

ICTs and strategic and organizational changes in Catalan business

A review of select evidence for Catalonia, Spain and international data

Jordi Vilaseca (jvilaseca@uoc.edu)
Director of Economics and Business Studies (UOC)
Researcher (IN3-UOC)

Joan Torrent (jtorrent@uoc.edu)
Professor of Economics and Business Studies (UOC)
Researcher (IN3-UOC)

Ángel Díaz (adiazch@uoc.edu)
Professor of Economics and Business Studies (UOC)
Researcher (IN3-UOC)

ABSTRACT

This paper examines the transformation of business deriving from the usage of Information and Communication Technologies (ICTs). The available data shows that the ICTs are transforming the production function of firms, but there is little evidence of what is happening within firms. It also introduces a series of variables concerning the value of a firm that should permit evaluation of the transformation of the business process.

KEYWORDS

Information and Communication Technologies, network firm, knowledge-based economy, new economy, e-business, digital technologies

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Introduction. PIC_empreses: explaining the research project

The work presented here is part of the "PIC_empreses" research project, the main object of which is to analyse the transformation of businesses deriving from the usage of Information and Communication Technologies (ICTs). This project is part of a more general multidisciplinary research project on the Information Society and Knowledge, the *Internet Catalonia Project* (PIC - *Projecte Internet Catalunya*) led by Professors Manuel Castells and Inma Tubella. The PIC_empreses project is led by the Director of the *New Economy Observatory* (ONE - *Observatori de la Nova Economia*), Professor Jordi Vilaseca. The ONE is a research team integrated within the UOC's Internet Interdisciplinary Institute (IN3 - Institut Interdisciplinar d'Internet). The research team comprises the researchers of the ONE group, Joan Torrent and Angel Díaz. It is also participated in by the researchers of the ONE and professors of the UOC's "Economics and Business Studies", Carlos F. Cabañero (strategy analysis, the organization and operations systems), David Castillo (investment/financial flows analysis, models of costs and information systems), Inma Rodriguez (analysis of the area of marketing and post-sales services) and Josep Lladós (analysis of the determinants of business innovation). We also thank Professor Gisela Ammetler for her support and comments.

Since the second half of the 90's, the most developed economies have been characterized by the progressive implementation of ICTs in their economic activities, both in production and in investment and consumption. A wide range of process innovations and of aspects of computer and telecommunications products have generated the emergence of new activities that, together with the transformation of some traditional activities, have produced an economic panorama that draws increasingly further away from the structures of manufacturing and services.

In fact, new productive activities linked to digital technologies are overtaking their own technological development and, nowadays, the goods and services they produce are not only used as an input for a growing number of productive activities, but are also seen as commodities, subject to transactions. As a result, a wide network of synergic relations is being constructed between these new goods and services and the rest of economic activities, whose main visible element is the *incorporation of knowledge into the economic sphere*.

In this sense, as can be deduced from Figure 1, we can say that the knowledge-based economy (new economy) centres around a process of technological revolution that has generated the emergence of a new productive sector and, in addition, knowledge of resources and commodities is increasingly used in other economic activities. In detail, the knowledge-based economy has a core sector: the information industry^[1], which exerts its own effects on the supply^[2] and the demand^[3] of other economic activities. In other words, the knowledge-based economy is not only the dotcom companies, but also includes the changes in supply and

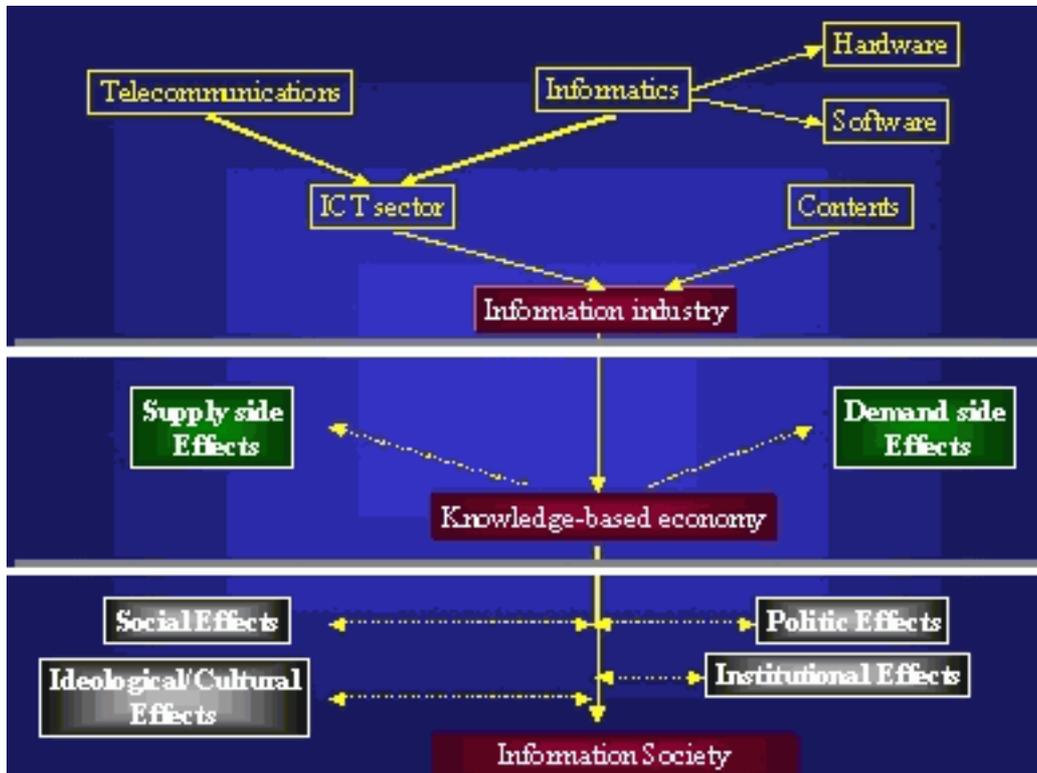
1. In fact, the core of the knowledge-based economy incorporates the productive sector, directly linked with digital technologies and which we have called the *ICT sector* and also the industry of creation, edition and diffusion of knowledge. An example of an information industry firm is the one resulting from the takeover between the leading Internet suppliers (Time-Warner). This takeover was an attempt to add synergies, of both technology and content, to explore the new digital markets. Information industry firms are what in journalistic terms are known as dotcom firms.

2. Among which we could underline the new forms of producing, working, of business interaction, of technological innovation and of creating organisational designs.

3. New ways of distribution and consumption, new ways of investment and financing and changes in international relations.

demand generated by the intensive economic use of the knowledge. In addition, the consolidation of the knowledge-based economy is leading to important changes to social relations and society as a whole. The transformations of labour relations, the ideological and cultural effects, the institutional and political changes and the new ways the individual relates to his or her own environment define some of the sociological and institutional effects of the new economic activities. In short, it deals with the repercussions the knowledge-based economy is generating in the construction of the Information and Knowledge Society^[4]

Figure 1. A diagram of the economy and knowledge-based society



Source: Vilaseca, Jordi and Joan Torrent (2001): "La nova economia: evolució o revolució?. La realitat econòmica de la indústria de la informació", *Perspectiva Econòmica de Catalunya*, 211 (January-February), 67-80, Cambra de Comerç, Indústria i Navegació de Barcelona, Barcelona.

If we concentrate on the transformations of the firm derived from the economic application of ICTs, one of the central elements of the new economic context is e-business, understood as^[5]: *the productive activities whose key operations, such as management, finance, innovation, production, distribution, sales and the relations between employees and customers, among others, take place on and via the Internet or via other computer networks, without prejudging the connection grade between both the virtual and physical dimensions of the firm*. In fact, the use of digital technologies for information processing defines a new form of company organization and strategy, based on networks, which could be called the *network firm*. This set of business changes can be approached in several ways. The one presented will be based on the analysis of four of the essential aspects of this process of economic transformation^[6]: the transformation of firm's activities (e-business), the relations between ICTs and the capital markets (e-capital), and the role of work and flexible occupation in the network firm model (e-work) and the specific character of innovation in the new economy (e-innovation).

The network firm is *the organizational form constructed around a business project that results from the cooperation of the different members of several enterprises, working over a network for*

4. Professor Castells carefully analyses these implications on his trilogy on the information age (1997; 1998; 2000).

5. See Castells (2001): *La galaxia Internet. Reflexiones sobre Internet, empresa y sociedad*, Plaza Janés, p.83.

6. In fact, the approach presented is based on the transformations ICTs are generating through the use of the basic inputs of economic activity: capital and labour, in business practices and in the essential element of economic knowledge in the long term: innovation.

the duration of a business project, their networks being reorganized to carry out with each project. In fact, it supposes a transformation of the firm's management into a system of variable geometry of cooperation and responsibilities and it emerges from the combination of the decentralization of big firms, as well as their alliances and strategic associations, and cooperation and the networked connection between small and medium enterprises.

The network firm is thus a flexible organization for economic activity constituted around the environment of specific enterprise projects, carried out through networks of various considerations and origins. The network is the firm. While the firm (or corporation) is the unit of capital accumulation, property rights and strategic management, business activity is developed via a network, so that the capacity to respond in a global economy, the need for constant innovation and continuous changes in demand are assumable. ICTs improve such networks, making them agile and able to expand rapidly, not only in external relations, but also within the enterprise. In short, *the essence of e-business resides in its own reticular, interactive connections, based on the network of products, customers and suppliers.* Consequently, the contribution of ICTs to the model of the firm is based on five aspects. The first, *Scalability*: the network allows for the inclusion of the elements necessary for the development of any business line, so that the variable geometry of the business strategy and the global or local dynamics of the firm are not a problem. Second, *Interactivity*: the relationship between the agents involved in the business activity can be defined at the desired moment (real or not) and, at the same time, the transmission of information and decision-making can be linked to the chosen time. Third, *Flexibility*: the firm's integration and the scope of the business project are extended and diversified according to the necessities of the business line, so both the strategy and the multiple and decentralized interaction of any agents can be easily combined as wanted. Fourth, *Brand management*: it is the sign of value recognition focused on the customer, so that a control of innovation and quality of the final product within a context dominated by reticular, global connections is necessary. And, five, *Personalization*: cultural changes and the diversity of global demand do not permit standardized mass production, although the economies of scale still have their role. Of the economic agents involved, the personalization and interaction ICTs permit are necessary in order to obtain efficient combination between volume and mass customised production within a context of large-scale production.

In short, *the contribution of ICTs to the network firm model lies in the firm's own capacity to evolve innovation, the production system and adaptation of the market demand organically, without losing sight of the main objective of any business: generating profits.*

The transformation of the capital markets is the origin of the development of the network firm. Despite the financial crisis of the core enterprises of the new economy, the spectacular advance of the prices of these companies during the 1990s had neither speculative nor "exuberant" motivations, but a real base. The profound changes in the financial markets are one of the bases of the new economy, for several reasons. First of all, they are *global and interdependent markets* because the electronic transmission of stock is transforming the financial markets, so that everything seems to indicate we are heading towards a world and electronic network of stock exchanges^[7]. In fact, online investment increases the volume of the capital markets, favouring the possibilities of desintermediation, accelerates the ability to respond and manifests information as a critical factor in decision-making. The result is an increase in the market's volatility, because its complexity, dimension and speed generate a model of fast action-reaction for Internet investors.

The second element to point out is *the process of financial evaluation*. The breakdown of the classic relationship between profits and stock value shows how the value of companies in the financial markets is progressively drawing away from their value on paper. This fact is due to the interpretation the markets make of the firm's intangible assets, such as technological investment^[8], its combination with organizational change^[9], the brand policy, corporate image, management efficiency and the sector of activity, so that any action involving ICTs has often received a premium (rising in expansion and falling in depression), independently of the degree of risk and the real return of the actual firms.

7. It has been calculated that the reduction of expenditures on financial transactions with the use of digital technologies is around 50%.

8. Some studies prove that each dollar invested in installing computers translates into five dollars in the firm's market value.

9. See, Brynjolfsson and Hitt (2000): "Computing Productivity: Firm-level Evidence", MIT Working Paper, Cambridge, Massachusetts. [Online]. Available from URL: <http://ebusiness.mit.edu/erik>^[url1]

In addition, the markets react to macroeconomic conditions and political decisions and to information turbulences as well, which with ICTs affect the (self-fulfilling) expectations of economic agents faster than ever. Professor Castells (2001) graphically illustrates this phenomenon: "*In the Internet era, characterized by the existence of financial markets systematically volatile and directed by information, the capacity to live dangerously becomes a part of the entrepreneurial lifestyle*".

If the evaluation of the financial markets is the main instrument to evaluate the return of a company, the workforce remains the source of the enterprise's productivity, innovation and competitiveness. In fact, the workforce recovers a significant relevance within an economy that depends increasingly on the capacities and abilities to process information and to generate and diffuse knowledge. In the new economy, the workforce requires a particular educational level linked to the capacity to take on initiatives and recycle in the face of current needs, as firms depend on the ability of their workers to adapt to this system of variable geometry. This notable training requirement sets the development of continuous training at the centre of the scene of professional development.

Moreover, this typology of work cannot develop its own capacities into a strict and traditional business environment. At a business level, Bresnahan, Brynjolfsson and Hitt (2000) have proved that positive feed-back on ICTs, informative flexibility and a high degree of work-skills^[10] is obtained. The retention of talent has defined new wage policies, the most common of which is the payment of part of the salary through stock options which, in addition, reduces the salary bill for the company. This new form of "co-property" and also "co-management" has a price: a high degree of exigency and commitment with the business project, much higher than what is contractually required. This view of the labour market leads us to distinguish between this self-programmable work and generic work (belonging to the workers with neither specific qualifications nor special habits) that can be done by a combination of machines, local work and external work. Both typologies are seeing an important transformation: flexibility.

The reticular structure of the enterprise, the rapid advance of the process of economic globalisation and the technology capacity that allows online work contribute to the consolidation of flexible work. In this sense, job and wage stability are making a way for a productive system based on flexibility, so that autonomous work, part-time employment, temporary employment, sub-hiring and consultancy are increasing in all the advanced economies. The company man is in crisis and the flexible woman is on the rise^[11]. In short, job flexibility, models of job variables, the diversity of working conditions and the individualization of labour relations are the systematic characteristics of the e-business labour market, features extending towards the other sectors of the economy.

One of the main expressions of the new economy is the increase in productivity. Over the last few years an intense debate concerning the growth of productivity and its sources^[12] has taken place. Measuring this indicator is difficult, for three basic reasons: the high percentage of employment in the service sector, inadequate official statistics from which to obtain increases in productivity within the complete value chain of reticular and globalised firms, and the temporary gap between the technological revolution and its productive impact. However, improvements in statistics and official measurements in the USA suggest a quantitative leap in productivity there since the second half of the 1990s, which can be linked to massive investment in ICTs, as well as to organizational change based on network employment. Such an increase in productivity has a cadence ranging from the core of the economic transformation^[13] to the other sectors of

10. The network firm is based on a flat hierarchy, a team working system and in easy and open interaction between workers and managers and between departments and levels of the hierarchic structure. See, Bresnahan, T.F., Brynjolfsson, E. and L.M. Hitt (2000). "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-level Evidence", *NBER working paper 7136*, Cambridge, Massachusetts. [Online, <http://www.nber.org/papers/w7136>]^[url2]

11. A UCSF/Field Institute survey (1999) based on a representative sample of the labour force in California in 1999 provided relevant data in this sense. If we define the traditional occupation as the unique, permanent and full-time job, remunerated by the contracting firm and not done from the worker's home nor as an autonomous worker, the conclusion reached states that just 33% of jobs in California can be fitted in this definition.

12. See, from an aggregate view the works of Gordon (1999; 2000), Jorgenson and Stiroh (1999; 2000; 2001), Oliner and Sichel (2000), Whelan (2000), Council of Economic Advisers (2001), Stiroh (2001), Baily and Lawrence (2001), Nordhaus (2001) and US Labor Department (2002) for the USA and Schreyer (2000), Scarpetta, Bassanini, Pilat and Schreyer (2001), Colecchia and Schreyer (2001), Colecchia (2001), Daveri (2001), Roeger (2001), Pilat and Lee (2001), Van Ark (2001) and BCE (2001) for other economies. In addition, it is remarkable that for some time now both empirical studies of the sector and studies from within firms show that the advent of ICTs has profoundly altered business activity. See Brynjolfsson (1996), Bresnahan, Brynjolfsson and Hitt (1999), Brynjolfsson and Kahin (2000), Brynjolfsson and Hitt (2000a; 2000b) and Yang and Brynjolfsson (2001), as well the empirical results of the productivity program of the US Labour Department (<http://stats.bls.gov/mpf/home.htm>) and of the NBER (<http://www.nber.org>)^[url3]

13. The empirical studies carried out so far (an excellent synthesis can be found in last autumn's IMF 2001 report on the world economic outlook: <http://www.imf.org>)^[url4] suggest the productivity growth in the informatics industry in the nineties was around the 25%.

the economy^[14].

In short, ICT investment and the reorganization derived from the diffusion of the network connection explains part of the growth in productivity in the USA, an increase significantly lower in other parts of the world, even though it begins to be perceived, especially in Scandinavia, Australia and Canada and, to a lesser extent, in the other G7 countries and the industrialized nations of Asia^[15]. Innovation is an essential factor of the economic activity in the knowledge-based economy, sustainable productivity increases depending on it. Within the new economic environment, the configuration of a framework of global responsibilities and the current processes of economic integration, with the growing substitution of the responsibilities for national economic policy, innovation becomes an essential factor to explain sustaining economic growth. All the evidence seems to suggest that salary-based responsibilities and the traditional competitive sources of national economic policy have been replaced by the creation of new commodities (product innovation) and more efficient combinations in the generation of what already exists (process innovation) in the strategy of profit maximization in a global economy. In fact, innovation currently depends on three essential factors: the creation of new growth through the existence of an efficient R&D system, the availability of self-programmable work requiring highly skilled workers and the existence of managers, institutions and societies with the necessary culture of enterprise. These three factors need to be combined with access to the capital needed to develop new business projects.

Despite the efforts made by both the different public and private institutions, the secondary available information is not enough to describe the important changes ICTs are generating in economic and managerial activity. Although we already have relevant information about the penetration of ICTs in firms and some of their more directed uses, nowadays it is not enough to have reliable and representative statistics of how ICTs are transforming management activity as a whole, understood as all the elements affecting the strategy and the organization of the company. In this sense, the PIC_empreses project introduced in the PIC (Projecte Internet Catalunya) project has as its general objective:

To obtain, structure, analyse and introduce sufficient, reliable information in order to know and understand the impact of ICTs in Catalan firms and to observe the changes concerning the companies not using ICTs

In more detail, it consists of:

- Analysing the impact of the use of ICTs in the firms established in Catalonia and to observe the changes concerning the firms not using ICTs.
- Designing a methodology of work enabling the analysis of the managerial transformations of the use of the ICTs, of a worldwide reference (of application in other geographic areas) and allowing the temporal comparison of the results.
- Configuring a representative sample of the Catalan business network, permitting the identification of different socio-economic features of firms and productive sectors and ascertaining the business transformations observed in each case.
- Identifying the competitive advantages, the behavioural changes, the efforts and the results that the use of ICTs in each element of its value chain represents for the company, as well as the connection established among them:
 - Research and development: Networks of technological distribution, centres for technological support, cooperation between suppliers and product innovations
 - Operations (Logistics and production). Relationship with the suppliers, efficiency and quality and process innovations.

14. Over several years the economists at the MIT e-business center (<http://ebusiness.mit.edu>,^[url5]) observed, for a group of 600 big firms of the USA, that between 1987 and 1994 internal decentralization and the adoption of network organizational forms were indispensable conditions to increase productivity. Lucas [(1999): *Information Technology and the Productivity Paradox. Assessing the Value of Investing in IT*. Oxford University Press, Oxford and New York] has provided evidence, based on case studies, of the usual primacy of investment returns of ICT to position the firm in terms of product, process and market.

