural Internet can therefore be considered as an opportunity for countries like France, Spain, or Portugal to develop as major players in that industry.

The degree of urbanization (Table 2) is both favorable and unfavorable to e-commerce development. While the urban population is more open to new technologically based social practices, France is characterized by a dense distribution network of efficient supermarket chains and specialized stores (Moati, 2000). Most French citizens can easily access a complete set of retailers in their own neighborhood. E-commerce channels, therefore, have to compete among a preexisting establishment.

In addition to the high level of literacy, the excellent quality of the French education system is also a contributor, and this is especially true for French engineers, many of whom pursue

⁵ Average population growth in the 1990s was 0.4 percent a year; adult literacy (percent over age 15 who can read and write): 99 percent; and educational level: 51 percent tertiary enrollment (Sources: World Bank, 2000; United Nations Development Program, 2000).

careers in the Silicon Valley or in London. This is generally considered a strong stimulus for the development of e-commerce, since most of those who emigrate return to France after a few years abroad.

More generally, France is considered an innovative country. In 1999, it ranked third behind Japan and the U.S. in terms of world market share of high-tech products. However, the French technology balance of payment is about even (-0.06 percent), while the U.S. balance is positive, (+ 0.25 percent) (SESSI, 2001c). This is because France does not perform well in several technological domains, including computers and consumer electronics (see Tables 15 and 16).

TABLE 2: Demographics

Region	Population, 1999	Urban population (% of total), 1999	Over age 65 (%), 1999	Under age 15 (%), 1999
France	58,620,000	75.42	15.65	18.89
United States	272,691,008	76.98	11.85	21.20
Scandinavia	23,818,588	78.59	15.75	18.61
European Union	375,665,947	79.36	15.97	16.83
OECD	1,107,844,550	77.28	12.63	20.43

Sources: International Telecommunication Union, 2001; World Bank, 2001.

France's wealth (Table 3) is far below that of the U.S. (although USD/Euro parity should be considered), but a bit above the average for the EU. France is, therefore, a relatively rich country, ranking just above the average for OECD countries. As compared to the EU, social inequalities are slightly more accentuated in France. However, France is a good example of the EU model of a society. It is difficult to assess if these factors could have a significant impact on the development of e-commerce, since according to these figures, the cumulative revenues of the middle and upper classes (the major targets of e-commerce) represent more than 90 percent of the national income of most developed countries.

TABLE 3: Wealth and Inequalities

Region	GDP in US\$ Billions, 1999	GDP per capita in US\$, 1999	Share of income or consumption (%), richest 20%, 1987-1998	Share of income or consumption (%), poorest 20%, 1987-1998
France	1,375.81	23,469.96	40.20	7.20
United States	9,299.20	34,101.60	46.40	5.20
Scandinavia	694.31	29,149.91	35.15	9.73
European Union	8,412.45	22,393.44	38.40	8.29
OECD	24,893.86	22,470.91	40.19	7.71

Sources: International Telecommunication Union, 2001; United Nations Development Program, 2000.

Due to a restructuring of its economy, France had trouble in the 1990s (see Tables 4 and 12), suffering, in a sense, a crisis, which contrasted with the growth of the U.S., and significantly affected major interest and investments in e-commerce until the end of the decade. While the economic climate did recover, French growth was on average slower than the growth of its main EU or OECD partners. This led to a high level of unemployment that reached its peak in 1997 (Table 4). Since then, the economy has been recovering. However, it must be noted that the bad economic climate was strongly related to in-depth structural changes that enabled France to modernize.

TABLE 4: Macroeconomic Indicators

Region	Unemployment rate (%), 1999	Inflation, (consumer prices annual growth in %), 1999	Average GDP annual growth (%), 1995-1999
France	11.9	0.53	2.34
United States	4.2	2.19	4.17
European Union	8.1	1.52	3.21
Scandinavia	6.3	1.38	3.31
OECD	7.1	4.85	3.22

Sources: International Labour Organization, 2001; World Bank, 2001; World Bank Group, 2001.

To a certain extent, France is a good synthesis of the EU when one considers cultural factors. France is both a country of Northern and Southern Europe with many mixes between the Anglo-Saxon and Latin cultures. Because of this, France's e-commerce domain could be considered an indicator for the average of the EU's e-commerce outcomes.

Information Infrastructure

France's information infrastructure reflects a "middle of the road" standing. To a large extent, French figures reach the average of the EU (see Tables 6, 7, and 8). As compared to the U.S. and Scandinavia, European countries are a bit behind with regard to traditional Information and Communication Technologies (ICTs, Table 7), and far behind for advanced ICTs (Tables 6 and 8). However, a catch up began in 1996, especially for cellular telephones, the Internet, and PCs, as shown in Tables 5 and 9. When the country began to recover from the crisis that began in the 1990s, and when decision-makers and citizens realized that the potential surrounding ICTs, investments in those technologies rose quickly.

TABLE 5: The Evolution of the Information Infrastructure

Categories	1995	1996	1997	1998	1999
IT spending, total in millions US\$	25,779	34,057	31,487.4	34,319.1	37,012.3
IT spending as % of GDP	1.68	2.21	2.26	2.41	
Teledensity					
Main phone lines per 1000 people	557.29	563.6	570.91	569.68	579.1
Cellular subscribers per 1000 people	22.39	42.19	98.54	187.83	364
ISDN subscribers	284,000	444,000	701,000	1,540,000	1,540,010
ISDN B-channel equivalents	1,130,000	1,608,000	2,128,000	2,807,000	3,601,000
Percent digital main lines (%)	90	93	96	97	98
Internet					
Internet users overall	500,000	800,000	1,000,000	3,500,000	5,660,000
Internet users per 1000 people	8.6	13.7	16.94	58.64	96.11

Sources: International Data Corporation, 2000; International Telecommunication Union, 2000; World Bank, 2000.

The situation in France is, in fact, quite mixed among the various technologies:

- The telephone and telecommunication infrastructure is excellent. Indeed, the former monopoly—France Telecom—invested deeply from the 1970s to the mid-1990s to build a dense and efficient digital infrastructure. Most of the phone network is now fully digitized and businesses benefit from large capacities on X.25 networks and ISDN.

For a long time Alcatel and France Telecom worked hand in hand on this, thus enabling both companies to become major players in the global telecommunication industry. The French telecom industry is indeed a strong competitor on the global market.

- This efficient digital telecommunication infrastructure clearly inhibited the development of the Internet. Together with the Minitel, which provided a cheap digital network well tailored to domestic and small business uses, they prevented the French from adopting the new technology. The “new” Internet technology was considered expensive for households (since Minitel was free and PCs were still costly by the mid-90s) and unsafe for businesses (X.25 networks were reliable and centrally administrated). In addition, the Internet competed with the French and European network operators’ approach of centralized digital networks, in which information and communication services are provided by a single service provider that coordinates network operators and information service providers (as experienced with the so- called "Value Added Service" (VAS); Brousseau & Quélin, 1996).