15. For further details, see the reports of the Economic Department of the OECD (http://www.oecd.org/dsti/sti/prod/sti_wp.htm,^[url6]).

- Marketing. New forms of promotion and of market research and new distribution channels.
- Organizational: Organizational innovations, organization by processes and administrative advances.
- Human Resources: New selection methods and training and strategic view of knowledge and its management.
- Financial-Accounting. Access to investment and financial instruments, identification of new management parameters and indicators and their incidence in knowledge management.
- Information systems. Access to relevant information and new economic and financial information management (internal and external).
- Obtaining data and results at a business level, which contrast the new trends of the changes in productive economic activities resulting from the incorporation of ICTs. Concretely, the relationships among productive factors (capital, labour and knowledge), productivity and competitiveness (efficiency, quality and innovation), organisational changes, the new requirements of the labour force and others.

As commented on above, the main objective of the proposed research is the analysis of the transformations of business activity in Catalonia as a result of the boom in information and communication technologies in the productive sphere. These transformations, which are translated into sustainable changes in both basic inputs of the business activity (capital and labour), as well as in management practices and in the decisive element for long term growth, innovation, need to be empirically contrasted from a general hypothesis. As can be deduced from Figure 2, the convergent full range of ICTs, globalisation of economic processes and changes in the patterns of household consumption have led to a far-ranging transformation of economic activity, which we include under the concept of the *new economy* and which from the point of view of economic activity can be approached from the angle of the economic cycle (macroeconomic) or from that of the market, or rather from the interaction between economic agents (microeconomic).

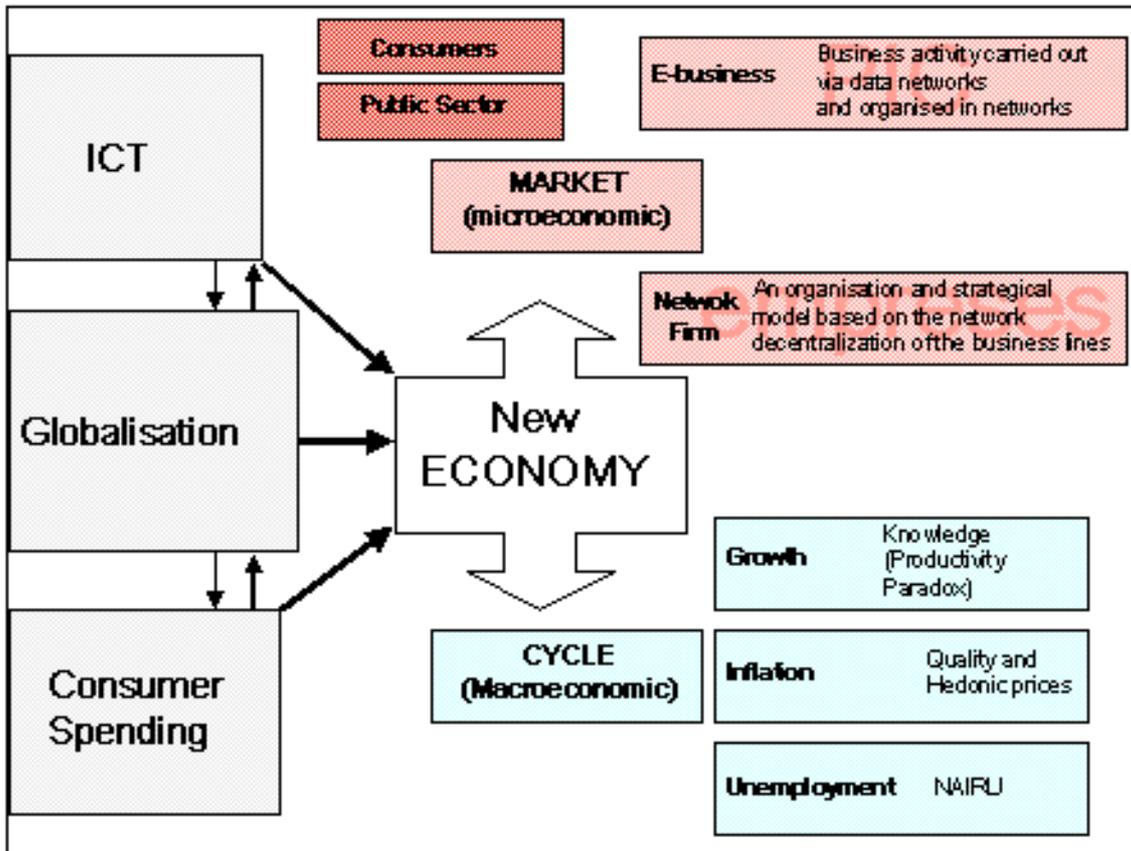


Figure 2. The new economy and the PIC_empreses project. Source: Own elaboration.

Above have we provided some results and empirical references on the analysis of the massive incorporation of knowledge into the economic activity from an aggregate point of view. However, the main objective proposed for the research is to *study the transformations of the firm as an economic agent*. In fact, in this conceptual framework, the PIC_empreses project attempts to prove the following main hypothesis:

The new economy transforms business activities carried out through information networks and organised in networks (e-business) and defines an organisational and strategic model based on the decentralisation of business lines via networks (network firm)

However, once the main idea this research project attempts to empirically contrast has been detailed, it is important to highlight the conceptual framework of the analysis that will be used to prove the main hypothesis. Once explained, the sub-hypothesis will help us to choose the necessary variables for the empiric contrast we wish to detail.

The conceptual framework chosen for the study of the transformation of business activities is the *general theory of business management*¹⁶. Within this framework, and in coherence with the theoretical evolution of the network concept, a set of new contributions overturn the exogenous conception of technology and focus its analyses on the endogenous interpretations of technological research.

In fact, the business economy has focused the study of the organisation and its administration on a set of aspects which acquire new meanings in the knowledge-based economy. These are the relationship of the firm with its environment, the role of the people within the company and the decentralization of its activities. Among these aspects, it is worth highlighting the consideration of technology and its relationship to both the strategy and the organization of the

16. See the work of Porter (1985; 2001), Mintzberg (1991), Navas (1994), Johnson and Scholes (1996), Hodge, Anthony and Gales (1998) and Chandler (2000).

firm.

Traditionally, technology has been considered a resource at the service of the company with which to improve the efficient combination of its productive factors, i.e. to improve its productivity. The strategic and business organization grounds were not questioned within this conceptual framework, as technology was regarded as an exogenous factor in business activity, a productive resource and not a key element in corporate culture. That is why the essence of business activity, based on the division of labour, as well as on the specialization of functions and on hierarchy^[17] was not questioned.

This exogenous vision of technology is revealed through the different definitions of researchers, who focus on partial aspects of organizations^[18]. Technology has thus been considered a factor of business contingency, as a factor of the environment that alters the organizational structure^[19], thus enabling different structural designs to be obtained for similar situations. The first studies were made within the context of the situational theory of business administration by Burns and Stalker (1961)^[20], Joan Woodward (1965)^[21], Lawrence and Lorsch (1967)^[22], C. Perrow (1970)^[23] and the studies of the Tavistock Institute of Human Relations in London and the Alston Group. All these studies establish organizational typologies in terms of technological features that, in their turn, respond to a particular business strategy. The resulting models do not suppose a breakthrough of the classical parameters of design, based on the division of labour, hierarchy, the relationships between departments and the decision making system.

At the same time, the idea of the network related to business activity was also linked to the concept of relationships with the elements of the environment, with hierarchies and within the network (suppliers, customers, etc.) and without a proper entity in its performance. The conception of the network within the business economy has its origins at the beginning of the twentieth century, in the context of the classic approach to the business administration. Taylor (1961)^[24] and Fayol (1961)^[25] introduce the concepts of division of task and specialization, basic to interpreting the business network. Nevertheless, the incidence of the wage as the single element of motivation, the emphasis on repetitive tasks, management behaviour principles and the realization of all the tasks within the framework of a firm that coordinates all the functional areas and the value activities limit the decentralized conception of business activity.

Later, the bureaucratic school^[26], the theory of the human relations^[27] and structural theory^[28], introduced new concepts which enabled us to advance in the decentralised conception of business activities, culminating in systems theory^[29], which conceives the firm as an open, global system, characterised by entropy and the interdependence of parts and undesigning organisational limits. Later, the subsequence schools, neoclassic theory^[30], behaviour theory^[31] and organizational development theory^[32] delve into the different aspects of the conception of the firm as a system. For example, these theories develop the decentralisation of business activity and the answer to external elements, decisions in terms of the information received from the environment and the existence of groups of people. In all these schools, technology is regarded as another element of the environment, a conception that is maintained in other later visions, such as cybernetics^[33] and particularly in situational theory^[34], which postulates the

17. In the Wealth of Nations, Adam Smith had already contrasted that the productive efficiency of a needle factory could be incremented through the division of labour (specialisation) and the use of better machinery. At the beginning of the twentieth century, the theories of Frederick W. Taylor related the achievement of greater efficiency to a similar standard of specialisation and a more adequate use of tools and individuals.

18. Ford, R.C.; Armandi, B.R.; Heaton, C.P. (1988). *Organization Theory: An integrative Approach*. Harper&Row, New York.

19. We should consider that organisational design is related to strategic design (Chandler, A. (1976) *Strategy and Structure. Chapters in the History of the American Industrial Enterprise*, Cambridge, Mass., The MIT Press.)

20. Burns and Stalker (1961). *The Management of Innovation*, London, Tavistock.

21. Joan Woodward (1965) *Industrial Organization: Theory and Practice*, Oxford University Press, London.

22. Lawrence and Lorsch (1970). *Organizational Structure and Design*, Homewood, Ill. Richard D. Irwin, Inc., and The Dorsey Press.

23. Perrow, C. (1970). *Organizational Analysis: A sociological View*, Tavistock, London.

24. F.W. Taylor (1961). *Principios de la administración científica*, Herrero Hermanos, Mexico D.F.

25. H. Fayol (1961). *Administración industrial y general*, Herrero Hermanos, Mexico D.F.

26. Bureaucratic theory focuses its interest on the client and conflict with the public. See, M. Weber (1947). *The Theory of Social and Economic Organization*, Talcot Parson, New York.

27. *The theory of human relations focuses its interest on people and the search for external equilibrium, or rather analysis of the organisational environment. See, E. Mayo (1945). The Social Problems of an Industrial Civilization, Harvard University Press, Cambridge, Massachusetts.*

28. *Structuralist theory studies the interrelation of organisations and their external environment, the interdependence of organisations and introduces the concept of the organisational man. See, T. Parsons (1960). Structure and Process in Modern Society, The Free Press, Glencoe, Illinois.*

29. See, R. A. Johnson; E. K. Freeman and J. E. Rosenzweig (1961). "Designing Management Systems", *Management Systems*, New York.

30. See, P. Drucker (1946). *Concept of Corporation*, John Day, New York.

31. See, H. Simon (1945). *Administrative Behavior*, McMillan, New York.

32. See W. L. French and C. H. Bell (1981). *Organizational Development: Behavioral Science Interventions for Organizational Improvement*, Prentice-Hall, New Jersey.

33. See S. Beer (1969). *Cibernética e Administração Industrial*, Editorial Zahar, Rio de Janeiro.

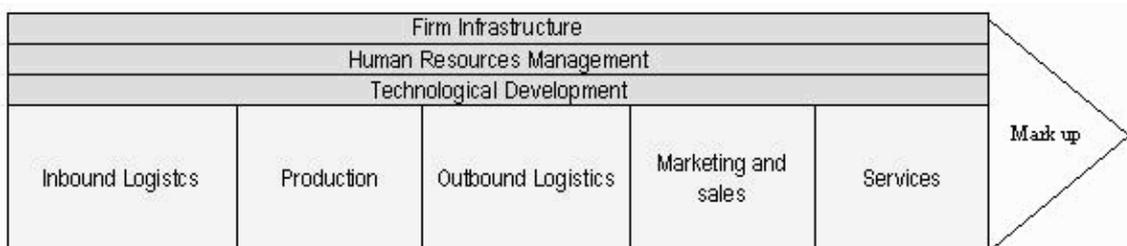
34. See A. Chandler (1962). *Strategy and Structure, Chapters in the History of Industrial Enterprise*, The MIT Press, Cambridge, Massachusetts.

so-called technological imperative, in accordance with which organisations should adapt themselves to the existing technology. Moreover, the situational school conceives, for the first time, the activity network, understood though, as a network of businesses, in which one of them acts as an integrator of the functions that has decentralised. Its principle is the reduction of transactional costs, as limited strategic integration of the value elements does not allow the advance at higher levels of decentralisation.

Finally, the new links existing between digital technologies and advances in productivity and the profound changes in the firm's activities are hard to explain within the previous conceptual framework. New studies, focused on existing interrelationships between technology, knowledge of the human factor, strategy and organisation provide us with a new perspective. The network is configured as the strategic and organisational model for those firms enjoying an advanced state of ICT integration in their activity^[35].

In fact, the interpretation of the economic agent chosen is the one of the firm^[36] as a set of inputs organised to develop a specific strategy, assuming risks and with the aim of making a profit. It leads us to the interpretation of the elements of the value chain of business activity, as the determinants of the organization^[37] and to the analysis of competitive forces as the determinants of business strategy^[38].

From this approach it is possible to tackle the study of the intangible elements so characteristic of the new economy such as flexibilization of the activity, cultural change, a new division of labour, based on multidisciplinary teams and the creativity and experience of the workforce and, finally, decision making based on these new competitive elements. Precisely because of that, the massive incorporation of knowledge into the organization and business strategy, and its repercussions on activity as a whole, advises against the use of other organizational conceptions, similarly valid, such as the traditional division into functional areas, based on more hierarchic elements. In fact, as shown in Figure 3, the value chain is a basic instrument for the systematic analysis of all the activities of a company, as well as their interactions. The value chain, with the objective of analysing sources and competitive advantage, dissects the firm according to its strategic activities in order to analyse the behaviour of costs and the sources of differentiation of the existing and potential product.



Source: Extracted from M. Porter (1985).

Figure 3. The value chain of business activity

This representation of the firm divides its activities into two groups, support activities, which have a transversal character, and primary activities, which include production and marketing. In detail, support activities are:

- *Firm infrastructure.* General administration, organization, accounting and financial activities, legal and fiscal activities. It provides support to the whole chain.
- *Human resources management.* Finding, hiring, training, developing and paying the employees.

35. See, referenced in the bibliography, the studies of Brynjolfsson and others.

36. See Valdaliso and López (2000): *Historia económica de la empresa*, Editorial Crítica, Barcelona.

37. By business organisation we understand the holistic human system and the synergies of cooperation and coordination integrated within defined limits and with the aim of achieving common objectives. In other words, the organisation comes from the division of labour into units and from the coordination of these units.

38. By business strategy we understand the long term orientation of business organization, adjusting inputs and the capacities available to the environment

- *Technological development.* Activities to improve the product and/or the process. Innovation.

Within the primary activities we have:

- *Inbound logistics.* Activities associated with the reception, storage and distribution of the productive activities of raw and semi-manufactured materials. It includes the managing of the materials, storage, stock control, vehicle programming and returns to suppliers.
- *Production.* Activities associated with the transformation of the inputs to final products.
- *Outbound logistics.* Physical storage and distribution of the final product^[39].
- *Marketing and sales.* Activities related to providing the consumers with an instrument through which to buy the products and induce them to do so, such as the advertising, the sales force, the channel and the price.
- *Service.* Activities associated with the provision of services to maintain or increase the product's value, such as the installation, repairing and adjustment of the product^[40].

Concerning the competitive forces, it is remarkable that it is a model that permits the analysis of the relevant factors within the definition of the business strategy^[41]. There are five of these: the negotiation power of the suppliers, the negotiation power of customers, the threat of substitute products, the existence of competitors and, outside the market, the possibility of new competitors.

These two elements of analysis therefore allow us to analyse the real performance of a given business activity. As is shown in Figure 4, business activity consists of designing a strategy to take advantage of the opportunities offered by the environment, while organising the inputs with the objective of maximizing profits within an uncertain context. The organization of inputs is part of the support and primary activities of the value chain. Setting up these activities gives rise to different types of organizational designs^[42], which correspond to the general guidelines of the strategy. In this sense, it is important to highlight the links between the strategy and the organization, which establish the empirically contrasted^[43] interrelation.

39. The activities of supplying, production and distribution are aggregated under the heading of *operations activities*. In fact, some systems such as MRP (Material requirement planning), MRP II (Manufacturing Resource Planning) and DRP (Distribution Resource Planning) integrally plan supply, production and distribution activities based on demand forecasts, which justifies the aggregation we propose.

40. Marketing, sales and post-sales services activities have been aggregated in a common division called *marketing and post-sales services*.

41. See M. Porter (1985).

42. There are different classifications of organisational designs. For example, Mintzberg (1991) classifies the organisational designs of the firm in a simple structure, bureaucracy, adhocracy and missionary. Other classifications divide it into traditional, functional, divisional, matrixial, by teams and network orientation (network firms).

43. Empirical studies of this yield, begun by the seminal work of Chandler (1962), prove that organisational structure determines the achievement of the business strategy.

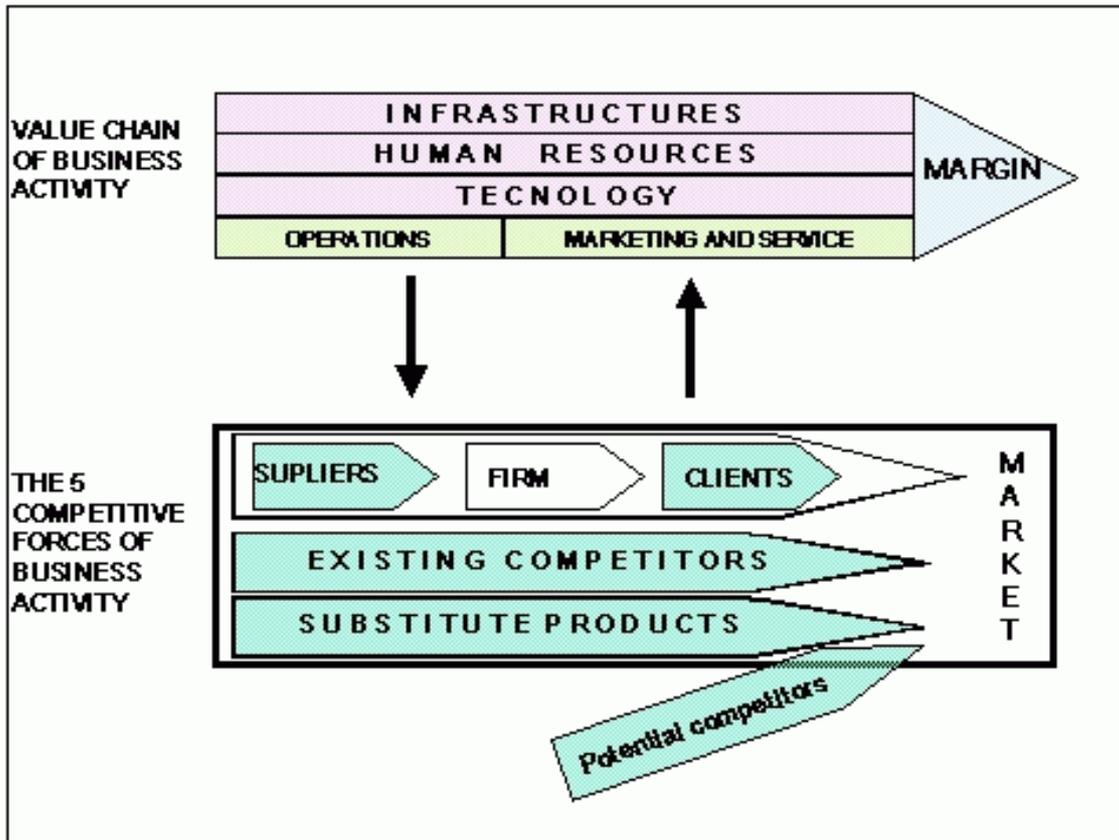


Figure 4. The value chain and the five forces

However, although the organizational design of business activity has for many years now tended towards decentralization, at present the advent of ICTs implies a break with the classical limit of organizational decentralization: the consideration of technology as being exogenous and allows a design which makes it possible to affirm that *the firm is a network*. In other words, the competitive evolution of the firm's environment supposes the formulation of strategies that need highly decentralised organizations in order to obtain higher and higher efficiency levels⁴⁴. The end result of this process has been the configuration of the *network firm*. However, ICTs involve a qualitative jump in this process. Why? The key lies in the improvement of information management of the different elements of the value chain. In other words, ICTs permit a networked decentralization of whole business lines (which includes the definition of the strategy) within a system of variable geometry (see Figure 5) of all the elements of the organization value. In other words, ICTs permit us to move from a network of firms to what we can call the network firm and, in doing so, overturn the concept of technology as an input and integrate it as a central element of the business culture which is translated into the strategy and, consequently, into the organization.