However, in 1999-2000, France began to catch up. Prices decreased, and the supply and demand for the Internet literally exploded, with most of the population realizing its usefulness and the value of associated digital technologies. A kind of fever arose with businesses and households switching quickly to the Internet, also fueling an increase of home PC purchases. Despite strong growth, this late take-off (departing from a very low level) did not enable France to totally make up for lost time. France remains behind the EU average, and far below Scandinavia and the U.S. in terms of rates of usage and equipment. According to many specialists, however, France’s interest in digital technologies, as well as the development of French on-line services, will nevertheless guarantee its catch up; growth rate indicators remained high in 2000-2001, even while the economic slowdown affected the growth of Internet related activities.⁶

- Until the mid-1990s, the development of non-hertzian television was severely constrained for several reasons. The French government was hostile toward commercial TV, as were investors who had previously had bad experiences. The supply of programs for cable television was weak, but a virtuous circle began in 1997-1998, when some major French communication companies, such as TF1, Canal+, and Vivendi, began to invest heavily in television infrastructure and programming. This resulted in a rapid increase of cable programming, but France still remains behind most countries with the same level of development. It is important to note, however, that most large French cities are already fully equipped with cable, often fiber, to the home. The number of digital satellite

⁶ France’s late start and subsequent catch up is confirmed by a set of indicators:

- **Internet users on-line:** there were 15 Internet users per 100 inhabitants by the end of 1999 (EU average: 19), which was an increase of 77 percent since the end of 1998 (EU average: 51 percent). Source: ESIS (European Survey of Information Society Projects and Actions), 2000.
- **Internet penetration within households:** In April 2001, 21 percent of the French had an Internet connection at home, up from 8 percent in October 1999 (and 2 percent in 1997). Source: Heitzmann and Loué, 2001. The number of active personal Internet access contracts rose from 3,030,000 in January 2000 (1,280,000 in January 1999), to 5,968,000 in March 2001. For the same period (January 2000-March 2001), the number of connection hours rose from 25,265,000 to 64,460,000. Source: AFA (Association des Fournisseurs d’Accès), 2001.
- **Internet penetration within companies:** 69 percent of all companies had Internet access by the end of 1999 (EU average: 63 percent), which represents an increase of 53 percent since the end of 1998 (EU average: 27 percent). Source: ESIS (European Survey of Information Society Projects and Actions), 2000.
- **Internet hosts:** The number of hosts under the suffix .fr grew more rapidly in France in the year 2000 than in the EU (58 percent versus 44 percent). For the second semester of the year 2000, French growth (25.1 percent) was even faster than the worldwide growth (17.8 percent). Source: SESSI, 2001b.
- **PCs:** In 2000, the number of PCs sold in France reached 3.9 million, up 4 percent as compared 1999, and 15.2 percent as compared to 1998. The number of households with a PC at home rose by 22 percent in 1999 and 18.4 percent in 2000. Source: Sessi, 2001 b.

subscribers is growing fast, and the major communication companies are active both in France and worldwide. These factors are expected to facilitate the development of high-speed Internet access at low prices⁷, and have already led cable and satellite TV operators to invest in e-commerce.

TABLE 6: IT Infrastructure

Region	IT as % of GDP, 1999	PCs per 1,000 population, 1999	IT hardware production, US\$, 1999	IT hardware exports, US\$, 1998
France	2.69	221.77	7,064.24	9,918.98
United States	4.14	517.07	85,085.21	37,967.00
Scandinavia	3.33	422.36	1,399.20	2,997.64
European Union	2.67	248.44	57,978.52	83,810.63
OECD	3.09	285.55	221,159.2	16,9573.8

Sources: International Data Corporation, 2000; International Telecommunication Union, 2001; Reed Electronics Research, 2000.

TABLE 7: Telecommunications Infrastructure

Region	Telecom investment as % of GDP, 1999	Main phone lines per 1,000 population, 1999	Cell phone subscribers per 1,000 population, 1999	% Digital phone lines, 1999	CATV subscribers per 1,000 population, 1999
France	0.49	581.71	365.63	98.0	49.25
United States	0.28	673.00	315.55	91.6	251.34
European Union	0.61	537.62	400.28	97.1	111.49
Scandinavia	0.71	653.00	583.66	100.0	129.64
OECD	0.54	508.28	325.44	93.8	140.02

Source: International Telecommunication Union, 2001.

TABLE 8: Information Infrastructure

Region	Internet hosts per 1,000 population, 1999	Internet users per 1,000 population, 1999	Access cost, 40 hours, off-peak, US\$, 2000
France	21.03	91.61	62.22
United States	195.00	271.74	35.40
European Union	22.57	158.65	n.a.
Scandinavia	73.97	390.83	n.a.
OECD	62.63	180.05	n.a.

Sources: International Telecommunication Union, 2001; OECD, 2000b.

Thus, for many different reasons in each of the specific technological domains, France was behind most developed countries in the development of its information infrastructure in the mid-1990s, with the noticeable exceptions of the telephone-telecommunication infrastructure and the existence of the Minitel.

Both were, in a sense, inhibitors of the development of a digital infrastructure based on the Internet. However, they were not the only reasons. The good quality of the hertzian TV system and programs, social customs, and various other factors have long inhibited the development of the Internet, cellular telephony, CATV, and other technologies in France.

⁷ France has the highest level of large-band access to the Internet for households in Europe (6 percent of individual Internet subscribers have large band access). Two-thirds of these large-band subscribers rely on cable access. However, this contrasts with figures for the U.S. (11.1 percent) and Korea (57.3 percent). Source: NetValue, 2001 (<http://www.netvalue.fr>).

A major switch occurred by 1997, when French decision makers and the population decided to massively adopt the new generation of ICTs. Increasing return of adoption and positive network externalities played a strong role, generating a loop between demand and supply. The explosion of the cellular telephone market illustrates this⁸. In 2001, the number of mobile phones surpassed the number of main telephone lines, a significant increase from 1995, as in the number of Internet users (see note 6).

France seems poised to catch up not only because of this virtuous loop, but also because it already has a high level of digital literacy. So far, catch up has been less rapid in France than in Japan (Table 9). Since France had less equipment at the onset, it can be theorized that France is still in its first phase of the logistic curve that characterizes the diffusion of most network technologies (i.e., slow rate of growth, followed by a high rate of growth, followed by a slow rate of growth; Curien, 2000).

TABLE 9: Evolution of the E-Commerce Infrastructure (in millions of units)

Technologies	France		EU 15		USA		Japan	
	1995	1999	1995	1999	1995	1999	1995	1999
PCs	7.8	13.0	56.2	93.2	86.3	141.0	15.1	36.3
<i>per 100 population</i>	<i>13</i>	<i>22</i>	<i>15</i>	<i>25</i>	<i>33</i>	<i>52</i>	<i>12</i>	<i>29</i>
Internet hosts	0.15	0.6	1.8	8.5	6.0	53.1	0.26	2.6
<i>per 100 population</i>	<i>0.3</i>	<i>1.0</i>	<i>0.5</i>	<i>2.3</i>	<i>2.3</i>	<i>19.6</i>	<i>0.2</i>	<i>2.1</i>
Internet users	1.0*	5.6	19.3*	55.9	40.0*	110.0	11.5*	18.3
<i>per 100 population</i>	<i>1.7*</i>	<i>9.6</i>	<i>5.2*</i>	<i>14.9</i>	<i>15*</i>	<i>40.5</i>	<i>9.3*</i>	<i>14.5</i>
Cellular phones	1.0	21.4	21.1	146.5	33.7	86.0	1.7	56.8
<i>per 100 population</i>	<i>1.8</i>	<i>36.3</i>	<i>5.7</i>	<i>39.1</i>	<i>12.9</i>	<i>31.7</i>	<i>9.3</i>	<i>45.0</i>

*1997

Source: Eurostat, 2001.

France has among the lowest rates of PC equipment and Internet connections in comparison to other developed countries (Table 9). However, all the figures indicate a catch up phenomenon starting in 1998 (note 6). The ability of France to actually make up lost ground is still in question. Indeed, France started from a very low level, and the pace of growth changed by the end of the period due to the macroeconomic situation (note 6 and Figure 3).

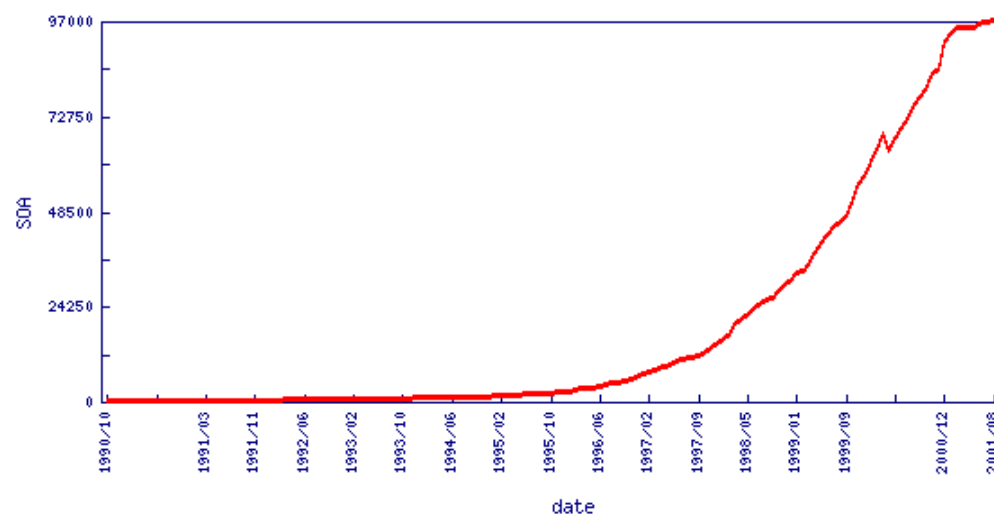
Excluding the impact of the macroeconomic situation, the strength of the pace of diffusion of digital technologies can be explained by two factors. First, until the rise of the Internet, households were not encouraged to own PCs. Indeed, they already owned diverse devices such as Minitel, Playstation, and TVs that sufficiently met their needs. Thus, France was poorly equipped in PCs and Internet connections, but the population was open-minded in regards to IT, and was skilled enough to use it. Second, the use of IT within the business world was already quite intensive. While the Internet was not used, networked computers and a wide set of communication technologies were already in use in small and large firms. Since the technology base was already installed and users had a basic skill in digital and multimedia technologies, the use of the Internet skyrocketed in 1999 and 2000 (Table 9; notes 6 and 8).

⁸ Mobile phone subscribers reached 29.6 million by the end of 2000, up from 43.9 percent in 1999. In June 2001, this number reached 33.1 million; 55.1 percent of French have a mobile phone in 2001, as compared to 1.8 percent in 1995. Source: Sessi, 2001; Eurostat, 2001.

Figure 3: The Rise of the .fr Domain Names

Number of SOA (Start Of Authority) in “.fr”

(Computed by RIPE DNS Hostcount, RIPE Network Coordination Center,

<http://www.ripe.net/>)

Source: AFNIC (Association Française pour le Nommage Internet en Coopération), 2001.

Industry Structure

As in any large country, French industry is dually comprised of large firms (more than 500 employees) doing business in the international market, and small domestic firms (Table 10). Around half of the employees work for large firms, which are more productive and more international than smaller firms. In the manufacturing industries, most of the smaller firms are working for large “national champions” as subcontractors or suppliers. Traditionally, innovation efforts were mostly concentrated in these large companies (e.g., Alcatel, Thomson, Airbus, and others). Two reasons explain this. First, French innovation efforts have long focused on large national programs such as high-speed trains, aeronautics (Airbus), nuclear power, the space industry (Ariane), and telecommunications (digital switches and ISDN). These programs involved close cooperation between a dedicated governmental agency and the large firms. Second, France did not develop an actual system of capital risk funding for innovative start-ups until the late 1980s. Innovation was funded mainly by national programs, without a financial system oriented toward the development of direct financing (low development of capital markets, strength of the banking system, and a publicly managed pension system).

One evolution occurring in the last 20 years has been the development of a large number of small firms whose specialized skills have become highly valued on the international market. The French gap between internationalized and domestic industries is, therefore, shrinking, as was the case between the service and manufacturing industries, before it ultimately disappeared altogether. Large French service companies went international in the 1980s, and today, these are strong industries (e.g., France Telecom and Vivendi-Universal). This internationalization of French industry was achieved both through the rise of exportation, and the development of offshore direct investments⁹. French companies massively invested in the

⁹ The United States continues to be the single largest host country for FDI, while its role as largest outward investor has been taken over by the United Kingdom since 1999 and, also, France for the first time in 2000. Source: United Nations Conference on Trade and Development, 2001.

U.S. and European markets, leading to the emergence of several French global groups. At the same time, industry financing progressively switched from bank-intermediation to a system based on financial markets.

While French industry is quite active in the global arena, foreign firms are also active in France (Table 11). The share of subsidiaries of foreign firms accounts for 34.5 percent of the total market. Moreover, many firms at the heart of the digital economy—such as IBM, Microsoft, and Apple—chose France to locate their European headquarters.

French industry, therefore, has become open to global competition, and French firms no longer follow specific policies that strongly diverge from the industry norm. In particular, due to the European integration, the globalization of French firms, and the privatization of most of the formerly nationalized companies, the French government can no longer sustain an independent industrial policy based on the subsidization and the protection of "national champions" and specific industries.

The French industrial structure can, therefore, be considered favorable to the development of e-commerce, both because French firms are confronted with competition from global firms that went digital, and because they experience e-commerce in their foreign markets. In addition, the evolution of the French industrial and financial structures enabled the generation of an active network of business angels and capital risk companies that are able to sustain the development of innovative start-ups. However, the French tax system, the lack of pension funds (because of the efficiency of the public pension system), and the difficulties of organizing transfers between universities and firms, prevented the development of economic structures as favorable to innovation as those in the U.S.