There are six main features of the network firm:

- First, the network firm is only possible with internal cultural change. The network firm is the result of a strategic and organizational change that requires a preliminary internal business culture that situates a networked workforce at the centre of its own definition.
- Second, *the network firm combines specialised assets, frequently intangible, under*

44. There are two variables defining business organization: the technological complexity of the activity and transaction costs. In a highly competitive environment, great technological complexity is required to obtain profits through the differentiation of costs and product. These levels of complexity imply very high transaction costs when the activities are vertically or horizontally integrated. This fact means a firm can consider the possibility of reducing those costs by collaborating with other firms if efficient in the use of such technologies. It therefore allows them to focus on their *core business*. In this way, the efficiency of the whole tends to be higher than the efficiency of the integrated firms. This process leads us to the *network firm*.

shared control. Strategic integration of suppliers and customers in the organization leads us to a global view of the inputs used for the achievement of goals and objectives, under a common business culture. This strategic link, making possible synergies between highly efficient nodes, permits the setting up of common projects of greater complexity.

- Third, *the network firm is founded on decision-making based on knowledge, not on hierarchy*. The use of ICTs frees the workers of some of their routine tasks, thus enabling the development of their capacity for decision-making. This fact situates tacit knowledge of the workplace at the epicentre of decisions, progressively substituting hierarchical relations. This alteration transforms the contractual relationship of the employee with the company, defining a new model of counter-contribution centred on the control of activities and on decision-making.

- Fourth, *information management in the network firm is based on direct communications, enclosing all its nodes*. ICTs reduce transaction costs to such an extent that this variable is no longer the central criteria of the organization, to the benefit of knowledge and its nodal relations, which are configured as the key element of internal communication in the firm.

- Fifth, *the network firm is organised in multidisciplinary working groups of variable geometry*. Knowledge-based specialization and direct communications enable the configuration of multidisciplinary working groups, variable and specific for each business project, which breaks down the traditional barriers of functional areas. Once the strategic objectives of projects have been obtained, these groups are flexibly re-situated to other projects.

- And, sixth, *the relationships between the integrants of the network firm overcome the contractual links based on price, functional features and service level*. The high degree of strategic integration defined by the network firm makes the three elements mentioned, characterising the link between two firms, insufficient. New variables, such as the capacity to adapt to different business cultures and the confidence to share relevant information, are configured as significant in the relationships between the different network business units.

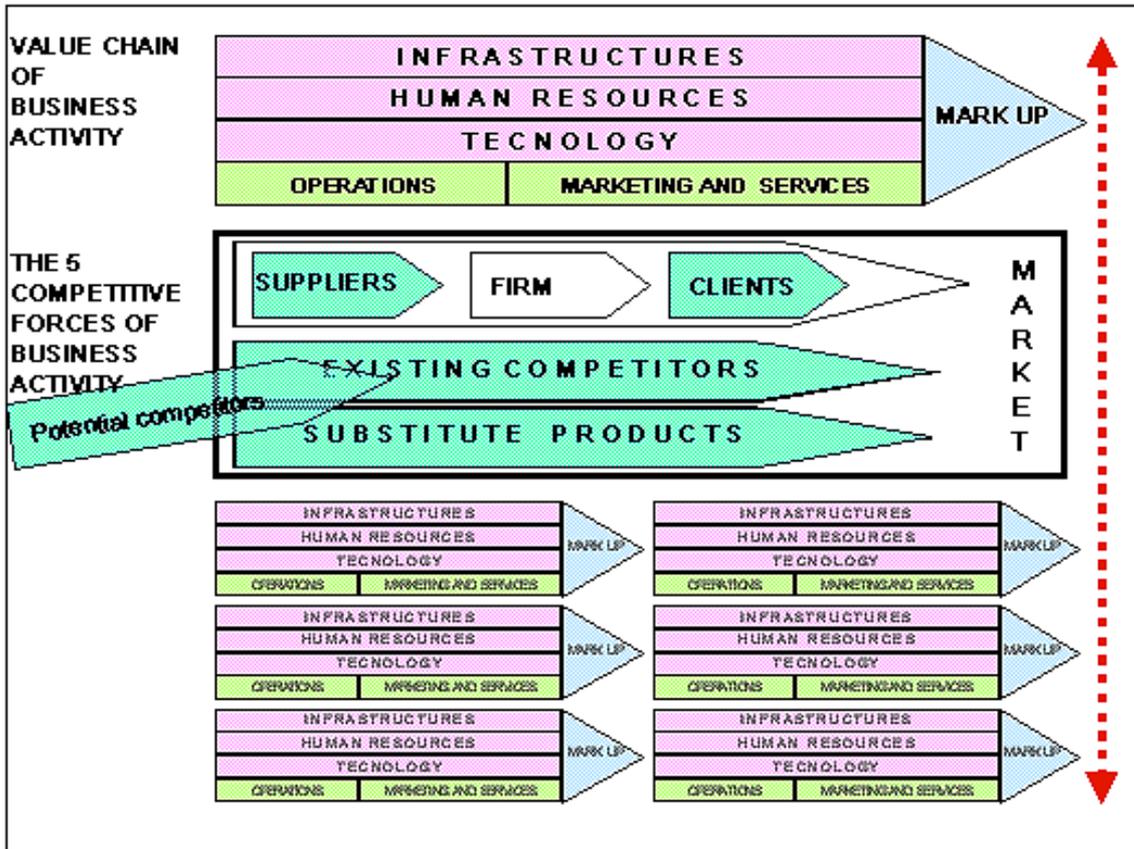


Figure 5. The main hypothesis: network business units.

In short, the network firm means a break from the main principles of the strategic business organization. ICTs transform the design of the workplace, the establishment of the hierarchic relations and the relationships between the different components of the business activity (areas or processes). The division of labour in the network firm is based on the division of knowledge: workplaces are designed to allow the human factor to be an active part of its activity, thus transforming hierarchic relations and setting the decision-making in the workplace. Knowledge as a central element of the organization and the business strategy is thus only feasible if relationship between the components of activities are structured as a network, as the old forms of coordination, based on a pyramidal hierarchy, are no longer viable. From all these motivations, as Figure 5 shows, this research projects seeks to contrast empirically *the transformations of business activity derived from organization and strategy in networks*.

In short, this paper studies the use of Information and Communication Technologies (ICTs) in businesses by analysing the available data. It presents evidence from the United States, Japan, the United Kingdom, Sweden, Norway, Finland, Denmark, Spain, Catalonia and the Basque Country.

The data has been collected from an exhaustive search of the main surveys dealing with how the Internet has changed production methods, as well as how it has led to the improvement of efficiency. In this sense, the surveys selected reveal the different influences any business can come under. There are obviously many other surveys related to the same topics of our study, but due to the impossibility of obtaining them all, or their lack of relevance, the whole range of existing surveys has not been studied. Despite this shortcoming, the available surveys are a representative sample, satisfactorily dealing with our objective.

Finally, the report presents a series of variables, extracted from all of the surveys studied, which measure the way firms have been transformed, as well as putting forward a summary of the

main aspects affecting such business processes.

Our analysis is divided into four sections according to the origin of the survey. Section I analyses the information available on Catalonia. Section II presents data from Spain and the Basque Country. Section III comprises an international comparison with data from the DTI (Department of Trade and Industry) in the UK (which includes comparisons with many other countries), the statistical institutes of the Scandinavian countries and the UNICE, which offers data for the EU, Japan and the USA. Section IV contains value variables with which to evaluate the transformation of business processes. Finally, Section V offers some conclusions on the use of ICTs in business and in different economies. The methodology used to study these surveys and the main figures extracted from them, as well as the questionnaires used, are included in the appendixes.

Section I. the use of ICTs in Catalonia

IDESCAT - The implementation of ICTs and research in Catalonia

The IDESCAT (Institut d'Estadística de Catalunya - Statistical Institute of Catalonia) has carried out a survey on the **implementation of Information and Communication Technologies** (ICTs) in Catalonia. The rise of this sector and the differences between it and its traditional counterparts have persuaded the Institute to draw up a special report in order to investigate what makes this sector different and the problems it faces.

The technical note of the questionnaire is as follows:

The **objective** of the survey is to ascertain the situation of the Information Society and the existing demand for professionals within this sector. To achieve this, the Institute analyses the needs of workers as well as their required skills.

The **questionnaire** is divided into nine parts:

- General data on the establishment
- Number of workers at the establishment
- Expectations of volume of personnel for the next twelve months
- Difficulties of finding qualified workers
- Work places or vacancies
- ICT professionals by educational skills
- Average wages of ICT professionals
- General data on the use of ICTs at the establishment
- Level of training in firms

PROBLEMS OF MEASUREMENT

The differences between ICTs and other sectors of the economy are analysed in the IDESCAT report. First of all, it is important to point out it is the most dynamic sector of the economy. The constant rotation of firms, as some companies disappear and many others emerge at the same time, makes analysis difficult. In addition, the properties of the sector make measurement of it more complex, since new ways of obtaining the same or better production quality are constantly arising.

Measuring the physical equipment is one of the main problems for firms, as the "informer" requires exact information about the number of personal computers in the businesses, the type of Internet connection, etc. Obtaining this is not always easy, as it depends on the firm and its homogeneity and, in some cases, the problems of measurement may lead to deviations from the population mean.

On the other hand, price and quality problems are affected by *Moore's law*. The strong growth and fierce competition in the sector have an affect on low prices and better quality products. To solve these problems, hedonic prices are common.

The inherent problems of the sector make it necessary to measure it by so-called

"satellite accounts". The IDESCAT recognises the more accurate approximation of this method of estimations, although it does not use it.

THE MAIN RESULTS

The results produced by the IDESCAT show the importance of Information and Communications Technologies in society. The number of employees is close to 100,000, which represents 4.3% of the labour force in Catalonia. The sales value is 2.4 billion pesetas and the gross investment represents 3.2% of the total for Catalonia.

Comparison of the ICT sector in Catalonia with the rest of Spain shows it represents 26.5% of total ICT-related employment and 27.7% of the sales value. Investment represents 20.6% of the Spanish total.

A by-sector analysis reveals the high proportion of industrial activities in the ICT sector (36%) in contrast to services, which have a relatively lower proportion in the Spanish economy. The data shows that, in 1999, industrial activities in the ICT sector accounted for 2,837 establishments (6.9% of the industrial establishments of Catalonia), 62,400 employees (9.3% of industrial employment) and 10.2% of the total sales value of the sector in Catalonia, which in terms of gross added value means 9.5% (4.3 billion pesetas).

In addition, the study shows the different dimensions of industrial activities between the ICT and the industrial sector. Whereas the ICT sector had 22 employees per establishment in 1999, this number drops to 16 in the industrial sector.

Exporting activities of "ICT industrial firms" is clearly higher than the mean. To be precise, it represents 17% of the total for the European Union and 17.8% of the rest of the world.

BUSINESS EQUIPMENT

The equipment companies have at their disposal could be a strong barrier for "e-development". Revealing this concern, the ICT occupation survey includes several questions about the equipment firms have and how they buy or sell their products.

The results show that 83% of businesses have an Internet connection, 50% have their own website and 38% have an intranet. However, less than 10% of businesses use the Internet to make purchases.

As regards business size, the data reveals that the bigger the firm, the better use that is made of ICTs. In other words, the bigger the business, the more ICTs equipment it has.

A third result comes from the analysis of the use of ICTs by sector of activity. Particularly noteworthy is the fact that 95% of businesses have an Internet connection and electronic mail and 80% have a website and personal domain. Moreover, the number of firms with an intranet ranges from 61.9% in the transport sector to 26.6% in the construction sector.

Finally, the IDESCAT compares its results with those obtained by the Department of Trade and Industry (DTI) in the UK. This reveals that businesses that have Internet access is similar to the other countries analysed, although the proportion that use ICTs to buy or sell is well behind other economies.

STATISTICAL PLANNING FOR CATALONIA

The IDESCAT drew up a special plan that covers the emerging digital economy. The plan is an extension of the statistical planning for Catalonia between 1997 and 2000. Its objectives are first to characterize ICTs as an emerging activity sector, and second to measure their use and impact on society from the three following points of view: that of the population, that of the firms and that of the administration.

The IDESCAT is also involved in two other projects, the DIASTASIS (Digital Era Statistical Indicators) and the EICSTES (European Indicators, Cybermetrics and the Science-Technology-Economy System). The DIASTASIS is an international project in which several institutions from different countries like European Dynamics (Athens, Greece), QUANTOS SARL (Paris) and others in Catalonia (the UPC-Universitat Politècnica de Catalunya; and the UPCnet) participate. Its objective is to define, measure and exploit new socio-economic indicators about the Information Society through the correlation of statistical data about the use of the Internet as well as statistical data from households and SMEs.

The EICSTES project involves many national organizations and several other institutions from the UK (UniS), Holland (Amsterdam University-UvA), France (INIST) and Greece (CTI). The main objective is to define indicators and statistical series in order to evaluate the new economy in the Information Society and its impact on citizens.

For further information see:

QUANTOS S.A.R.L. www.quantos-stat.com^[uri7]

TECSYS infopartners www.tecsysip.com^[uri8]

UPC www.upc.es^[uri9]

IDESCAT www.idescat.es^[uri10]

UPCnet www.upcnet.es^[uri11]

UvA www.uva.nl^[uri12]

Austrian Research Centers Seibersdorf (ARCS) www.arcs.ec.at^[uri13]

Centre National de la Recherche Scientifique www.inist.fr^[uri14]

Other Business Surveys

The emergence of ICTs has awoken the interest of many firms and institutions to various aspects concerning the business world and innovation. The CIDEM and the Barcelona Chamber of Commerce are two clear examples of such things.

The CIDEM (Centre d'Innovació i desenvolupament empresarial- Centre of business innovation and development) has been working since 1994 on the RITTS-RIS projects (Regional Innovation and Technology Transfer Strategies) within the framework of the Innovation Program of the European Commission. The goal of the project is to give support to both local and regional governments and to the organisations of economic development in order to carry out effective policies of innovation. Furthermore, as the CIDEM states, "The resulting strategy must provide a framework for the optimisation of policies and infrastructures of regional innovation, in particular for SMEs".

The Barcelona Chamber of Commerce has implemented an e-commerce survey, which measures the evolution of e-commerce in Catalan business. At the same time, the Chamber is currently working on a services sector survey that includes relevant questions providing information about the use of ICTs in firms.

In 2000, COPCA and Bellmore consultants produced a report on the impact of e-commerce on Catalan society, entitled "Catalonian enterprises and electronic commerce in Catalonia", considering a sample of 243 firms. Finally, the Council of Barcelona studied Internet access in Barcelona in 1998.

SECTION II. THE USE OF ICTs IN SPAIN, THE BASQUE COUNTRY AND OTHER COUNTRIES

Evolució del nombre d'usuaris d'Internet

Periodically, the Spanish National Institute of Statistics (INE - Instituto Nacional de Estadística) carries out surveys basically relating to the use of ICTs in business. These surveys are:

- Survey of technological innovation in enterprises
- Statistics on scientific research and technological development activities
- Yearly services survey
- Annual survey of industrial enterprises
- E-commerce survey
- Statistics on the Information Society

1.- Survey of Technological Innovation in Enterprises

Some OECD countries have carried out surveys of the use of ICTs in the manufacturing sector, studying how ICTs contribute to the transformation of the production system. Likewise, this survey measures the impact of new technologies on businesses in Spain.

The main goal of the survey is to obtain information about how businesses use ICTs in the process of innovation. At the same time, it analyses the strategies of innovative firms. Unlike other surveys, this one examines not how the use of new technologies has transformed production methods but the innovation processes of the companies that make it possible.

Additionally, the survey deals with whether there is both an innovation and/or a product and consequently, how and to what extent of ICTs affect firms.

The main questions included in the questionnaire attempt to reveal how businesses achieve their objectives, the structure of the company, whether or not they are innovative firms, and what influence the state has on them. Finally, it attempts to analyse the effects of innovations in business procedures.

Main results

The INE has published the main results of the surveys for 1998 and 2000. The businesses size is subdivided in two:

- Fewer than 250 employees
- More than 250 employees

There is also available but non-published data about firm-size.

Businesses invested 1.67% of the GDP in 2000, or #10.17 billion. 41.45% of the expenditure on innovation is attributable to R&D activities, 32.83% being carried out by the firm, 8.62% outside the business, while the rest is divided into other types of

investment related to innovation processes, such as the acquisition of machinery and equipment.

The automobile sector has the highest expenditure on innovation. More than #1 billion was spent in the year 2000, representing 14.7% of the total for industry. However, the sector with the most intense innovation is R&D, with spending 62.2% of the sales value. Available data on the number of innovative companies with more than 10 wage-earners is also provided. In this sense, the sector with most businesses is the retail one.

2.- E-commerce survey

The e-commerce survey for 2000 provides data on the use of ICTs in businesses, and is divided into 11 sections:

- Use of ICTs
- Internet connection
- Barriers to the use of the Internet
- Trading firms using e-commerce
- Uses of e-commerce
- Barriers to the use of e-commerce
- Advantages of the use of e-commerce
- Businesses that e-commerce for sales
- Businesses using e-commerce in the bargaining process
- Impediments to using e-commerce
- Advantages to selling by e-commerce

The data from the survey show that 27.2% have an Internet connection, 19.5% have electronic mail and 5.3% have an intranet. Leaving aside the businesses with an Internet connection, other possibilities of connection are available, though 80.97% of firms use the modem. Finally, 23.4% have ISDN connections and 3.6% via xDLS (e.g. ADSL).

Independently of whether or not firms are connected, common barriers to the use of the Internet arise. The most common is that the benefits for firms using the Internet are intangible. Or rather, the absence of tangible benefits deriving from it (which is the case for 31.15% of firms) is the cause of the second problem recognised, the lack of appropriately skilled professionals (15.8%).

On the other hand, the firms that use e-commerce to make purchases (or that are currently planning so), is close to 10%, a very low rate compared to the DTI estimates. 90% of the businesses that make purchases via the Internet acquire goods or service applications. Moreover, it is those companies that take advantage of the speed of the processes, the simplification of tasks and the saving in costs.

The most common barrier to purchasing via the Internet is the need for goods or services that the Internet cannot provide. 24.6% of firms face not only this problem but are also concerned with the means of purchasing, including the uncertainty of payments or contracts and guarantees, the figures being 17.2% and 18.5%, respectively.