TABLE 10: French Manufacturing Firms

Firm size by no. of employees	Number of companies	Cumulated employment	Cumulated sales	Exportation (FF Millions)	Investment (FF Millions)	Sales/employee (FF 000)	Export/sales (%)	Invest/sales (%)	Benefit/sales (%)
Small (20-499)	20,696	1,474,959	1,467,672	373,045	59,506	995.1	25.4	4.1	2.6
Large (>500)	887	1,454,781	2,684,945	982,236	121,297	1,845.6	36.6	4.5	3.0
Non-sig*	760	38,517	136,588	44,803	1,857	3,546.1	32.8	1.4	2.9
Total	22,343	2,968,257	4,289,205	1,400,084	182,660	1,445.0	32.6	4.3	2.8

* Non-Significant relates to holding companies.

Source: SESSI, (Service des Etudes et des Statistiques industrielles), 2001a.

TABLE 11: French Industry Structure

Market Type	Market share of the four main competitors (C4 Index)	Market share of small firms (20-499 employees)	Market share of firms owned mostly by non-residents
Consumption Goods	5.6	46.8	36.9
Automotive Industry	63.7	7.7	20.1
Equipment	13.9	38.6	39.3
Intermediary Goods	7.8	50.6	36.4
Total	-	40.4	34.5

Source: SESSI (Service des Etudes et des Statistiques industrielles), 2001a.

Business Readiness and Environment

ICT Uses and E-Commerce Practices

On the one hand, France has a long history of e-commerce; however, it did not rush towards the Internet. Until late 1997, for the French government -- and late 1998 for many businesses

-- the advantages of the Internet as compared with the Minitel for B-to-C e-commerce, and as compared with EDI for B-to-B e-commerce, was not obvious. Moreover, until 1998, France was still recovering from its recession that began in 1993. Macroeconomics, therefore, influenced the industry's ability to invest in the Internet, and the population's likelihood to spend their money on new technology (Table 12).

TABLE 12: The French Economic Climate in the Late 1990s

(in percent of growth, inflation deflated)

Macroeconomic Indicators	1994	1995	1996	1997	1998	1999	2000
GNP	2.1	1.7	1.1	1.9	3.4	2.9	3.1
Household consumption	1.2	1.2	1.3	0.1	3.4	2.8	2.5
Public expenditures	0.7	-0.1	2.3	2.1	-0.1	2.0	2.2
Investment in capital	1.5	2.0	0.0	-0.1	7.0	6.2	6.1

Source: INSEE (French Census Agency), 2001.

Until 1998, French opinion leaders and citizens did not seriously consider the potential of the Internet in general, and of the Internet for e-commerce in particular. In a sense, e-commerce (or more likely e-business) and the Internet were considered two separate phenomena.

- The progressive digitization of business activities was considered an already old and slow trend. Following the computerization of administrative, manufacturing, and business processes (from the late 1960s to the late 1980s), the development of digital networks (X.25 networks and LANs) was supporting a greater integration among business partners by relying either on EDI systems or integrated computers in network systems. E-business was considered a predominantly B-to-B phenomenon, linked to huge and slow processes of organizational change that had already started in many industries. To the French, with a complete set of efficient X.25, ISDN, leased lines, and fully-digitized telephone networks, development of an additional network did not seem necessary. Moreover, Minitels, as well as call centers and PCs connected to mainframes through the telephone network, were available technologies for B-to-C applications.
- The Internet was seen as a competing technical (and U.S. dominated) standard, and not as the new architecture for the Information Society. The decentralization of the administration of the Internet was considered as a disadvantage in terms of safety (as compared to X.25 networks). Consequently, the dominant feeling was that the Internet was a kind of U.S. Minitel, able to efficiently support C-to-C communication because of its multimedia features. The perceived lack of safety of the Internet was, however, considered a major hindrance to its uses in e-business and e-commerce.

These opinions evolved in 1998 and –1999, when the development of the technology and the evolution of cryptographic regulations in OECD countries convinced most decision-makers and users that the Internet was actually becoming the platform of integration for all digital technologies and information-based services. This led to a rapid and massive adoption of Internet technologies in France, both by businesses and citizens (see Tables 5 and 9; notes 6 and 8).

While this belated catch up was strong (except for PCs; see Table 4), France remains technologically behind the U.S. (Tables 6, 7, 8, and 9). This is true both for customer and professional uses, especially in small firms (Table 13).

TABLE 13: ICTs in Small Businesses

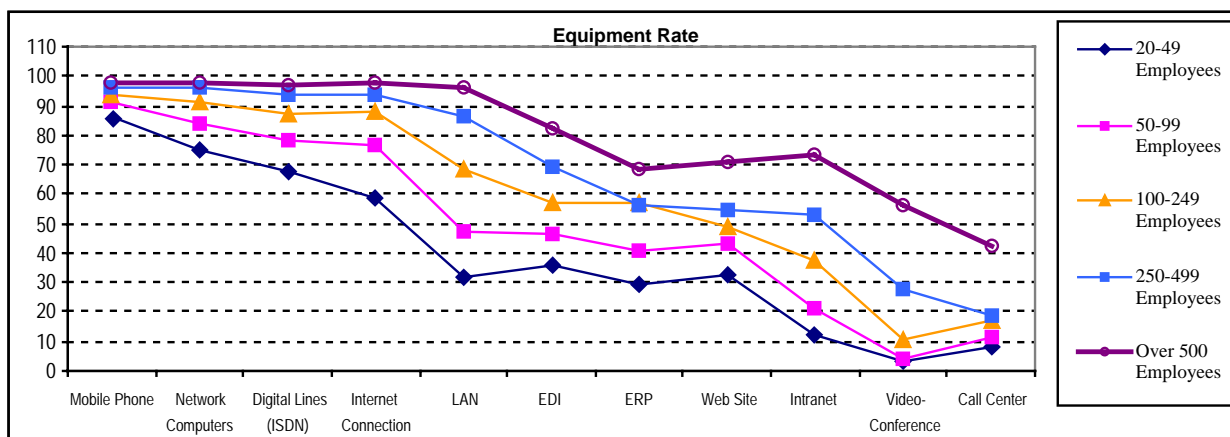
Number of Employees	% of firms accessing the Internet		% of PCs in network in connected companies		% of firms with website	
	France	US	France	US	France	US
2-99	40	61	20	50	<10	31
100-499	60	82	10	31	20	51

Source: Lorentz, 1999.

Considering the penetration of various ICTs in the industry (Figure 4, detailed data are available only for the manufacturing industries), it is clear, however, that French firms use a wide set of technologies, and that the level of equipment was already high in 1999. Internet connections were roughly the same as the use of PCs and mobile phones, and significantly higher than the use of EDI, ERP, and the development of specific websites by companies. Figure 4 shows, therefore, that by late 1999, French businesses had already switched to the Internet, but that most advanced uses of Internet and related techniques were still in their infancies, and concentrated in large firms. In particular:

- Internet connections do not automatically mean website and on-line transactions. On-line transactions remain scarce (10 percent of firms on average). Moreover, we do not know the actual number of shares of the firm's on-line orders or sales (See Figures 2 and 4).
- Not surprisingly, most advanced uses of ICTs are performed by large and internationalized firms that belong to groups, are innovative, and are involved in the high tech industries (Table 14).

Figure 4: Equipment in ICTs in French Manufacturing Firms
(Percent of firms. Firms are grouped by number of employees.)



Source: Fevrier & Heitzmann, 2000b.

TABLE 14: Equipment in ICTs in French Manufacturing Firms in 1999
(Percent of firms using various ICTs in each category of firms.)

Type of Firms	Technologies	Internet connection	Website	On-line order	Intranet	Extranet
Large firms		97.7	70.5	13.6	79.1	37.2
Small firms		67.6	38.1	8.9	19.3	8.6
High tech		85.6	51.5	9.2	36.5	16.8
Low tech		64.3	36.2	8.9	17.4	7.8
Export > 25% of sales		83.0	52.4	10.2	33.4	16.7
Export < 25% of sales		64.0	35.0	8.6	17.3	7.3
Group 's subsidiary		82.1	47.9	9.5	38.4	15.8
<i>Subsidiary of foreign firms</i>		85.7	46.3	9.8	46.5	20.0
Independent firms		59.2	33.3	8.6	9.5	5.3
Innovating company		80.5	49.6	11.1	28.6	13.2
Non-innovating company		58.7	30.5	7.3	15.2	6.6

Source: SESSI (Service des Etudes et des Statistiques industrielles), 2001a.

In summary, while France did not rush over to Internet technologies, it already had a favorable technological infrastructure to support the development of e-commerce. However, small firms and a significant part of the population remain disconnected from the Internet and do not use the most advanced techniques.

Another facilitating factor for e-commerce in France is that banking services are already intensively digitized¹⁰. For years French companies have paid each other, and their employees, electronically. Most French citizens have a bank (credit or debit) card that is a smart card implemented in a unified system. Many citizens already experienced banking at home through the Minitel system. Consequently, the development of secure on-line payment systems is not a problem, both because of the existence of this unified card system, and because French citizens and businesses are used to electronic payments.

The Impact of the French Specialization within Its

One reason for French reluctance in the adoption of Internet-based technologies is that IT industries are significantly less important in France than in the U.S. (Figure 5). Moreover, French companies have a different specialization than those in the U.S. The French IT sector focuses mainly on telecommunications and electronics (except for consumer electronics; see Tables 15 and 16), while the U.S. industry focuses on computers and software, the basis of the Internet¹¹.

¹⁰ Twelve percent of the population were regular or occasional users of on-line banking in 1999, and 28 percent are projected to do so by 2001 (EU-10 average was 5 percent, and is projected to be 21 percent) (Source: EcaTT, 2000).

¹¹ Major French manufacturing industries include HP France, Sagem, IBM France, Philips France, Alcatel Business System, Alcatel, ST Microelectronics SA, Bull, and Thomson. Major service companies include France Télécom, Vivendi, Bouygues, Orange, Cap Gemini, Sema Group, Dassault, CSI, and Sopra.

TABLE 15: The French IT Industry in 1999

Industry Segments Key Figures	Computers		Telecommunications		Electronic	IT Industry		
	Manuf.	Services	Manuf.	Services	Manuf.	Manuf.	Services	Wholesale
Number of employees	38,179	189,893	92,279	170,456	143,705	274,163	360,349	77,200
Sales (FF millions)	87,946	163,489	128,280	219,465	176,207	392,433	382,954	194,800
Exportation/sales	44.8	8.1	49.1	2.8	50.2	48.6	4.9	7.0
Gross profit/sales	23.2	24.6	19.6	51.4	20.3	20.7	40.2	16

Manufacturing companies over 20 employees, service companies over 30 employees.

Source: SESSI (Service des Etudes et des Statistiques industrielles), 2001c.

Table 16: French IT Foreign Trade in 1999

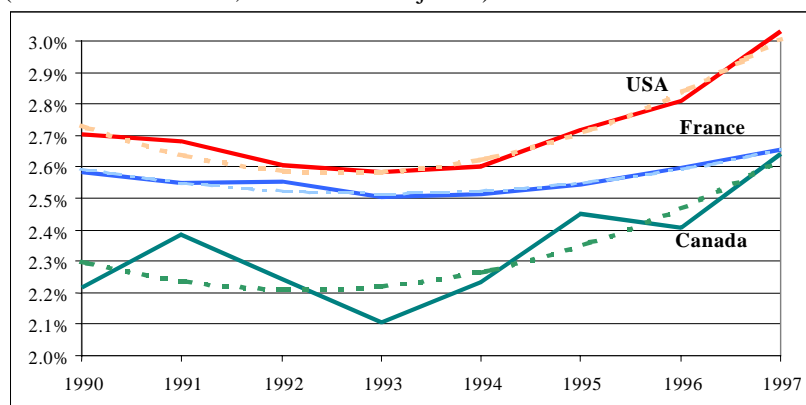
Industry Segments	Exportation* (in millions of Euros)	Trade Balance (in millions of Euros)	Exportation/Importation (x 100t)
Electronic components	7.4	0.3	104
Computer equipment	9.6	4.8	66.6
Telecommunication equipment	6.8	3.0	178
Consumer electronics	3.4	1.39	71
Measure and control instruments	4.3	0.02	100.4
Cabling	1.2	0.16	115.4

French companies' ratio of export (export/sales) rose from 33.5 percent in 1992 to 48.6 percent in 1999.

Source: SESSI (Service des Etudes et des Statistiques industrielles), 2001c.

Figure 5: Share of IT-Based Industries in the Workforce

(Plain lines: observed; dashed lines: adjusted)



Source: Davies, Brookes, and Williams, 2000.

Consequently, diffusion between IT-based industries and other industries was not present in France. Moreover, French firms and governments were more focused on traditional telecommunication technologies than on technologies related to networks of computers. To put it differently, the Minitel and the mobile telephony were long considered the gateway technologies for entrance into the Information Society, while in the U.S., PCs and the Internet have long been considered the core technologies.

In the year 2000, wireless Internet (UMTS) was considered the next step in the development of the information infrastructure. Due to the technological immaturity of the "mobile Internet" and to economic uncertainties—most European UMTS licenses were sold at prices that are today considered too high because they forced telecom operators to substantially increase their debt, and because the prices of the services will probably be too high—it is uncertain whether this technology will enable Europe to catch up in the Internet technologies and e-commerce applications, as had been widely expected.

National Policy

Policy of the French Government

Until late 1997, the development of e-business and e-commerce was clearly not an essential factor in governmental and industry policies.