Lastly, only 0.98% of businesses use e-commerce to sell via the Internet, while 5.26% are considering doing so. The main reason for such a low rate is the impossibility of selling some goods and services via the Internet (36.5%). However, the principal advantages are the reduction and rationalisation of costs (26.9%), the possibility of obtaining new buyers (67.4%) and, above all, geographic expansion of the firm (78.6%). Additionally, using ICTs to sell products is a way of not conceding market share (41.5%).

3.- Statistics on the Information Society

This special survey on the information society (IS) is in the context of the "*e-Europe*" project and measures the most important features of the so-called "IS" by analysing a number of firms in the ICT sector. Accordingly, the objective of the research is the evaluation of the economic impact on several activities within the Information Society on the economy. The data collected is based on the national classification of economic activities (NACE-93) in the context of the European accounts system.

The INE does not disaggregate the number of employees per firm. Consequently, measuring the way ICTs affect the different variables related to firm-size is not possible, as the results provide a general average of what is currently happening.

The main variables analysed in this research are production, added value, sales value, the number of employees and investments in tangible and intangible assets. The contribution of each ICT sector is deduced from the data, and shows the highest contribution is made by the telecommunications sector, which generated #10.48 billion (42.8% of the total) in 1998.

The increase in productivity in the telecommunications sector for the period 1996-1998 was very significant (18.9%), while added value also grew by 18%. The growth of investment in intangible assets increased by 127% in the same period, while investment in tangible assets fell by #42 million, or 1.5%.

In terms of the NACE, wholesales activities are categories 51.43, 51.64 and 51.65. Together they generated #5.8 billion in 1998, 23.7% of the total added value of the ICT sector considered by the INE. Unfortunately, the latest available data for this sector dates from 1998, so we cannot compare its growth with the telecommunications sector.

4.- Yearly Services Survey

The yearly services survey is an annual report that measures economic activities in the service sector. ICTs synergies affect services as much as the rest of the economy. For this reason, the implications of this survey should be relevant to the analysis of ICT firms.

Since 1999 the survey has included questions about the use of ICTs in service businesses. The questions concerning the use of ICTs are as follows:

- Computer equipment
- Connections
- Internet presence of the businesses
- E-commerce
- Telephony
- Teleworking
- ICT employment

- ICT training
- Sales value of the establishment

The results available on these questions are showed in four tables:

- Use of ICTs by informatics services
- Use of ICTs by telecommunications services
- E-commerce services: main aggregates
- E-commerce services by percentage of use.

As all the results date from 1999, the comparison of growth from previous years is unfortunately not possible. However, observing the structure of these sectors according to ICT use, the results show that variance depends to a large extent on the sector. 24.9% of the hotel business sector uses e-commerce to improve or provide information about their services, while the proportion in passenger transport is just 0.6%. Obviously, the greater the use of ICTs for e-commerce, the greater the return and the added value.

5.- Statistics on scientific research and technological development activities

The INE includes a series of statistics on R&D, the goal of which is "to measure the effort in national R&D activities in such a way that the necessary information can be supplied so that the right decisions can be taken in scientific-technological policy".

The INE also provides a classification by scientific discipline:

1. Exact and natural sciences

1.1 Mathematics and information technology (Mathematics and other related fields; information technology and other related disciplines - software development exclusively; the development of hardware is classified in the fields of engineering and technology)

1.2 Physical sciences (Astronomy and space sciences, physics, other related fields)

1.3 Chemical sciences (Chemistry and other fields)

1.4 Geological sciences and related environmental sciences. (Geology, geophysics, mineralogy, physical geography and other geological sciences, meteorology and other atmospheric sciences, including weather research, oceanography, volcanology, paleoecology, other related sciences).

1.5 Biological sciences (Biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other related disciplines with the exception of medical and veterinary sciences).

2. Engineering and technology

2.1 Civil engineering (Architectural techniques, technical and scientific studies in construction and civil engineering/building, study of urban infrastructures, and other related disciplines).

2.2 Electrical engineering, electronics (Electrical engineering, electronics, communications engineering, information technology engineering - hardware exclusively - and other related disciplines)

2.3 Other engineering (Chemical engineering, aeronautical and aerospace techniques, mechanics, metallurgy and materials engineering and its specialised subdivisions; applied sciences such as geodesy, industrial chemistry, etc; science and technology of food; specialised technologies or interdisciplinary fields, for example, systems analysis, metallurgy, mining, textile technology and other related fields)

3. Medical sciences

3.1 Basic health (Anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (Anaesthesia, paediatrics, obstetrics and gynaecology, internal medicine, surgery, stomatology, neurology, psychiatry, radiology, therapeutics, ear, nose and throat, ophthalmology)

3.3 Health sciences (Public health, hygiene at work, environmental hygiene, nursing, epidemiology)

4. Agricultural sciences

4.1 Agriculture, forestry, fishing and related sciences (Agronomy, fishing, forestry, horticulture, other related fields)

4.2 Veterinary medicine

5. Social sciences

5.1 Psychology

5.2 Economy

5.3 Education sciences (Education, training and other related fields)

5.4 Other social sciences (Social and cultural anthropology and ethnology, demography, - human, economic and social - geography, urban and rural planning, management and administration, law, linguistics, political sciences, sociology, organisation and methods, various social sciences and S+T interdisciplinary, methodological and historic activities, which have a relation with the disciplines belonging to this group. Physical anthropology, physical geography and psychophysiology would normally be classified in the exact and natural sciences heading)

6. Humanities

6.1 History (History, prehistory and history, as well as the auxiliary historical sciences such as archaeology, numismatics, palaeography, genealogy, etc)

6.2 Language and literature (Languages and ancient and modern literature)

6.3 Other humanities (Philosophy -including history of sciences and of technologies-, art, art history, art critique, painting, sculpture, musicology,

dramatic art except artistic "research" of any kind, religion, theology, other fields, themes and activities of science and technologies related with humanities)

The results are offered by activity sector. The activities analysed are:

Branch of activity	NACE
1. AGRICULTURE	01+02+05
2. EXTRACTIVES	10+11+12+13+14
3. MANUFACTURING INDUSTRY	15 to 37
4. Food, beverages and tobacco	15+16
5. . Food, beverages	15
6. . Tobacco	16
7. Textiles, clothes, leather	17+18+19
8. . Textiles	17
9. . Clothing and furs	18
10. . Leather and footwear	19
11. Wood, paper, printing, publishing	20+21+22
12. . Wood and cork (except furniture)	20
13. . Cardboard and paper	21
14. . Publishing, printing and reproduction of recorded supports	22
15. Coke, petroleum, chemistry, rubber and plastic	23+24+25
16. . Coke, refined petroleum and nuclear fuel	23
17. . Chemistry	24
18. .. Chemistry (except pharmacy)	24-24.4
19. .. Pharmaceutical products	24.4
20. . Rubber and plastic	25
21. Non metallic mineral products	26
22. Basic metallurgic products	27
23. . Ferrous metallurgic products	27.1+27.2+27.3+27.51+27.52
24. . Non-ferrous metallurgic products	27.4+27.53+27.54
25. Metallic products (except machinery and equipment)	28
26. Machines, computers, transport instruments and material	29+30+31+32+33+34+35
27. . Machinery and mechanical equipment	29
28. . Office, calculation machines and computers	30
29. . Electrical machinery	31
30. . Electrical equipment	32
31. .. Electronic components	32.1
32. .. Radio, TV and communications apparatus	32-32.1
33. . Optical and timekeeping instruments	33
34. . Motor vehicles	34
35. . Other transport material	35
36. .. Naval construction	35.1
37. .. Manufacture of aircraft and spacecraft	35.3
38. .. Other transport equipment	35-35.1-35.3
39. Furniture, other manufacturing activities	36
40. . Furniture	36.1

41.	. Other manufacturing activities	36-36.1
42.	Recycling	37
43.	PRODUCTION AND DISTRIBUTION OF ELECTRICITY, GAS AND WATER	40+41
44.	CONSTRUCTION	45
45.	SERVICES SECTOR	50 to 99
46.	Trade, repair of vehicles, etc	50+51+52
47.	Catering	55
48.	Transports, storage	60+61+62+63
49.	Communications	64
50.	. Post and courier services	64.1
51.	. Telecommunications	64.2
52.	Financial intermediation (including insurance)	65+66+67
53.	Real estate agents, rents and services to companies	70+71+72+73+74
54.	. Information technology and related activities	72
55.	.. Software	72.2
56.	.. Other information technology activities	72-72.2
57.	. R+D Services	73
58.	. Other Real estate activities, rents and services to companies	70+71+74
59.	. Public administration, social and collective services, etc.	75 to 99

The available results suggest that, by comparison, Spain is a long way behind the main OECD countries. Within the economies analysed, attending to internal R&D expenditures, Spain is only 20th out of the 24 economies with data available in 1998, with 0.89% in terms of GDP.

Within the activities, research and development accounts for more than 2.5% of the added value in machinery and mechanical equipment (2.97%), chemical industry (4.73%), electronic, electric and optical equipment (6.89%), transport material (4.03%) and non-market services (3.02%). On the other hand, the lowest percentages come from real estate agents, and rents and services to companies (0.18%).

6.- Annual survey of industrial enterprises

The annual survey of industrial enterprises is the analogue of the services survey. Its objective is to obtain exact information on the characteristic structure of industrial activities. The INE uses the same structure as in the service sector, asking the same questions concerning to the use of ICTs in the business activities.

Being able to spend two years with the same methodology and with a disintegration of 2 digits, which includes the analyses of the use of ICTs, makes it possible to compare the different growths in a number of industrial activities. Unfortunately, the INE does not follow the example of the DTI, which gives free access to its benchmark study, in which the main results are presented in an aggregate form.

The annual survey of industrial enterprises is also the result of a collaboration between the INE and the IDESCAT, which contributed with some special questions about the adoption of ICTs in industrial companies. Both have also collaborated in the yearly services survey to get results for Catalonia. In addition, the service and industrial surveys are elaborated together in order to obtain homogenous results for the two main sectors of economic activity.

EUSTAT: THE INFORMATION SOCIETY 2000

The EUSTAT (Basque Statistical Institute- Euskal Estatistika Erakundea) carries out an annual survey on the Information Society. The survey is divided into three parts: families, businesses and the ICT industry. The first analyses household equipment, the possibilities of new technologies and Internet usage. The businesses part details the increasing use of new technologies in businesses and provides a series of indicators to

determine the real situation of Basque companies in the "IS". Finally, the last section analyses the ICT industry sector. Our analyses of the results will focus on the second part: "Information Society and Companies".

The analyses of the use of ICTs in firms is compared to the data available from Scandinavian companies. The data reveal the lower use of ICTs in Basque firms. First, a common fact is that the larger the business-size, the greater the Internet usage and, in general, the more ICT equipment. In terms of firm-size, there has been a transformation of the production procedures, which occurs particularly when the business is larger in terms of employees (see, for example, ICT equipment in business establishments in the Basque country).

On the other hand, comparing ICT usage in different sectors within industry, the most intensive use is made by paper, publishing and graphic arts, the chemical industry, machinery, electric material and transport material. As for the service sectors, the most intensive users are banking and insurance, services to companies, public administration and education.

The survey does not examine how firms use ICTs to change their production methods. It just provides information on the ICT equipment in businesses, but not on the way this transforms the business, so we cannot extract any conclusion on that score.

On the other hand, 97.1% of the firms with a website supply general information about the company and 78.1% also provide information on the products they supply.

There are certain factors that stimulate the development of e-commerce. The main one is speed, but there are also others, like market expansion, advertising, improving client services, image, the simplification of purchase processing and reducing costs. On the other hand, the main obstacles facing e-commerce are the nature of the goods and services, the preference for the current model, unprepared clients, the risk of fraud and the related costs, the questions of security and confidence, the very high costs of technology, etc.

Other business surveys

Some private companies have produced other surveys: the "annual survey of information and communication technologies" (carried out by Telefónica); the "e-Spain 2001" report (Retevisión). The institutions SEDISI and ANIEL investigate the ICT sector through reports and statistics.

The Telefónica survey presents ICT trends and their evolution. The 2001 survey is the third to analyse the regulation of the telecommunications market, the development of the Internet and mobile phone trends. It does not provide statistics on evolution, like the INE, but it measures how society is continuously being transformed by the research and development in ICTs.

The Retevisión report began in 2001 with an analyses of the development of the Information Society in Spain. The objective is to measure the degree of implementation of ICTs in Spain, as well as to compare development within the different regions in Spain. The results show that the most developed communities are the Basque Country, Castilla-Leon, Andalucía, Asturias and Navarre.

SEDISI is an organisation that produces several reports on the development of ICTs. The one made in 2000 is entitled "the technologies of the information society in businesses", and states that "at the end of the year 2000, the companies in the Spanish Information Technology sector had a total turnover of more than 2.5 trillion pesetas - or nearly 15.5 billion euros - a record high, reflecting year-on-year growth of 18.2%. This result was possible thanks mainly to an 18.1% increase in internal market sales, and also because

of an improvement in export sales, which rose 18.6% during the year. Another indication of the trend in the IT market is the 24.1% increase in endogenous activity, concerning transactions between companies within the sector, particularly those engaged in distribution. However, towards the end of the year, a mild slowdown was perceptible which, under the new economic circumstances, could be interpreted as an early sign of the shift in the growth trend during 2001."

The reports published by Aniel are based on the Information Society and the impact of ICTs on it. The annual report on the "electronic and telecommunications sector" looks at the evolution of the sector in the last year.

Finally, the COTEC is an institution that studies the innovation process and its interaction within the firm. Despite their relevance to understanding the innovative firm, they do not contribute to the analysis of the variables affecting the value chain of firms in the new economy.

SECTION III. INTERNATIONAL ANALYSIS

DTI - Business in the information age

One of the key economies in the European Union is the UK. The study of the Information and Communication Technologies there is consequently an important point of reference when studying the IT sector. This year the Department of Trade and Industry has presented the results of an investigation into the way the business sector is working from the point of view of the information age.

There are three principal goals of this study:

- To enhance understanding of the levels of ownership and usage of ICTs by UK businesses across all their business processes
- To measure the UK's performance against other benchmarked countries, and to highlight areas of relative strength and weakness across all sizes of business.
- To measure progress towards the Government's targets of ensuring that:
 - a) 1 million micro, small and medium-sized businesses are trading online by 2002
 - b) the performance of the UK's micro and small businesses is up with the best in the world

The size-bands adopted by the DTI to measure the size of businesses is the following:

- 0 - 9 employees.#####.###Micro business
- 10 - 49 employees.#####.####Small business
- 50 - 249 employees#####.####..Medium business
- 250+ employees####.#####.Large business

Government targets

First of all, the report shows whether the Government's targets are being achieved, so that we can see whether the efforts have been correctly directed to obtain the objectives determined last year. In this sense, both the number of firms with Internet connections and e-commerce have been growing during the last year as expected, particularly the former, where the number of online business greatly exceeded expectations (1.9 million in 2001 compared with the 1.5 million expected). However, this growth is not equal for all business sizes. The small, medium and large companies show reductions in the levels of 2001, whereas micro businesses grew from 410,000 in 2000 to 505,000 in 2001. Faster growth is biased by the figures for micro businesses.

On the other hand, the report also shows that if online business trading is weighted by employment, it leads to a reduction of the resulting number. In other words, the proportion of business trading online when calculating by adding each trade weighted by employment has fallen during the last year (2001). Similarly, by international comparison, most of the economies analysed had reductions of this proportion.

Connectivity technologies

A second concern of the report is how companies connect to the Internet and the extent and sophistication of their websites. It also shows that 94% of UK business have access to the Internet and it appears to be reaching saturation point, with growth slowing and more than 90% of business having access, not only in the UK, but also in most of the countries analysed, including the most advanced ones.

An important result is that most of the indicators suggest strong growth in the rates compared to the year before, but these increases are lower than those observed in the second half of the 90's.

The way employees use the Internet is also studied by the report. Statistics on ICT use and access by employees shows that there was a significant increase in the percentage of workers who use the Internet at least once a month during 2001 in all countries but Sweden, where the rate is already highest. A significant proportion of employees use e-mail for daily communication.

All of these points are made possible by the adoption of ICTs. The number of businesses with a website has been increasing rapidly during the last five years (in half of the countries studied, between 73% and 80% have a website) and the percentage of them that evaluate the effectiveness of their website lies, in most economies, between 45% in Canada and 57% in the UK.

One way to create business value is through *intranets* and *extranets*. An intranet uses Web technology in conjunction with a LAN (Local Area Network) to enable staff to communicate with each other, access databases and exchange documents and files. Intranets have become an important step towards streamlining and integrating internal business processes. Once more, Sweden is the economy with the most businesses with an intranet (61%), with Italy having the lowest percentage (38% in 2001). A significant fact is that for six of the countries studied the figure is almost 56%, which means that more than half of businesses are using an intranet to streamline their internal business processes.

On the other hand, an extranet is a "private network that uses Internet protocols and the public telecommunication system to share securely part of a business's information or operation with suppliers, vendors, partners, customers, or other businesses". Furthermore, an extranet is an easy way of, for example, checking stock availability for any company, which can be an important step forward in adopting new ways of working with partners.

The proportion of businesses with an *extranet* ranges from 12% in Italy to 31% in Canada. One of the differences with intranets is that extranets are still growing fast in most countries.

Use of ICTs to access and publish information

The report also investigates how business uses ICTs to obtain and provide, or publish, information. The first finding is that many businesses use ICTs to access information rather than to publish it. So we have some companies that operate by trading with it, others that operate with but do not trade information and others that collect information to generate added value.

Concerning businesses that use ICTs to trade with information, more than 67% supply information on goods and services using online technologies. In addition, the proportion of businesses providing information on availability, terms and conditions and prices, varies from 35% in France to 50% in Sweden. There is also data about after-sales services, ranging from 23% in Japan to 34% in Canada.

On the other hand, some businesses use ICTs to provide non-trading information to customers both in and outside of the originating business. The proportion lies between

44% in France and Australia and 53% in Japan, while Germany is an exception with 86% of information provided on operations or goods/services externally developed.

The information on vacancies or jobs shows that the highest proportions of businesses with ICTs that use them to provide such information are in Japan (56%) and Sweden (53%), while the lowest is in Italy (13%).

Finally, the proportion of businesses that use ICTs to collect information for use in developing goods and services lies between 48% in Canada and 64% in France. Between 50% and 60% use it to collect information for market research or other market information, as well as for training and staff development.

Use of ICTs in supply operations

One important line of investigation in the report concerns how businesses use ICTs to interact with customers, suppliers and others. Its importance lies in usage to change or transform the way some of their business activities are undertaken.

In all the economies studied there has been significant growth in the proportion of businesses that permit customers to order and to pay online. The statistics show that a significant proportion allow orders to be placed online, representing 10% or more of the total value of their sales. However, it is remarkable that a considerable proportion of the total sales are B2C. More exactly, the percentages range from 17% to 38% in Canada.

To make online sales possible companies use ICTs to change and transform marketing and sales activities. The results suggest that a significant proportion of the businesses that use ICTs have transformed their marketing activities (from 35% in Germany to 17% in France).

However, online advertising is a small proportion of the total spent on advertising, although they have the ability to use this new marketing and sales medium. It ranges from 6% in France to 20% in Germany, but most countries are between 12% and 14%.

e-marketplaces are another way for businesses to sell products via the Internet. In most countries the proportion of companies using this method is above 3% (3% in France and Italy; 11% and 10% in Germany and Japan).

Finally, some businesses allow online customers to specify their own designs or requirements for goods and services, although the percentage is small, as with e-marketplaces, (from 3% in France to 11% in the USA).

Use of ICTs in purchasing operations

The number of businesses ordering online has fallen during last year in five of the eight countries analysed in the report. This reduction has been particularly high in Sweden, where in 2000 the figure was 50%, falling to 25% in 2001. Nevertheless, among businesses that order more than 20% of the total value of supplies online, there has been a significant increase. It was specially notable in France (from 13% in 2000 to 42% in 2001), in the UK (from 14% in 2000 to 43% in 2001) and Italy (from 14% in 2000 to 51% in 2001).