Government policy was focused on two main issues. First, France had to prepare its integration in the Single Market, and then in the Euro system. The French "modernization" policy clearly addressed those issues as priorities. While this was essentially a macroeconomic policy issue, it had implications for more microeconomic policies, such as industrial policy and competition policy. The French government focused its attention on the liberalization of the French economy, and on the strengthening of French firms. A whole set of "deregulations" occurred, resulting in the internationalization of French firms, and the development of more efficient financial markets and industry governance systems. Second, in the telecommunication industry, the French government drove a complete movement of deregulation and privatization. In less than a decade, the French Administration of Telecommunication was transformed into France Telecom, a dynamic, private telecommunication company, competing against strong competitors on the French and international markets. This policy led to the enrichment of the telecommunication services portfolio provided to French customers and businesses, and to rapid decreases of telecommunications prices; however, it did not focus on the Internet.

At the firm level, French companies were not focused on the development of e-business or e-commerce. The management of the rise of the Single Market within the EU was clearly the strategic stake for French firms. They had to manage dynamic mergers and acquisitions policies in order to reach the minimum size for this wide market. In addition, they had to face a difficult business climate in Europe.

While the earlier 1997 governmental and firm policies laid the groundwork for entry into the so-called "New Economy," it is clear that until 1997, ICTs in general, and e-business (or e-commerce) in particular, were not considered essential issues by political and business decision-makers.

This clearly changed with Prime Minister Jospin, who promoted the "Entry in the Information Society" as an essential axis of his policy for the modernization of France.

He launched a "French Taskforce for e-commerce" a few weeks after he came to power, and in 1998, this taskforce implemented a plan that is still in force today (Lorentz, 1998, 1999). The taskforce became a governmental agency by mid 2001. Its key actions are (see French Government, 2001):

- To facilitate access to the Internet by deepening the deregulation of telecommunication services. This was achieved by the end of 2000, when the local loop was completely deregulated. This policy, jointly managed by the government and the Telecommunication Regulation Authority, led to large decreases in Internet access prices. During 2000, with the development of DSL and cable access to the Internet, broadband Internet became available at low prices, averaging \$40-45/month for citizens in major cities. In June that year, the government decided to subsidize broadband access in areas with low population density (see notes 6 and 7).

- To develop digital literacy by funding and encouraging schools, universities, and professional training organizations to provide access to the Internet in their facilities and specific training programs. Public subsidies were dedicated to equip schools, and to finance the development of on-line teaching and training programs. By the end of 2001, all classrooms will be equipped with an Internet connection¹².
- To promote use of the Internet by managing a strong communication policy targeting decision-makers in the business world. In addition, the government strongly encouraged its own administration and agencies to set exemplary applications, and to enhance quality by developing G-to-C and G-to-B services¹³. Today, the French administration is one of the most advanced in Europe, considering the breadth and quality of its Internet-based services, even though it is still far behind the U.S.
- To stimulate innovation in the digital technologies. The French System of Higher Education and Research is currently being reengineered in order to create strong institutes dedicated to digital technologies. French public research was previously strong both in telecommunication technologies and hard-science (e.g., physics), but weak in the other IT related domains. In addition, the French government strongly supported private initiatives by developing funding for start-ups (reengineering the French capital risk system); facilitating transfers among researchers and industry; and supporting innovative applications.
- To adapt the French legal system to the digital world. Due to the previous development of X.25 networks and the Minitel system, many French laws were already adapted to the digital era. For instance, many privacy issues were already implemented in French law, as were property rights over digital devices, such as databases, where the structure can be protected, but not the content. However, new action lines have been dedicated to the following issues:
 - Restrictions to encryption were removed, and electronic authentication became legally binding.
 - By late 1999, most of the existing French laws related to mail order delivery—"at a distance selling"—were extended to on-line transactions. The French law provides extended protection to the consumer. He can refuse the sale within eight days, either because he is dissatisfied with the product or because he simply changed his mind. Moreover, in the case of fraud on credit card payments, it is the seller who is responsible, not the card owner.

¹² The rate of connection to the Internet in high school rose to 100 percent in the year 2001 (from 32 percent in 1997). It reached 91 percent in colleges (from 11 percent in 1997), and 50 percent in primary schools (from 0.6 percent in 1997). Today, there is one PC for each 6 students in high school (up from 1 PC/12 students in 1997), one PC for 14 college students (up from 1 PC/ 26 students in 1997), and 1 PC for 23 students in primary schools (from one for 100 pupils in 1997). Source: Ministry of French Education, 2001, <http://www.educnet.education.fr/plan/bilan2001.htm>.

¹³ Eighteen percent of the on-line population has used the Internet in the past three months to visit government websites (EU average, 15 percent) (c.f. EU-15). Source: EC-DG Inso (European Commission, Directorate General Information Society), 2000. Seventy-five on-line procedures were available by mid 2001 (French Government, 2001). They range from tax declarations, to replies to governmental calls for tender, and include the request for many official documents.

- In 2000, many amendments to existing laws were passed to recognize the validity of on-line operations. This became true for almost every operation among businesses; between businesses and government (tax declarations, response to calls for tender, usual correspondence); between citizens and the government; and among citizens and businesses.
- In 2001, a "Forum for Rights on the Internet" was established by the government, business representatives, citizens, and other Internet stakeholders. The aim of this forum is to enlighten the government in the adaptation of the legal system as it concerns property rights, privacy, and Internet regulation.

Policy of the European Union

It must be recognized that French policy is quite close to the policy that had been followed by the other EU members. France became a leader in the coordination and implementation of these types of policies at the EU level, and the commission led by Romano Prodi made "Entry in the Information Society" one of the essential axes of its action. This became particularly clear with the conclusions of the Lisbon Summit, during which an e-Europe initiative (http://europa.eu.int/information_society/eeurope/index_en.htm) was launched in June 2000 (European Commission, 2001a). The Lisbon Summit also pointed out the importance of building knowledge infrastructures, enhancing innovation and economic reform in order to ensure durable and sustainable growth, and ensuring social cohesion in Europe. Along this line, the EU sees the creation of conditions favoring the development of e-commerce and the Internet as essential to sustain the long-term competitiveness of European industry. In addition, to achieve positive social benefits. Consequently, major European R&D programs, funding of private initiatives, and action in education and training are focused on initiatives related to e-commerce.

As far as e-commerce is concerned, the EU is complementing National State actions on two main dimensions: R&D and Regulation.

- EU members recognize that most of the R&D related to digital technologies or to e-commerce and e-business new practices (e.g., tests and implementation), should be organized at the European level, rather than at the national level. Following the successful ESPRIT and EUREKA programs that succeeded in stimulating international research efforts by associating businesses and universities, the Information Society Technologies program (IST, <http://www.cordis.lu/ist/home.html>) was launched in 1997. The aim of IST is to promote the joint development of new technologies, new contents, and new practices. The managers of this program—especially the Directorate General "Information Society" (DG Insfo; http://europa.eu.int/comm/dgs/information_society/index_en.htm) of the European Commission—made huge efforts to restructure the European research capabilities in this domain, and to ensure a wide diffusion of its results in the society and economy (European Commission, 2001b).
- Concerning regulation, the European Commission has proposed a new directive on e-commerce in order to ensure harmonized rules within the EU on authenticity, contractual issues, and marketing practices such as spamming. According to this directive, the official place of e-business will be where the operator is registered for tax or company law purposes, irrespective of where websites, mailboxes, or servers are located. Furthermore, operators will be obliged to disclose basic information such as names, addresses, and trade register numbers. In order to avoid spamming, commercial communication by e-mail must be clearly identifiable so they can easily be deleted. A political agreement on

this directive was reached in December 1999, and will contribute to a more transparent consumer protection regime within the EU (as soon as it is passed in every national law). In the EU and EFTA (European Free Trade Agreement) countries, the Lugano/Brussels Convention allows consumers to raise cases either based on their home country laws or because of the appropriate laws in the home country of the seller. This rule has obvious advantages for consumers and is generally recommended by consumer organizations. However, such a solution raises a number of problems in terms of technical trade barriers and extra-territorialism, including the enforceability of decisions. It is, therefore, unlikely that this convention can be extended beyond European borders.

There remains a division of labor between the Commission and the National States that seems to function well on these issues related to digital technologies, e-business, and the Information Society. The Commission is responsible for harmonizing the national policies and in developing actions aimed at sustaining the long-term development of an efficient technical and institutional infrastructure. National governments are responsible for stimulating the adoption of ICTs by their administration, industry, and population.

This policy generated significant effects that became visible by the end of 1999, when many start-ups were launched and private investment in e-business and e-commerce technologies became significant. In 2000, every French firm had at least a taskforce dedicated to e-commerce. However, the bursting of the "Internet bubble" in the second quarter of 2000 resulted in many start-ups and projects being abandoned. This is probably one of the explanations for the figures above (Tables 15, 16 above, and Table 18 below). Since the French enthusiasm for the Internet and e-business projects took-off only a few months before the end of the Internet bubble, many experiments that occurred in the U.S. and were financed by the bubble were impossible in France.

The good news is that new projects—whether they emanate from firms of the "old" or the "new" economy—are more seriously designed today. Only the projects that have reasonable chances of success are launched, and projects are more mature than they were a year ago.

Diffusion of E-Commerce

It is difficult to measure e-commerce because the measured categories and the methods to measure them are evolving quite rapidly (CNIS, Conseil National de l'Information statistique, 2000). The problem with assessment based solely on on-line ordering figures is that it does not take into account the actual impact of the Internet on the performance of markets, because of the importance of "brick-and-mortar" models (Brousseau, 2002; Giraud-Héraud et al, 2001). For example, only 2 percent of U.S. car sales occur over the Internet, but, according to various studies, the Internet plays a role in about half of the transactions (Scott et al, 2000). In France, like in the U.S., B-to-B e-commerce seems to account for about ten times more in sales than B-to-C e-commerce.

TABLE 17: On-line Exchanges (US\$ Billions), 2000

Type of exchange	U.S.	Japan	France
B-to-B	449,900	29,618	9,102
B-to-C	38,755	2,262	818
Total	488,655	31,880	9,920

Source: Forrester Research, Inc., 2000.

These figures have to be discussed because for France, as for many countries, the assessment of e-commerce volume varies from one to ten, depending on consulting firms (OECD, 2000a).

Whatever the accuracy of these figures, in France, all the experts agree on the fact that B-to-B e-commerce and B-to-C e-commerce differ strongly (Brousseau, 2000).

- B-to-B e-commerce is generally not performed on the Internet. The bulk of exchanges are performed via EDI systems (for large companies) and via Minitel (for small businesses), even though many applications are migrating toward the Internet (see Figure 2). Moreover, B-to-B e-commerce mainly deals with managing the ex-post phases of the transaction (after the deal has been made). Put another way, digital networks do not support electronic brokerage or digital markets; they support the co-operative processes and exchanges of information necessary for the delivery of services (whose conditions of exchange were settled off-line). Electronic marketplaces are still in the project phase and do not yet exist today. However, major French companies are involved in most initiatives in various industries.
- B-to-C e-commerce is mainly performed over the Internet, but a significant share remains based on the Minitel system. As opposed to the B-to-B segment, B-to-C e-commerce systems essentially focus on the ex-ante operations of the transaction (research and negotiation).

The types of markets that are already significantly developed are the same as in the U.S., except for cars, apparel and fashion, and gifts (Table 19). These exceptions are due to the specific organization of the French distribution system and to the French organization of urban space (see below).

TABLE 18: E-Commerce

Region	Secure servers per 1,000,000 population, 1998	Secure servers with <i>strong</i> encryption per 1,000,000 population, 1998	B-to-B trade in US\$, 2000	B-to-C trade in US\$, 2000	% Internet users who purchased on-line in past month, 2000
France	3.77	0.98	9,102.02	818.22	7
United States	54.29	38.39	449,900.00	38,755.00	27
Scandinavia	16.15	5.02	12,500.31	1,042.23	n.a.
EU	13.31	2.64	71,880.16	8,083.13	n.a.
OECD	17.77	11.47	588,900.80	52,184.17	n.a.

Sources: Netcraft, 2001; Forrester Research, Inc., 2000; Taylor, 2000.

TABLE 19: Distribution of the B-to-C E-Commerce Market in 1999

Market	France		US	
	FF Billion	% of total	\$ Billion	% of total
Travel & Lodging	620	47.18	7,798	38.33
Computers & Software	312	23.74	4,455	21.89
Books / CDs / Video	137	10.43	2,376	11.67
Apparel & Fashion	5	0.38	1,620	7.96
Flowers / Gifts	15	1.14	656	3.23
Food & Drinks	33	2.51	513	2.52
Health / Beauty	-	-	509	2.50
Furniture / Consumer Electronics	25	1.90	446	2.19
Ticketing	7	0.53	300	1.47
Gaming / Gambling	2	0.15	253	1.24
General (Mail-order, malls, etc.)	92	7.00	-	-
Various	66	5.02	1,418	6.97
Total	1,314	100.00	20,344	100.00

Sources: Benchmark Group, 2000; Forester Research, Inc., 2000.

As in the U.S., these figures must be compared with those of the whole market. In the U.S., on-line orders account for 7 percent of the book market, 6 percent of the CD market, and 3.7 percent of the ticketing and gaming markets. These figures are even less in France. For

instance, the FF 620 billion travel and lodging market accounts for only 0.3 percent of the total French market. While the pace of evolution is quite dynamic, it is clear that B-to-C e-commerce still represents only a minute share of retail sales (Bureau d'Information et de Prévision Economique (BIPE), 2000).

It is also interesting to note that the relative size of e-commerce markets (Table 19) does not correspond with the supply of e-commerce sites (Table 20). When comparing the distribution of the e-commerce sites to the distribution of e-commerce sales, it is clear that many sites will not survive in the coming months. Digital bankruptcies are expected to occur in France, as in the U.S., possibly affecting enthusiasm about e-commerce.