On the other hand, the data available reveals that a very low percentage of businesses use ICTs to make payments online to suppliers. In fact, in some countries the percentage has fallen.

ICTs transform purchasing activities in that they change the stock control system and the timing of production. On this subject, the report reveals some information about the transformations businesses are undergoing. Firstly, ICTs have changed or transformed purchasing activities in the USA and Canada by 74% and 73%, respectively. In other

countries, the proportion ranges from 57% in the UK to 31% in Japan. In addition, the proportion of businesses that automatically re-order supplies online lies between 4% in France and 18% in the USA, and from 10% in Canada to 2% in Japan, in the case of businesses that enable automatic adjustment of supplies online.

Some businesses also use ICTs to identify or gather pre-purchase information or to check availability of supplies, with percentages varying but in most cases from 18% to 32%.

Use of ICTs in production and post-production operations

a) Logistics and delivery

The report investigates beliefs in businesses about how ICTs have transformed the way they undertake their logistics and delivery.

Between 20% and 30% of the businesses that use ICTs in the countries studied state that their introduction has changed or transformed their logistics activities. Furthermore, between 11% and 27% use ICTs to improve communication with customers about the delivery of goods and services. Finally, between 4% and 20% of companies use them to improve the speed of delivery of goods and services.

On the other hand, a relatively low percentage of businesses that have ICTs enable customers to access automated systems to find information about the progress of orders (from 4% in France and Italy to 10% in the USA and the Republic of Ireland)

b) Finance

Information and Communication Technologies have transformed the financial management activity of some businesses. In fact, a large proportion of firms use online banking or investment services (from the 77% in Sweden to 25% in France) and some of them use ICTs to change or transform the way they undertake their financial activities.

It is also remarkable that the use of ICTs has allowed real-time knowledge of financial situations.

c) Operations, processing and assembly

This section considers the extent to which businesses believe that the introduction of ICTs has changed or transformed the way they produce their goods and services.

The first indicator of this shows that the percentage of businesses that use ICTs to change or transform the way they produce their goods and services ranges from 9% in France to 22% in the USA.

Many other firms use ICTs to enhance flexibility in operations and productions methods (18% in USA to 5% in France). In other words, the use of ICTs has made possible the transformation of operations and production methods and, for example, collaboration between own-design systems and those of partners. The implication is that the use of ICTs has reduced the development lead time.

d) After-sales service

As for post-production operations, between 4% and 20% of businesses use ICTs to change or transform after-sales services. There are three main methods of Internet communication used by businesses to provide after-sales services or information: *responding online to individual after-sales queries; via a frequently asked questions*

page; via an online search facility to find relevant information.

Finally, businesses also collect customer feedback online either manually or automatically in order to monitor product or service quality. The percentages range from 1% to 9% in both cases.

Benefits of ICTs and barriers to adoption

In this section, the DTI examines the attitudes of businesses towards the adoption of ICTs. The results of the report reveal that the firms that recognise that ICTs are relevant to them and offer tangible benefits have increased significantly on the previous year.

The analysis investigates the benefits of and the barriers to ICTs, and differentiates between users and non-users.

The report studies eleven relevant questions concerning the benefits:

- Increased business turnover
- Increased customer base in existing markets significantly
- Increased customer base in overseas markets significantly
- Improving quality of goods and services
- Helping communicate better with customers
- Helping communicate better with workforce
- Helping operate more effectively with suppliers
- Helping undertake operations more efficiently
- Helping improve delivery of goods and services
- Enabling better financial management
- Helping better integrate all business processes

The answers to all these questions are more positive in businesses that use ICTs than in those that do not. The greatest difference between users and non-users concerns communication, as the businesses that use ICTs obtain a considerably larger benefit in the corresponding areas than the businesses that do not.

The barriers to the development of online technologies are studied from seven points of view:

- Online technology set-up costs
- Online technology running costs
- Concerns about the risk of fraud
- Concerns about confidentiality
- Not enough customers having online access

- Employees not having the IT skills
- Businesses not having enough time to understand

The results show that businesses that use ICTs respond with less concern than those that do not to most of the statements. However, the gap between users and non-users is smaller than the gap between their perceptions of benefits.

Use of ICT in Nordic enterprises 1999/2000

Statistics Denmark, Statistics Finland, Statistics Norway, Statistics Sweden

The report presents the use of Information and Communication Technologies in Scandinavian countries. The authors expect that greater use will lead to a major impact on profitability, productivity and employment levels. A first problem of the survey is the timing of the four national statistical institutes. The first survey was carried out in Denmark and Finland in early 2000, while the Norwegian and Swedish studies were made in the middle of 2000. So the survey was elaborated within a time span of approximately six months. The consequences of this are that the latter includes questions on the year 2000, making comparison more difficult.

Remarkably, the available data includes not only the businesses that have Internet access and an intranet, but also those with an extranet and EDI. This enables us to observe the way they implement other existing types of ICTs that also transform firms. In 2000, businesses using the Internet ranged from 77% in Norway to 94% in Finland. The proportion with intranets lies between 31% in Norway and 44% in Sweden. Growth on the preceding period was very significant in the case of enterprises using an extranet. In 1999 the proportions were 11%, 10%, 8% and 6% for Finland, Sweden, Denmark and Norway.

The highest proportion of businesses with EDI was Denmark with 28% in 1999, while in 2000 39% of enterprises had EDI. The lowest rate grew significantly from 11% to 17% (in the case of Sweden).

The percentage of businesses with the possibility of receiving orders via their websites ranges from 19% in Denmark to 12% in Norway, coinciding with the rate of website adoption (Norway has the lowest proportion of enterprises with websites, 35%; while Sweden, Denmark and Finland have 57%, 53% and 49%).

The main use enterprises make of Internet access is to search for general information, as well as to carry out financial transactions, computer analysis, dealing with public authorities and recruitment of personnel. All the percentages have increased in 2000, indicating greater use of the Internet among businesses, which also leads to a major transformation of the business process.

B2B provides data on the use enterprises make of the Internet as customers. In all cases Finland has the lowest percentages, while Sweden has the highest. The main activity is searching for information on suppliers' websites, followed by "receiving digital products".

The most significant constraints on Internet use are the risks of viruses and hackers, the slowness of data communication, the costs of developing and maintaining an Internet system and the working hours lost because of irrelevant net surfing.

On the other hand, e-commerce has a significant relevance in Scandinavian countries, probably due to the fact that more firms have their own website and that Internet use is growing faster there than anywhere else. In fact, the percentage of all businesses with at least 2% turnover from e-commerce ranges from 5% in Denmark and Norway to 7% and

8% in Sweden and Finland. The most significant constraints regarding electronic commerce are the expenses involved in internal readjustment, considerations regarding existing sales channels, uncertainty regarding guarantees, etc., uncertainty concerning payments and potential customers and goods not suitable for the Internet.

The reNEWed economy - Business for a dynamic Europe

The UNICE Benchmarking Report 2001

The current is the fourth UNICE benchmarking report. The "new economy" has transformed society, introducing other forms of carrying out both new and old activities. Firms have changed their organisations and new technologies allow new forms of working better. The impact of the new economy is the consequence of the "third industrial revolution: automated brain power and the death of distance".

The report "compares and contrasts the spread of new technologies in Europe, the United States and Japan, and also includes some recommendations for European businesses".

The emergence of the "New Economy"

The first chapter presents evidence about the emergence of the new economy. For this, a number of indicators relating to economic growth are presented. The first, the annual growth of real GDP per capita, shows how standards of living have increased more rapidly in the USA than in Europe and Japan since 1995 and, mainly, because of the business sector. Furthermore, employment has grown 40% since 1980, while in Europe growth has been only 5%.

As regards knowledge-intensive sectors, the share of them in the total value added was more than 40% in the USA and 33% in Europe. This gap coincides with the evolution of total factor productivity growth in the USA and the EU, with an increasing average in the late 90s in the case of the US and decline in the EU. One of the reasons argued by the UNICE for the faster rate of growth of the US economy is the use of more efficient methods of production.

The report also reveals the importance of the ICT sector for the economy. First of all, "it is a high value-added industry" that creates new wealth and jobs. In addition, this technology can be used as an input in most sectors of the economy, and to reorganise structure and businesses strategies as well. The data confirms these facts and the share of the total value added within the business sector is close to 9% in the USA, while in the EU and Japan it is less than 7%.

However, one the most important figures in the first chapter are the benefits of ICTs with or without organisational change. The data shows faster growth for companies adopting new organizational methods with ICTs.

New technologies transform the economy

The second chapter concerns the way ICTs transforms the economy. ICTs have many implications for the market structure and customer activity.

The first available indicator concerns e-commerce, which has been transformed in the last few years by B2B and B2C. The most highly developed economy is the US, which is estimated to have more than #40 billion in B2B and #30 billion in B2C. The UNICE sees this growth as being important in four ways:

- Increasing the speed and quality of information on products and prices
- Allowing small companies access to international suppliers and customers
- Making geographical distance less important
- Giving customers more choice

The development of e-commerce is greater in per-capita terms in the US economy. In fact, the US saw B2C transactions worth nearly \$90 per capita, while in Sweden (which ranks second) the figures ranged between \$20 and \$30 per capita.

A third remarkable fact is the power that ICTs give to businesses as they permit the control and coordination of supply and facilitate forecasts of changes in supply and demand. There is a significant proportion of companies believing that "the Internet has brought or will bring a medium to significant change in 2003".

Finally, the report emphasises the capacity of the government to improve the use of ICTs and increase their use in order to interact with citizens.

Policies to realise the full potential of the new economy

The last section includes indicators of how ICTs are used in several ways and some recommendations to improve them and ensure more stable growth. The UNICE states that the US ICT sector is "much larger and productive than that in the EU", mainly due to higher investment in generating new knowledge and its diffusion in a more efficient way. The available data on patents and per capita R&D expenditure confirm these facts.

The greater innovative capacity in the US also comes from an important mechanism consisting of the multiple alliances that have allowed firms to cooperate with one another in order to make new advances and convert them into new products, thus generating added value.

As the UNICE states, infrastructure is the backbone of the Information Society, although the implementation of telecommunications advances and their diffusion is also important for the economy. The role of the government is essential in order to improve the use of ICTs and to organize policies to generate greater use. The indicator of "price of Internet access and Internet host penetration" is a good example, as it shows how the countries with low prices have a greater number of Internet hosts, which may later become a more developed sector.

In order to measure the development of infrastructure, there is an "Information society infrastructure indicator" that measures and compares whether the infrastructure is properly adapted to the development of the information society. Additionally, it reveals the widely acknowledged underdevelopment of the Information Society in Spain in comparison with many other countries.

Customer acceptance shows that the sooner customers and producers adopt new technologies, the quicker new products are developed. The survey includes various indicators of this, such as "online shopping", "online banking" or "secure servers", which reveal the degree of development in each country.

It also includes the implications of new technologies for the labour and capital markets, as well as the possible implications as ICTs are adopted by businesses. The labour market needs a more flexible market since many companies start up, others reorganise and the rest close down. In addition, new technologies demand new skills, so the development of the Information Society is also directly related to the labour market and its structure.

On the other hand, capital markets may be affected by the development and the acceptance of the new economy. It is very important to exploit the potential of the new economy, although it requires "equity-based risk capital". The integration of capital markets leads to a more efficient way to supply the necessary capital. The most integrated market is in the US, so it is understandable that it offers better opportunities that report higher growth.

Finally, the higher returns for investors doing business in US markets are worth remarking. The increasing development of capital markets and the new economy lead to higher returns in those sectors and, by extension, in the whole economy.

SECTION IV: INDICATORS

Technological infrastructures

- 1. SMEs that are connected
- 2. Connectivity indicator
- 3. Businesses trading online by size-band
- 4. Number of businesses involved in E-commerce
- 5. Proportion of businesses trading online
- 6. Proportion of micro businesses that are connected
- 7. Proportion of small businesses that are connected
- 8. Proportion of medium businesses that are connected
- 9. Proportion of large businesses that are connected
- 10. Proportion of micro businesses that are trading online
- 11. Proportion of small businesses that are trading online
- 12. Proportion of medium businesses that are trading online
- 13. Proportion of large businesses that are trading online
- 14. Businesses with access to the Internet
- 15. Date connected to the Internet
- 16. Method of connection to the Internet
- 17. Businesses with a website
- 18. Businesses that evaluate the effectiveness of their website
- 19. Ways of evaluating effectiveness of website
- 20. Businesses with an Intranet
- 21. Businesses with an Extranet
- 22. Businesses considered having an Intranet and Extranet

Business environment (strategy)

- 23. Businesses that provide information on goods and services
- 24. Externally using online technologies
- 25. Businesses that provide information on availability, terms and conditions, or pricing information externally using ICTs

- 26. Businesses that provide information on delivery schedules and delivery costs externally using ICTs
- 27. Businesses that provide information on after-sales services externally using ICTs
- 28. Businesses that provide information on their operation or goods/services development externally using ICTs
- 29. Businesses that provide information on purchasing requirements externally using ICTs
- 30. Businesses that use ICTs to collect information for use in developing goods and services
- 31. Businesses that use ICTs to collect government information and services
- 32. Businesses that use ICTs to collect information on training and staff development
- 33. Barrier to (further) use of ICTs - isn't relevant to business
- 34. Barrier to (further) use of ICTs - offers no tangible benefits
- 35. Attitude of business to ICTs
- 36. Agreement with statement that online technologies will increase business turnover significantly
- 37. Agreement with statement that online technologies will increase customer base in existing markets significantly
- 38. Agreement with statement that online technologies will improve the quality of goods and services
- 39. Attitudes to online technologies
- 40. Business interaction with local or central Government

Business Infrastructures

- 41. Businesses that provide business accounts or other financial information externally using ICTs
- 42. Businesses that use ICTs to collect banking, investment or financial information
- 43. Businesses that use online banking or investment services
- 44. Businesses that use ICTs to change or transform the way they undertake financial activities
- 45. Businesses that use ICTs to access accounts and cash flow information
- 46. Businesses that use ICTs to get real-time knowledge of financial situation
- 47. Businesses that use all financial information to optimise the businesses cash

flow situated in real time

- 48. Agreement with statement that online technologies will enable better financial management
- 49. Agreement with statement that online technologies will increase customer base in international markets significantly

Human Sources

- 50. Average percentage of employees using the Internet at least once a month
- 51. Percentage of employees making daily use of external e-mail for external communication
- 52. Agreement with statement that online technologies will help communicate better with workforce
- 53. Businesses that provide information on vacancies or jobs externally using ICTs

Innovation

- 54. Barrier to (further) use of ICTs - employees don't have the IT skills
- 55. Barrier to (further) use of online technologies - risk of fraud
- 56. Barrier to (further) use of online technologies - concerns about confidentiality
- 57. Barrier to (further) use of online technologies - online technology set-up costs
- 58. Barrier to (further) use of online technologies - online technology running costs
- 59. Barriers to (development of online technologies)
- 60. Sources of IT advice
- 61. Rating of quality of IT advice received
- 62. Barrier to (further) use of online technologies - don't have time to understand

Operations

- 63. Percentage of online orders made by households
- 64. Businesses that allow customers to make payments online, 2000 and 2001
- 65. Percentage of the value of sales paid for online
- 66. Businesses that use ICTs to change or transform the way marketing and sales activities are undertaken
- 67. Businesses that undertake online advertising
- 68. Businesses that provide goods and services for sale at an e-marketplace
- 69. Businesses that enable customers to specify their own designs or requirements for goods and services online

- 70. Businesses that gather information on customers during online communication to target marketing activities.
- 71. Businesses that use ICTs to order supplies, 2000 and 2001
- 72. Percentage of businesses ordering more than 20% by value of supplies using ICTs
- 73. Percentage of the total value of goods and services ordered for businesses using ICTs
- 74. Businesses that use ICTs to make payments online to suppliers, 2000 and 2001
- 75. Percentage of the total value of goods and services purchased for businesses that are paid for online
- 76. Businesses that use ICTs to change or transform the way purchasing activities are undertaken
- 77. Businesses that use ICTs to identify suppliers or gather other pre-purchase information 2000 and 2001
- 78. Businesses that use ICTs to check availability of supplies, 2000 and 2001
- 79. Businesses that use ICTs to track the progress of supplies on order, 2000 and 2001
- 80. Businesses that use online sales support services, e.g. technical support
- 81. Businesses that automatically re-order supplies online
- 82. Businesses that enable automatic adjustment of supplies online, to meet fluctuations in requirements
- 83. Agreement with statement that online technologies will help you communicate better with customers
- 84. Agreement with statement that online technologies will help you operate more effectively with suppliers
- 85. Agreement with statement that online technologies will help you undertake operations more efficiently
- 86. Agreement with statement that online technologies will help you improve delivery of goods and services
- 87. Agreement with statement that online technologies will help you better integrate all your business processes
- 88. Barrier to (further) use of ICTs - not enough customers have online access

Marketing and After-sales services

- 89. Businesses that use ICTs to change or transform the way goods and services are provided

- 90. Businesses that use ICTs to improve communication with customers about the delivery of goods and services
- 91. Businesses that use ICTs to improve the speed of delivery
- 92. Businesses that use automated systems to let customer's track the progress of goods on order
- 93. Businesses that enable customers to specify online where, when and how their purchase is delivered
- 94. Businesses that use ICTs to change or transform the way they produce their goods and services
- 95. Businesses that use ICTs to enhance flexibility in operations and production methods
- 96. Businesses that use ICTs to change or transform the way they produce goods and services are developed
- 97. Businesses that use ICTs to collaborate between own design systems and those of partners
- 98. Businesses that use ICTs to speed up incorporation of new materials, components or services
- 99. Businesses that use ICTs to reduce development lead times
- 100. Businesses that use ICTs to change or transform after-sales services
- 101. Businesses that respond online to individual after-sales queries
- 102. Businesses that respond via a frequently asked questions page
- 103. Businesses that respond via an online search facility to find relevant information to respond to customer queries
- 104. Businesses that collect customer feedback online manually to monitor or product service quality
- 105. Businesses that collect customer feedback online automatically to monitor product or service quality
- 106. Businesses that use ICTs to collect information on market research or other marketing information

SECTION V. CONCLUSIONS

The development of ICTs has transformed both businesses and society in general. Enterprises are now in a very complex situation of a changing environment that is the object of study of many economists. This report has attempted to collect some information on the main investigations or surveys relating to the use of ICTs in businesses carried out so far.

The available data shows that ICTs are transforming firms' production function, but there is also little evidence about how this happens. In other words, the great transformation is currently within businesses, so further information about how organisations and their strategies are

changing is needed.

Some conclusions are given from the international data collected, although more data is required to deal with the case of Spain. Moreover, the international data shows lower development and adoption of ICTs in Spain compared to the main economies of the European Union, Japan and the United States.

Furthermore, analysis of the available questionnaires is a powerful tool to extract the variables affecting the value chain of the firm. Such variables help us to explore the degree of transformation of any economy or region. In this sense, we have tried to uncover the main variables that can be extracted from the different questionnaires analysed.

The classification has been made around seven points, namely:

- Technological infrastructures
- Business environment (strategy)
- Business infrastructures
- Human resources
- Innovation
- Operations
- Marketing and after-sales services

All of the variables are included in any of these groups, since they are related to the value chain. In addition, these groups include all the possible effects on this value chain, so that we can analyse how it is transforming businesses as new technologies are penetrating firms. The classification is also consistent with the concept of the network firm analysed.