TABLE 20: Distribution of the B-to-C E-Commerce Sites, Beginning 2000

Market	France	
	No. of Sites	% of total
Travel & Lodging	129	5.0
Computers & Software	263	10.2
Books / CDs / Video	227	8.9
Apparel & Fashion	159	6.2
Flowers / Gifts	230	8.9
Food & Drinks	327	12.8
Health / Beauty	113	4.4
Furniture / Consumer Electronics	134	5.2
Ticketing	35	1.3
Gaming / Gambling	94	3.7
General (Mail-order, malls, etc.)	190	7.4
Services	218	8.5
Information	95	3.7
Various	343	13.4
Total	2,557	100.00

Source: Benchmark Group, 2000.

Immediately after the initial deflation of the “Internet bubble,” the *Journal du Net* (an online newspaper) began to list collapsing dot.com companies that had pulled out of the market—those already established companies that went bankrupt, became short of cash because investors withdrew funding, or were unable to find buyers.

Table 21 shows that a majority of these companies were B-to-C e-commerce websites—sites dedicated to selling tangible goods and services. Many sites providing services on-line had trouble as well. While data from such surveys may not be completely reliable, these figures indicate that the business models of many e-merchants were non-viable.

TABLE 21: Collapsing Dot.coms, 2nd Quarter 2000 to 2nd Quarter 2001

Market	USA		France	
	Number	%	Number	%
B-to-C sites	72	35.4	19	39.5
On-line services (insurance, travel, marketing, etc.)	33	16.2	3	6.2
Content services (media, etc.)	21	10.3	7	14.5
Portals, community Sites	19	9.3	13	27.0
ISP and Internet operators	17	8.3	2	4.1
Solutions and technology provision	17	8.3	1	2.0
B-to-B sites (e-procurement, marketplaces)	12	5.9	1	2.0
Trading and financial information	9	4.4	2	4.1
Auction	3	1.4	0	0.0
Total	203	100.0	48	100.0

Source: *Journal du Net*, 2001, computed by E. Brousseau.

In addition to the backwardness discussed earlier explaining the weak development of B-to-C e-commerce in France as compared to the U.S., it is important to note that the organization of distribution systems in the two countries has had an impact.

- In France, cities are more mono-centric than U.S. "hedge cities" (i.e., cities without an actual and single city center; see Rallet, 2001). Consequently, the population is concentrated in city centers where shopping facilities are widely available, and provide customers with diversified services and a convenient means to access them. Demand for at-a-distance commerce and home delivery is less important than in the U.S. Moreover, home delivery is very complex (and costly) to organize in city centers (Rallet, 2001).
- Besides the proximity of shops in France's city centers, huge integrated and pluri-functional supermarket chains distribute almost all categories of consumer goods and services. Consumers do not regularly request on-line commerce, because going to a supermarket enables them to gather their products, as well as other services at a single counter. Moreover, these integrated chains also manage facilities in the city centers (Benghozi, 2001; Licoppe, 2001).

B-to-C e-commerce seems, therefore, to be a niche market. However, there are opportunities for the development of a new type of service based on the customized assembling of information intensive services (Gensollen, 2001), or on value-added services mixing the advantages of traditional retailing and on-line retailing (Brousseau, 2002). French supermarket chains are today investing in the development of "points of delivery" in large cities, where consumers could conveniently pick up their on-line ordered basket, and where they would be provided with additional services (fine food, take-out, dry-cleaning, banking, and other services).

Social/Economic Impacts and Implications

Because Internet-supported e-commerce is still in its infancy, it is difficult to assess and measure its impact on the economy.

At the macroeconomic level, since the technological base of e-commerce is not manufactured in France, the conventional wisdom is not to expect a significant impact of e-commerce development in the IT sector, and therefore, on economic growth, as happened in the U.S. (Gordon, 2000). However, it is expected that the re-engineering and re-organization of firms, markets, and industries will generate significant and positive productivity returns in the end. That is why the French government is strongly pushing the development of e-commerce and e-business.

There are, nevertheless, controversies in France— as in the U.S. —about the productivity paradox. Huge statistical efforts have been launched by the French Census Administration (INSEE) to ground analysis of the impact of ICTs on better statistical data. The result of the first round of data processing in 2000 is that these effects are unclear (Gordon, 2000; Cohen & Debonneuil, 2000). Positive impacts may occur in specific industries when organizational changes are implemented together with the technology (Brynjolfson & Hitt, 2000; Greenan & Mairesse, 2000; Quinet, 2000). Since organizational changes are slow, anticipated positive effects should be very progressive (Brousseau & Rallet, 1999).

In the B-to-C segment, e-commerce is not expected to radically transform the structure of the distribution industry in France. Indeed, no new players succeeded like Amazon.com in the U.S. While there were independent start-ups, the most successful French sites were

subsidiaries of U.S. e-commerce sites, French supermarket chains, or mail-order companies. Consequently, everyone is expecting a consolidation of the industry towards brick-and-mortar models. These models will be dominated by traditional distribution companies that consider the Internet an additional channel to market and advertise their products or services. Due to the efficiency of the French model of supermarket and specialized distribution chains, it seems that B-to-C e-commerce sites will essentially enable these companies to provide their customers with additional and customized pre-sale or after-sale services. On-line ordering and at-home delivery is not considered the primary advantage of e-commerce.

It is clear that on-line distribution will become essential for information-based goods and services. In the music industry, it is expected that major music companies will reinforce their ability to dominate the market (most of them are U.S. companies, with the exception of Vivendi-Universal and Sony). However, French book publishing companies, the press, and service companies are expected to be major players in providing services to the French-speaking world.

B-to-B e-business is, for the moment, concentrated in two industries where after-sale operations are performed through digital networks. In the automotive and distribution industries, EDI enabled productivity gains due to higher turnover and just-in-time management of demand. This did not lead, however, to more competitive markets. On the contrary, integration among suppliers and major firms is reinforced because to guarantee an efficient quality of services, long-term cooperative relationships have to substitute for spot transactions.

Most major French firms are participating in the various international alliances that are currently creating large marketplaces. The conventional wisdom about these marketplaces is that they are appropriate mainly for the exchange of standardized products and services. As long as companies need specific inputs, they will continue to develop long-term cooperative relationships with a reduced number of partners. Therefore, e-commerce is expected to generate two types of differentiated effects. When applied to standard goods or services, marketplaces should make markets more transparent and reinforce price competition, leading to substantial productivity gains and major restructuring of industries at the worldwide level. When applied to customized and specific goods and services, EDI type systems will enable business partners to cooperate more efficiently only if they are able to maintain long-term, cooperative relationships. While both should lead to productivity gains, the dynamic of the two trends is quite contrasted, and the second effect will not impact strongly on the existing structure of the French industry, since it is already based on long-term, cooperative, inter-firm relationships.

The dynamic toward the development of e-commerce is, therefore, present. French firms and the government are actively working to develop it. However, it seems that nobody is expecting major and radical changes brought by e-commerce in the short-term. The rise of e-commerce is understood as a major, but slow and long-term process, which will significantly affect the organization and the dynamic of French industry and the economy in the end.

Since the stakes are huge, and since a gap has to be filled, it is nevertheless expected that the investment in e-commerce technologies and in the development of e-businesses and related skills will remain high.

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