APPENDIX I. METHODOLOGIES

DTI - METHODOLOGY

Scope	UK, USA, Canada, Japan, France, Germany, Italy, Sweden, Australia, Ireland
Universe	The sampling unit is the business, the level at which decisions are usually made
Sample dimension	Design: For countries other than the UK, 500 interviews. For the UK, 3,113 interviews
Sample method	Less than 10 employees: Micro 10-49 employees: Small 50-249 employees: Medium 250 or more employees: Large
Sample error	*
Data collection	All interviewing was centrally conducted on CATI (Computer Assisted Telephoned Interviewing)
Data	The interviewing took place between 19 March and 14 May 2001.

The 2000 International Benchmarking Study (IBS) was divided into two separate segments: the main body of the report concentrates on international comparisons and results at the regional level within the UK are also included. This year's study maintains that structure. The international survey has been expanded to include Australia and the Republic of Ireland, the former due to its position as one of the leading countries in use of online technologies, the latter due to the rapid growth of its economy in general over the last few years.

* To obtain the overall proportion for any characteristic, the sample proportions in each size-band (or for the UK, each region in each size-band, as the sample for the UK was stratified by both region and size-band) have been weighted by the relative size of the population within each size-band, using the following formula:1

$$\hat{p}_{Tot} = \sum_j \frac{E_j}{E} p_j$$

where \hat{p}_{Tot} = the overall proportion

E_j = employment in the j^{th} size-band (for UK, j^{th} region in size-band)

E = total employment

p_j = sample proportion in j^{th} size-band (for UK, j^{th} region in size-band)

The estimate of the standard error of the sample proportion in each size-band is calculated using the following formula:

$$SE(p_j) = \sqrt{\left(1 - \frac{n_j}{N_j}\right) \frac{p_j q_j}{n_j - 1}}$$

where :

n_j = number of businesses in sample in j^{th} size-band

N_j = number of businesses in population in j^{th} size-band

$q_j = 1 - p_j$

It is worth noting that the standard error for an estimated proportion is at its highest when the proportion in the size-band is around 0.5. Proportions near to 0 or 1 from the same sample have smaller standard errors.

The estimate of the standard error of the overall proportion is calculated using the following formula:

$$SE(\hat{p}_{Tot}) = \sqrt{\sum_j \frac{E_j^2}{E^2} \left(1 - \frac{n_j}{N_j}\right) \frac{p_j q_j}{n_j}}$$

To obtain estimates of the total number of businesses showing a particular characteristic, the sample numbers in each size-band are weighted by the ratio of the number of businesses in the population to the corresponding sample number, using the following formula:

$$\hat{Y}_{Tot} = \sum_j \left(\frac{N_j}{n_j} \sum_k y_{jk}\right), \text{ or alternatively } \hat{Y}_{Tot} = \sum_j N_j p_j$$

where \hat{Y}_{Tot} is the estimated total number of businesses with that characteristic

and $\sum_k y_{jk}$ is the sum over the n_j firms in the j^{th} size-band (for UK, j^{th} region in size-band)

that show that characteristic

The estimate of the standard error of the number of companies with the characteristic in each size-band should in theory be calculated using the following formula:

$$SE(y_j) = \sqrt{N_j^2 \frac{p_j q_j}{n_j - 1} \left(1 - \frac{n_j}{N_j}\right)}$$

The estimate of the standard error of the total number of businesses with the characteristic should in theory be calculated using the following formula:

$$SE(\hat{Y}_{Tot}) = \sqrt{\sum_j N_j^2 \frac{p_j q_j}{n_j - 1} \left(1 - \frac{n_j}{N_j}\right)}$$

Further information available on: <http://www.dti.gov.uk>^[url15]

SCANDINAVIA - METHODOLOGY

Scope	Sweden, Denmark, Norway and Finland
Universe	The sampling unit is businesses with more than 10 employees
Sample dimension	Design: Denmark 2,440 interviews Finland 1,655 interviews Sweden 1,901 interviews Norway 2,712 interviews
Sample method	10-19 employees 19-49 employees 49-99 employees 100 or more employees
Sample error	n. a.
Data collection	The data collection was carried out as postal surveys on a voluntary basis with one reminder in three countries, and two reminders in Sweden
Data	The interviewing took place in Denmark in October 1999, in Norway December 1999, in Finland at the beginning of 2000 and in Sweden in May 2000.

www.stat.fi/tk/yr/tietoyhteiskunta/ict_nordic01.pdf^[tur16]

IDESCAT - METHODOLOGY

Scope	Catalonia
Universe	Catalan firms with more than 10 employees, divided into eight activity sectors.
Sample dimension	Design: 1,600 interviews
Sample method	10-20 employees 21-20 employees 21-200 employees 201 or more employees
Sample error	For a 95% confidence level, $p=q=0.5$, the error is the $\pm 2,5\%$ for the whole sample.
Data collection	Telephone interviews and faxes in some cases
Data	The interviewing took place between 21st October and 13th December 2000.

Further information available on: <http://dursi.gencat.net>^[ur17] | www.idescat.es^[ur18]

INE - METHODOLOGY - STATISTICS ON R&D ACTIVITIES

Scope	Spain
Universe	The statistics cover all companies, public bodies, universities and private non-profit making institutions that carry out systematic activities in scientific research and technological development nationally, in any scientific field, including the social sciences and humanities.
Sample dimension	Design: 5,000 interviews
Sample method	Fewer than 20 employees 19-49 employees 50-199 employees 200-499 employees 500-999 employees 1,000 or more employees
Sample error	n. a.
Data collection	The data collection is carried out as postal surveys, completion being obligatory, with one telephone reminder.
Data	*

* The main reference period of the statistic is the year immediately previous to that in which the statistics were obtained. For characteristic expenditure, the reference period is the natural year. As for personnel, this is measured at a particular moment, to 31 December, to determine the number of persons who work in R+D, and the natural year will also be used to calculate equivalence to complete dedication from the personnel who carry out R+D activities (persons/year).

Further information available on: www.ine.es^[url19]

INE - METHODOLOGY - SURVEY OF TECHNOLOGICAL INNOVATION IN ENTERPRISES

Scope	Spain, except Ceuta and Melilla
Universe	The sampling unit is businesses with more than 10 employees
Sample dimension	Design: 16,000 interviews
Sample method	10-49 employees 50-249 employees 250 and over
Sample error	n. a.
Data collection	The data collection is carried out as postal surveys, completion being obligatory, with one telephone reminder.
Data	n. a.

This study attempts to obtain, as a principal objective, direct information about the process of technological innovation within firms, elaborating indicators that allow us to ascertain the different aspects of the process (economic impact, innovative activities, cost, etc.).

This large-scale study, apart from providing valuable and varied information on the process of technological innovation, provides the basic framework for later specific studies about precise aspects of the innovation process.

Finally, using an internationally widely-accepted methodology permits achievement the objective of international comparability of the outcomes obtained and brings forward our national experience in the study of the innovation.

Further information available on: www.ine.es^[url20]

EUSTAT - METHODOLOGY

Scope	The three provinces of Euskadi (the autonomous Basque region)
Universe	Group of business establishments of any size and any activity sector that carries out business in Euskadi, except for the primary sector, domestic service and extraterritorial Institutions.
Sample dimension	Design: nearly 7,100 interviews
Sample method	Five unspecified sizes.
Sample error	Relative sampling error at 95% confidence.
Data collection	The information was collected through personal interviews or by telephone contact, by means of a specific questionnaire, sent by post.
Data	The interviewing took place in third quarter of 2000.

Further information available on: www.eustat.es^[url21]

APPENDIX II. TABLES AND GRAPHICS

DTI

Figure 2.1 Model of e-adoption ladder



Adapted from Cisco-led Information Age Partnership study on e-commerce in small business

Figure 2.2 Percentage of businesses in each country that say ICTs have changed or transformed business

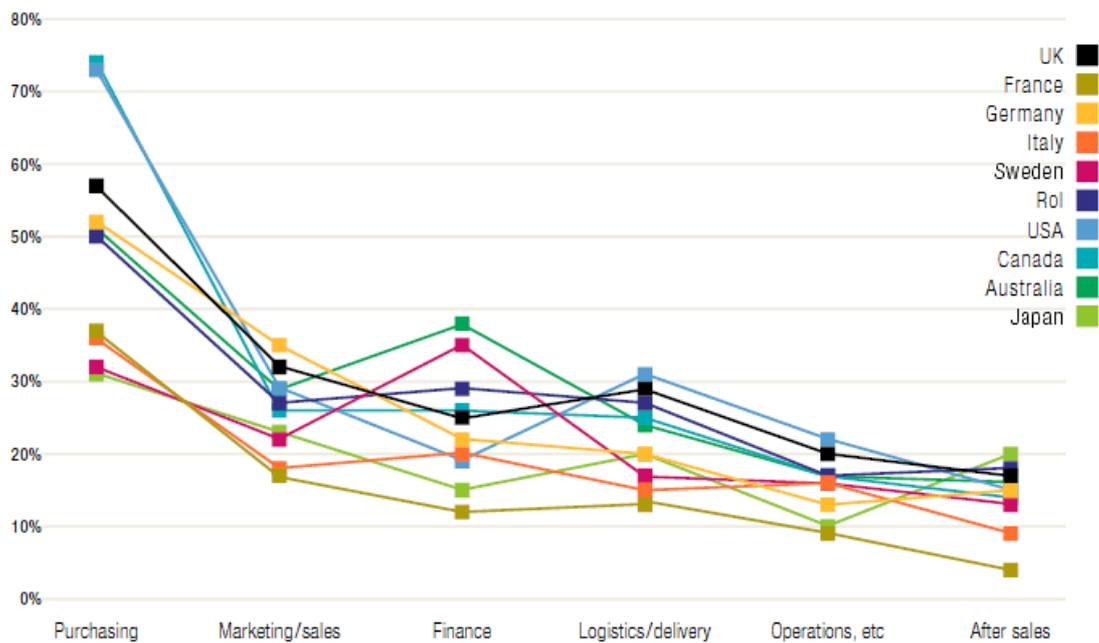
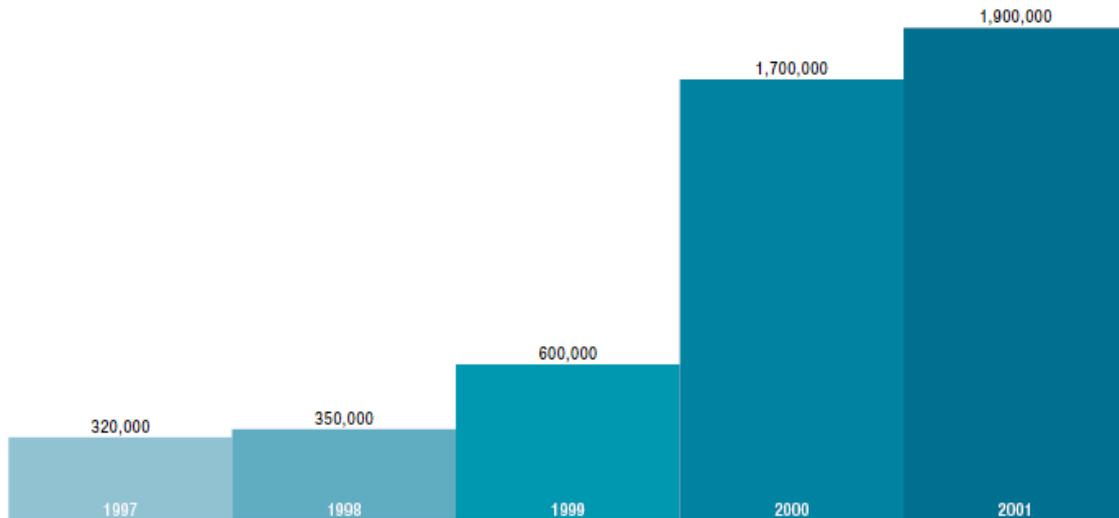


Figure 3.1/Fi

UK SMEs that are connected

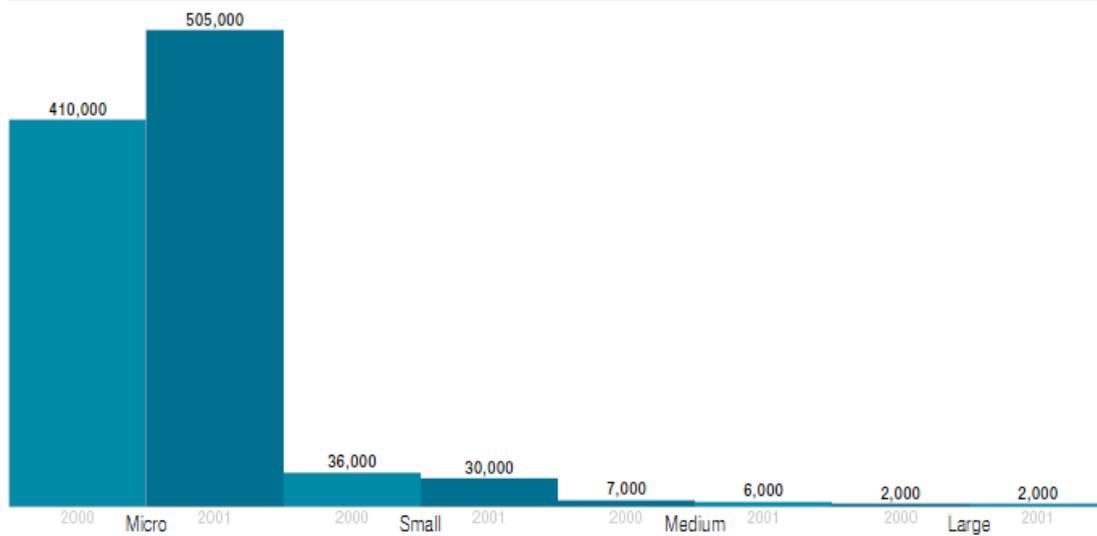


Base: All respondents weighted by number of enterprises.
 Note: Only micro, small and medium businesses.

Figure 3.3

UK businesses trading online by size-band, 2000 and 2001

Absolute number



Percentage (%)

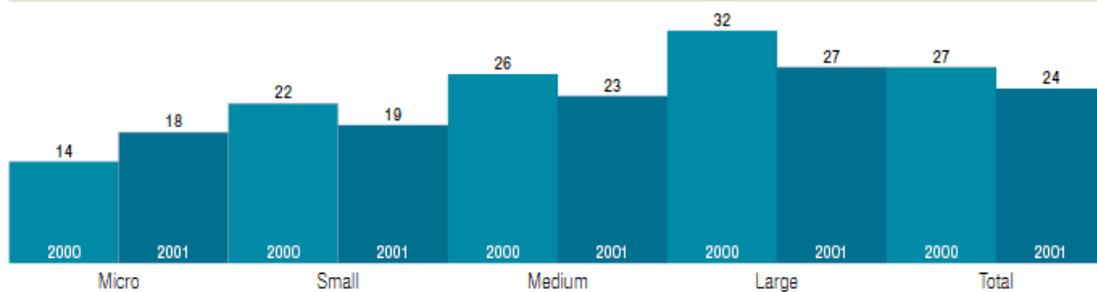
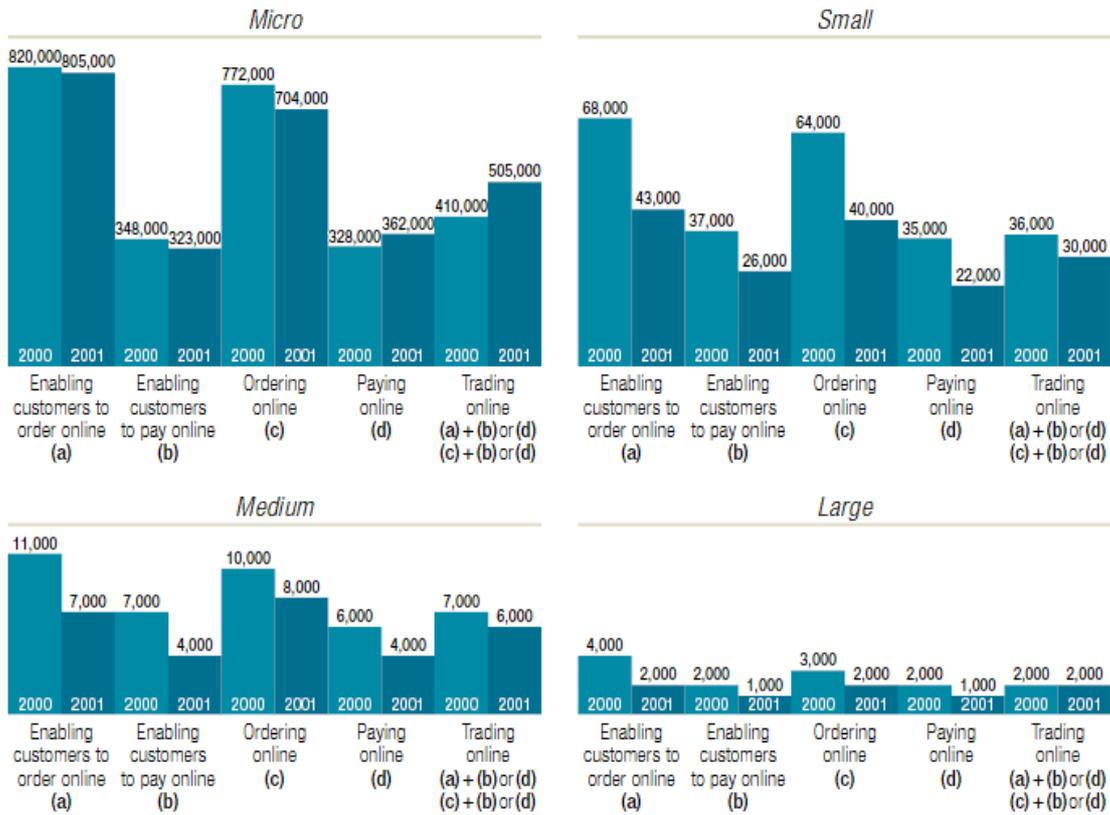
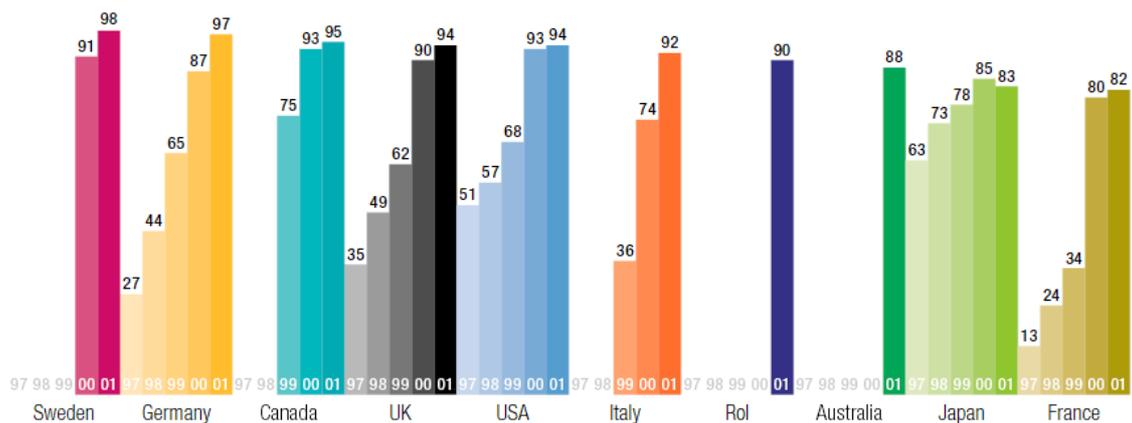


Figure 3.4 Number of businesses in the UK involved in e-commerce, 2000 and 2001



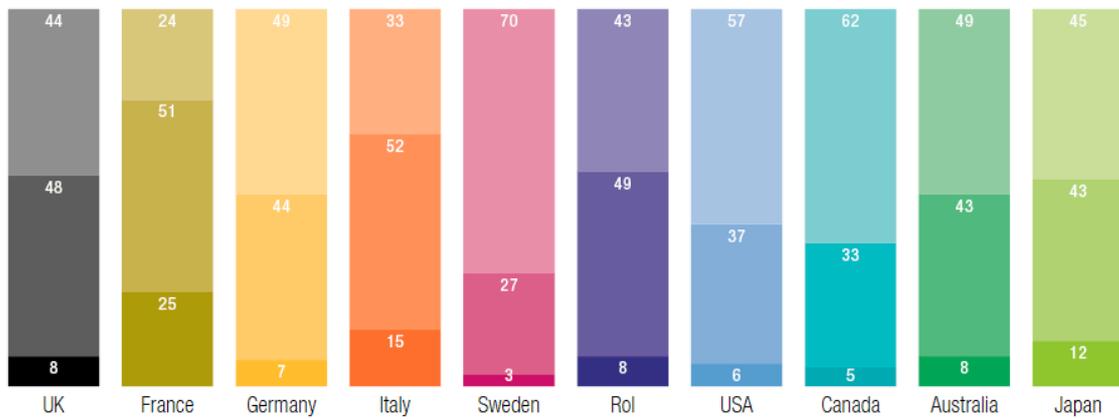
*This is explained in the Introduction and in more detail at Appendix A.

Figure 4.1/C1.1a Businesses with access to the Internet, 1999 to 2001 (%)



Base: All businesses who pay online, weighted by number of employees.
 Note: Source for 1997, 1998 and 1999: Spectrum/NOP, International Benchmarking Study,
 Source for 2000: Romtec, International Benchmarking Study.

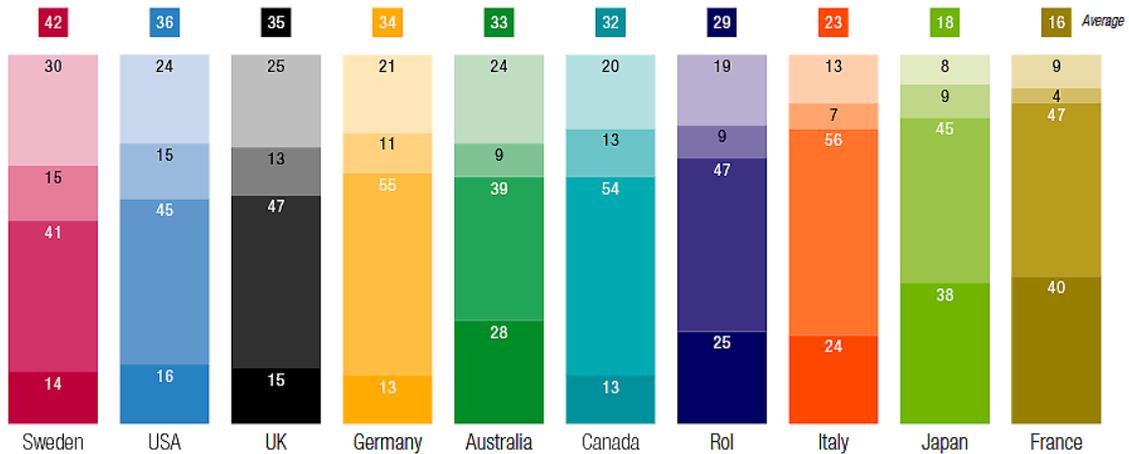
Figure 4.2/C.2 Date connected to the Internet (%)



Base: All businesses with access to the Internet weighted by number of employees.

Less than 1 year ago
 Between 1 and 3 years ago
 Over 3 years ago

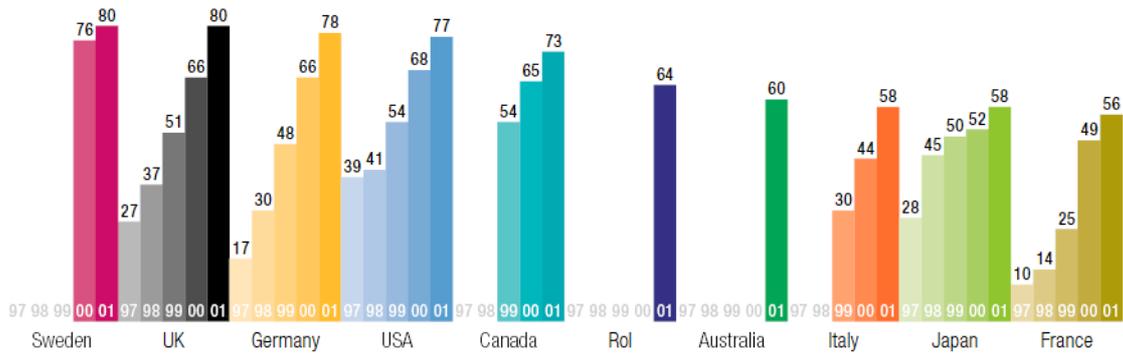
Figure 4.5/C6 Percentage of employees making daily use of external e-mail for external communication (%)



Base: All businesses weighted by number of employees.

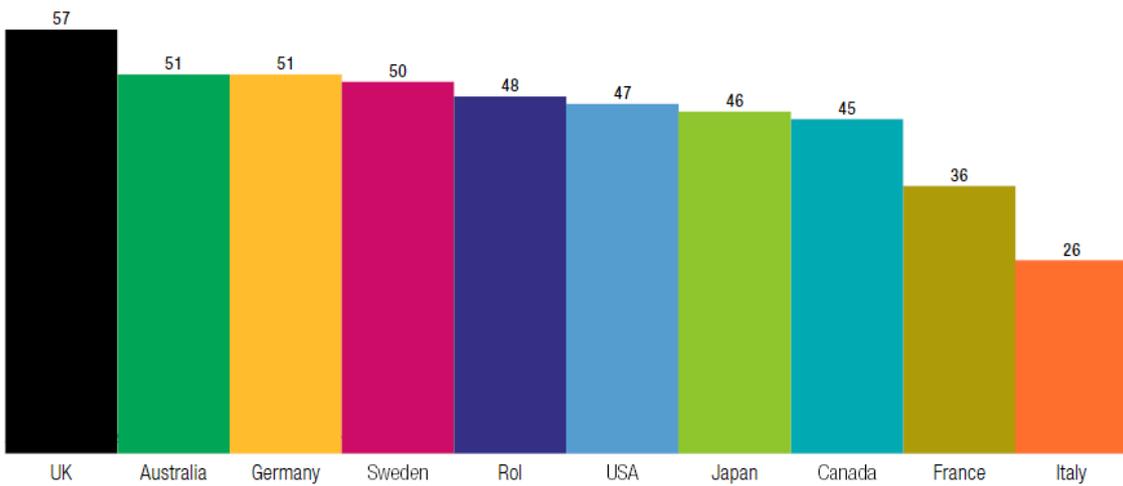
0%
 1-40%
 41-60%
 61-100%

Figure 4.6/ C1.2a *Businesses with a website, 1997 to 2001 (%)*



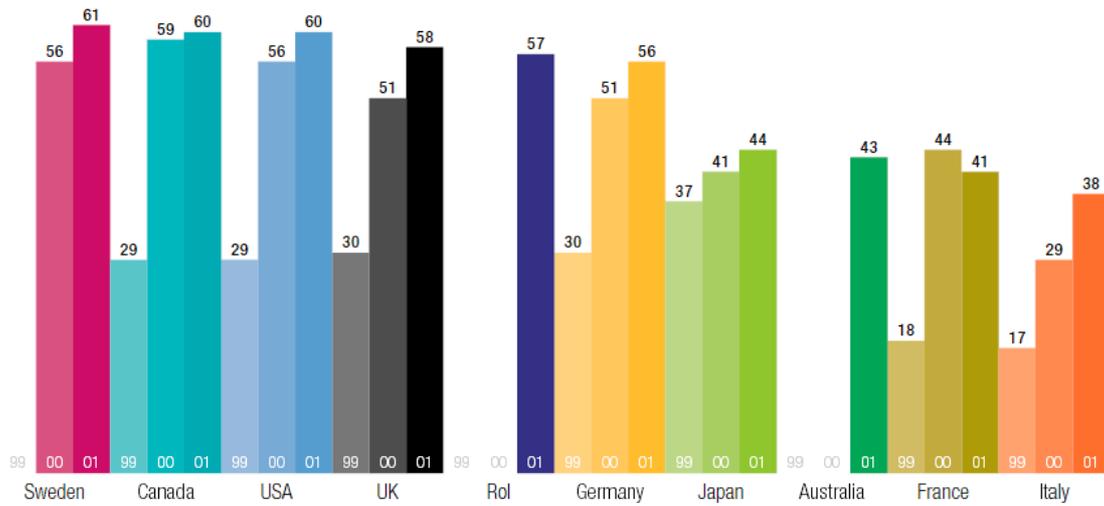
Base: All businesses weighted by number of employees.
 Note: Source for 1997, 1998 and 1999: Spectrum/NOP, International Benchmarking Study,
 Source for 2000: Romtec, International Benchmarking Study.

Figure 4.7/ C9 *Businesses that evaluate the effectiveness of their website (%)*



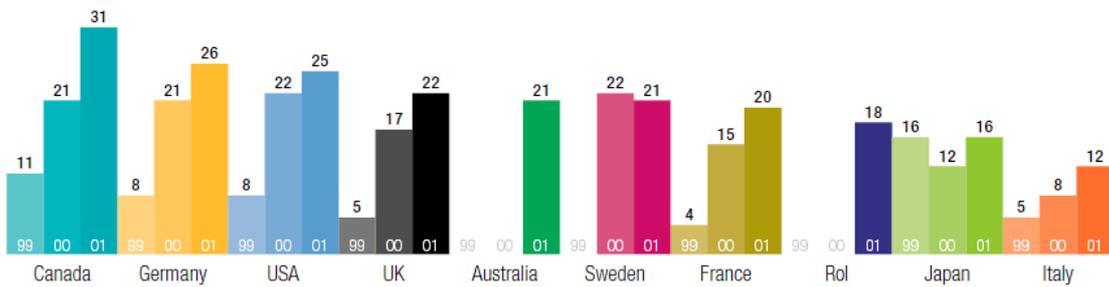
Base: All businesses with a website, weighted by number of employees.

Figure 4.9/C1.4a *Businesses with an Intranet, 1999 to 2001(%)*



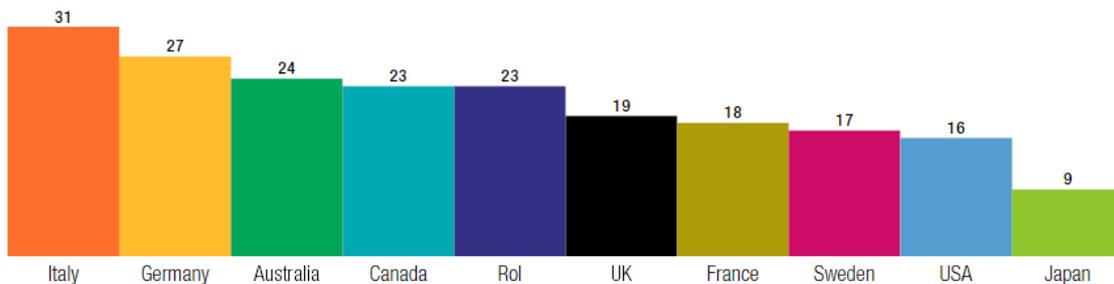
Base: All businesses weighted by number of employees.
 Note: Source for 1999: Spectrum/NOP, International Benchmarking Study;
 Source for 2000: Romtec, International Benchmarking Study.

Figure 4.10/C1.5a *Businesses with an Extranet 1999 to 2001(%)*



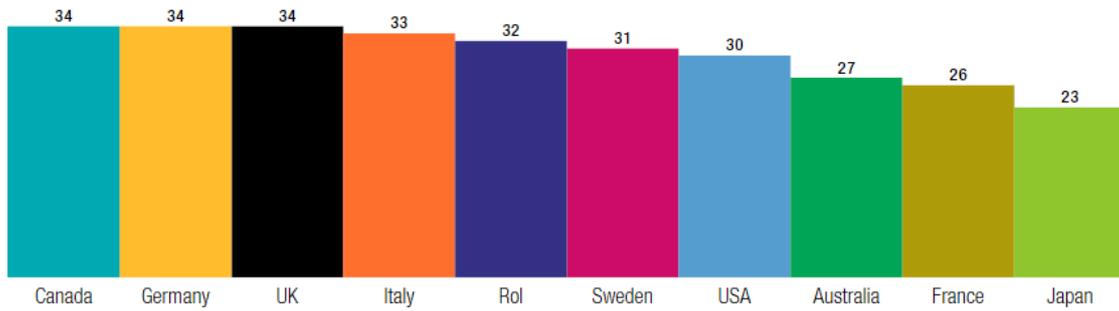
Base: All businesses weighted by number of employees.
 Note: Source for 1999: Spectrum/NOP, International Benchmarking Study;
 Source for 2000: Romtec, International Benchmarking Study.

Figure 5.3/C10.5a *Businesses that provide information on delivery schedules and delivery costs externally using ICTs (%)*



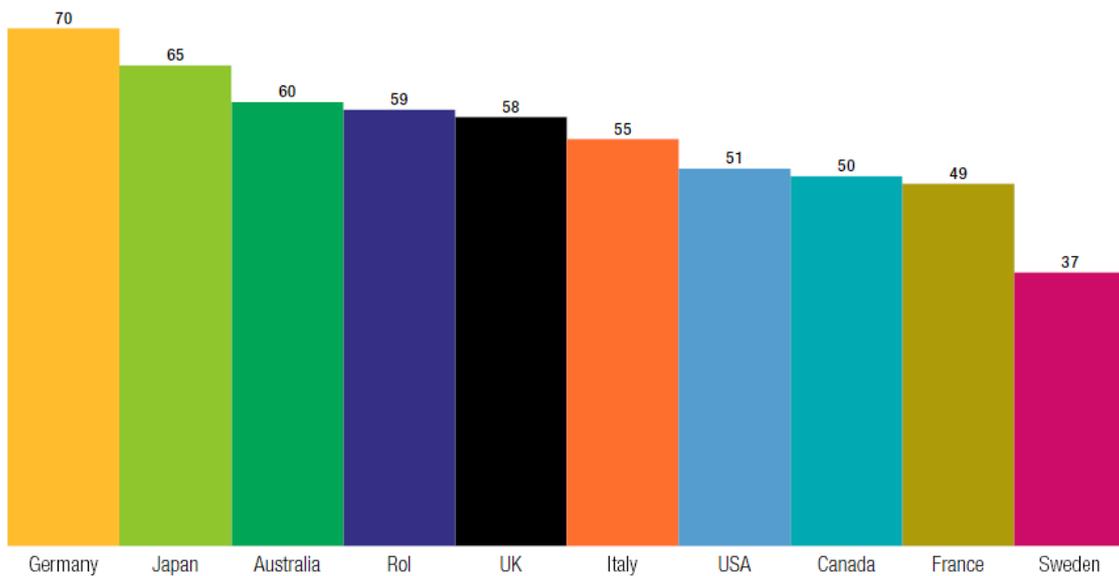
Base: All businesses using an online technology, weighted by number of employees.

Figure 5.4/C10.6a *Businesses that provide information on after-sales services externally using ICTs (%)*



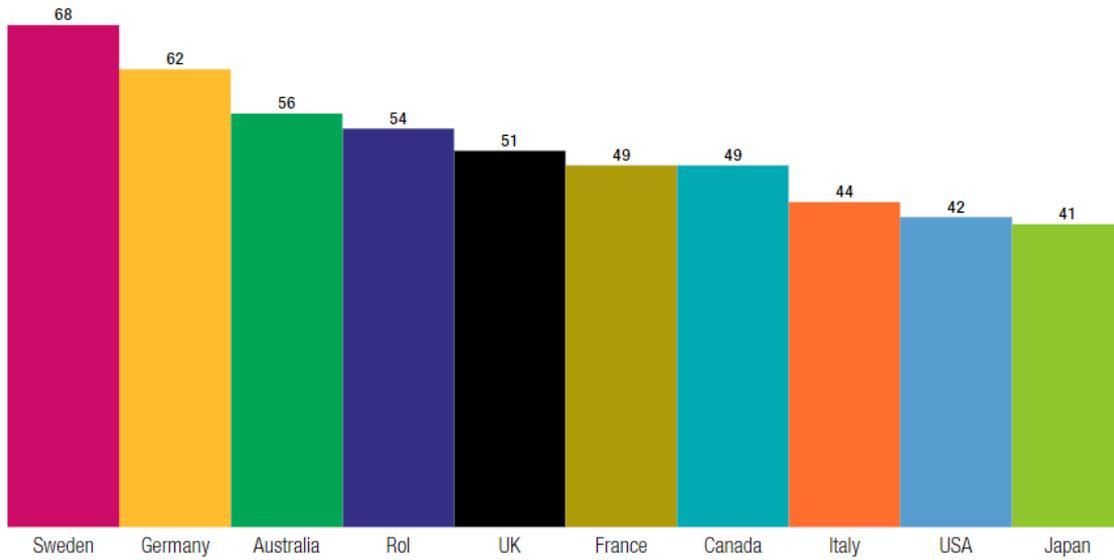
Base: All businesses using an online technology, weighted by number of employees.

Figure 5.10/C11.1a *Businesses that use ICTs to collect information on market research or other marketing information (%)*



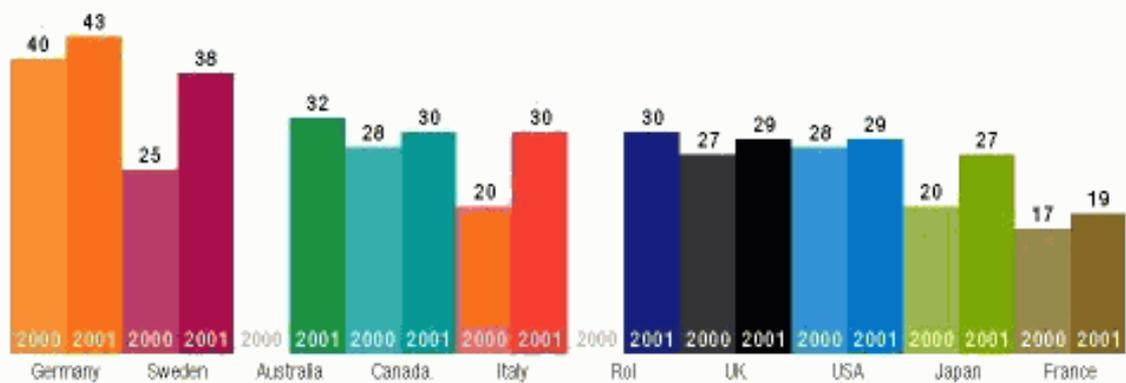
Base: All businesses using an online technology, weighted by number of employees.

Figure 5.11/C11.3a *Businesses that use ICTs to collect banking, investment or financial information (%)*



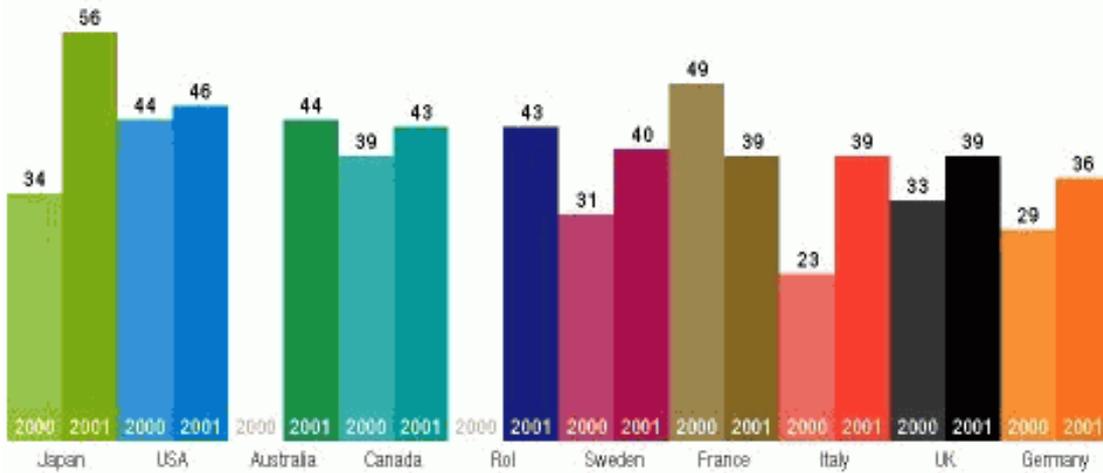
Base: All businesses using an online technology, weighted by number of employees.

Figure 6.1/D1.1a *Businesses that allow customers to order goods and services online, 2000 and 2001 (%)*



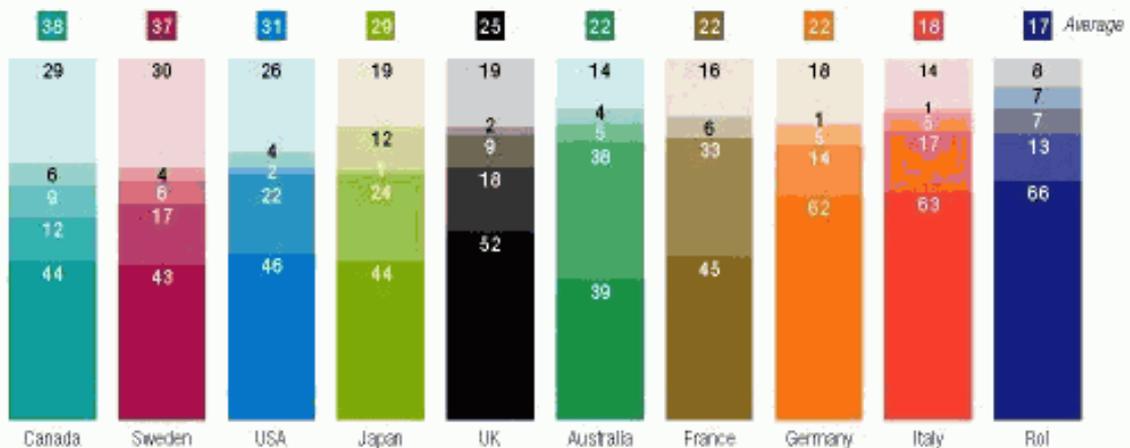
Base: All businesses, weighted by number of employees.

Figure 6.2/PF Percentage of businesses receiving 10% or more of the value of sales through online ordering (%)



Base: All businesses weighted by number of employees.

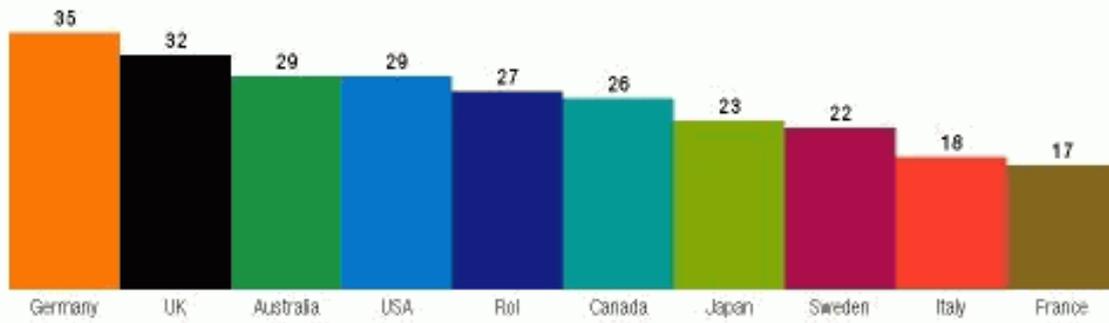
Figure 6.4/D4 Percentage of online orders made by households (%)



Base: All businesses allowing customers to order online, weighted by number of employees.

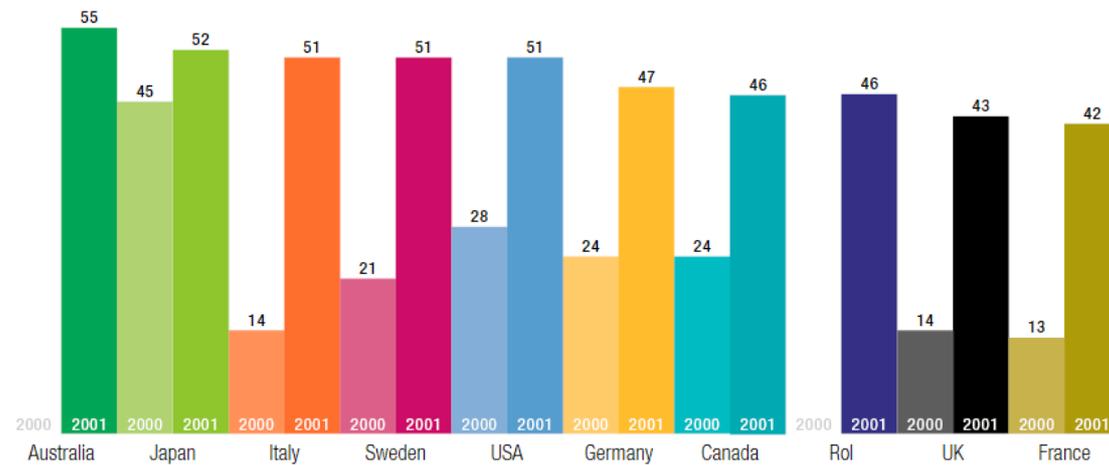


Figure 6.7/D6.1a *Businesses that use ICTs to change or transform the way marketing and sales activities are undertaken(%)*



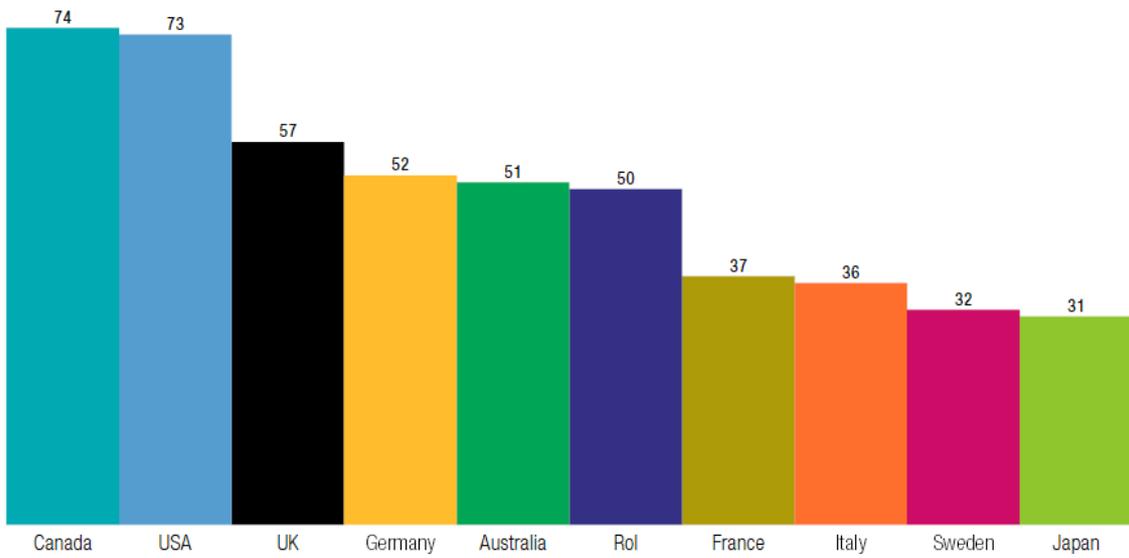
Base: All businesses using an online technology, weighted by number of employees.

Figure 7.2/G1.4a *Percentage of businesses ordering more than 20% by value of supplies using ITCs (%)*



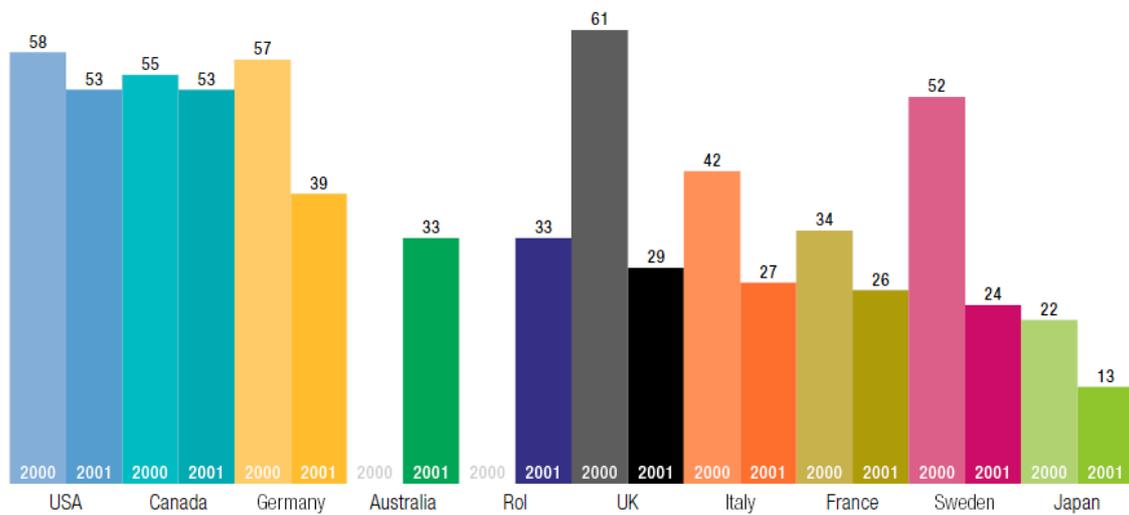
Base: All businesses, weighted by number of employees.

Figure 7.6/ G1 *Businesses that use ICTs to change or transform the way purchasing activities are undertaken (%)*



Base: All businesses using an online technology, weighted by number of employees.

Figure 7.7/ G1.2a *Businesses that use ICTs to identify suppliers or gather other pre-purchase information, 2000 and 2001 (%)*



Base: All businesses, weighted by number of employees.

Figure 8.1/E1.1a

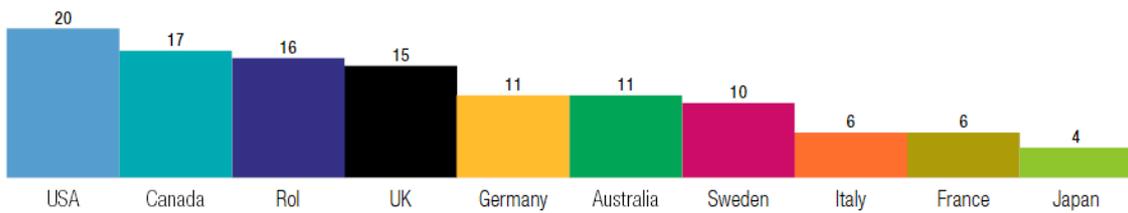
Businesses that use ICTs to change or transform the way goods and services are provided (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 8.3/E1.3a

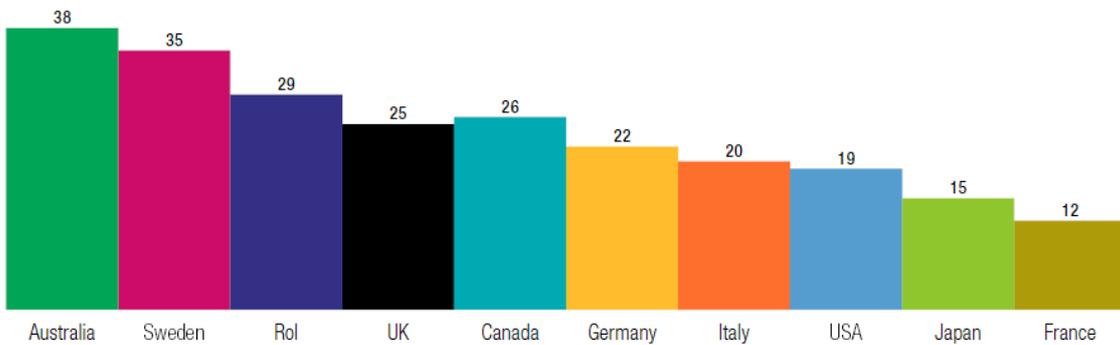
Businesses that use ICTs to improve the speed of delivery (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 8.7/I2.1a

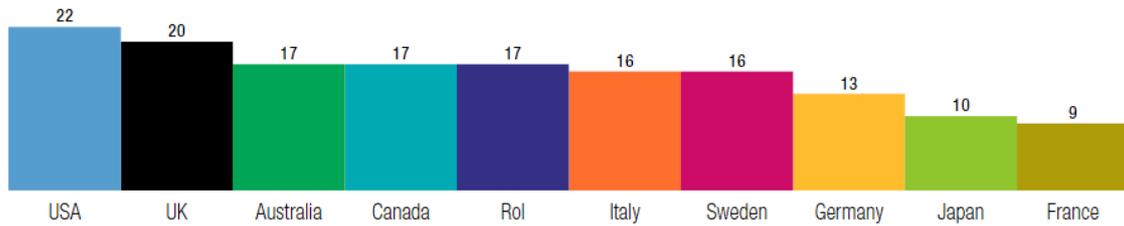
Businesses that use ICTs to change or transform the way they undertake financial activities (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 8.11/H1.1a

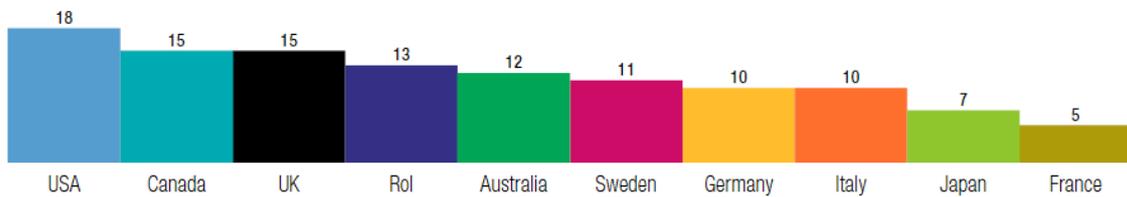
Businesses that use ICTs to change or transform the way they produce their goods and services (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 8.12/H1.1b

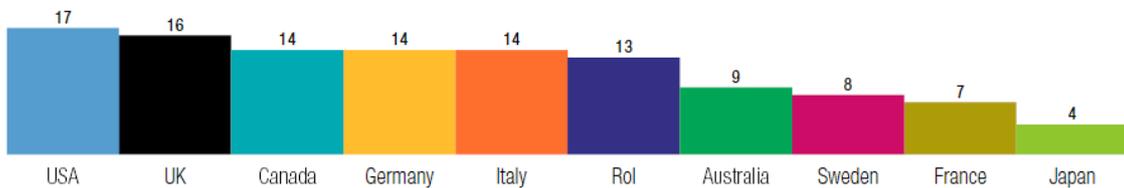
Businesses that use ICTs to enhance flexibility in operations and production methods (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 8.14/H2.3

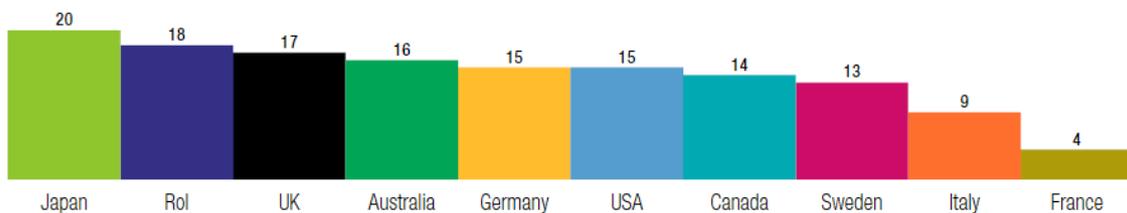
Businesses that use ICTs to collaborate between own design systems and those of partners (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 8.17/F1.1a

Businesses that use ICTs to change or transform after-sales services (%)



Base: All businesses using an online technology, weighted by number of employees.

Figure 9.15 Attitudes to online technologies (all countries)

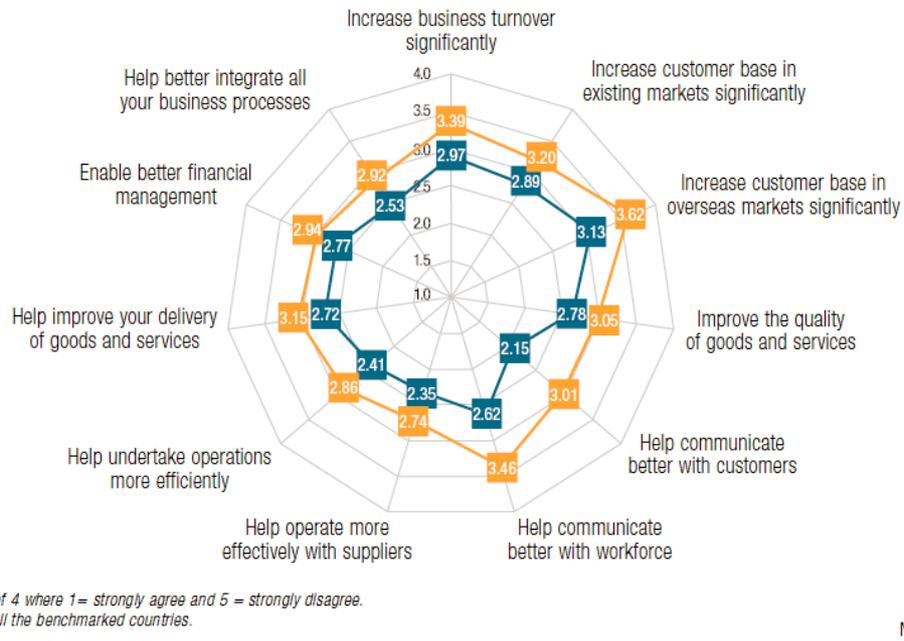
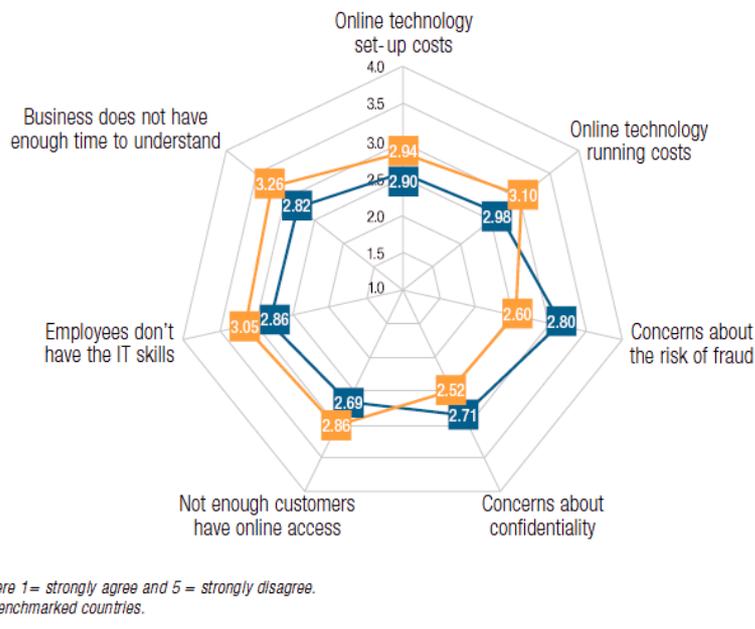
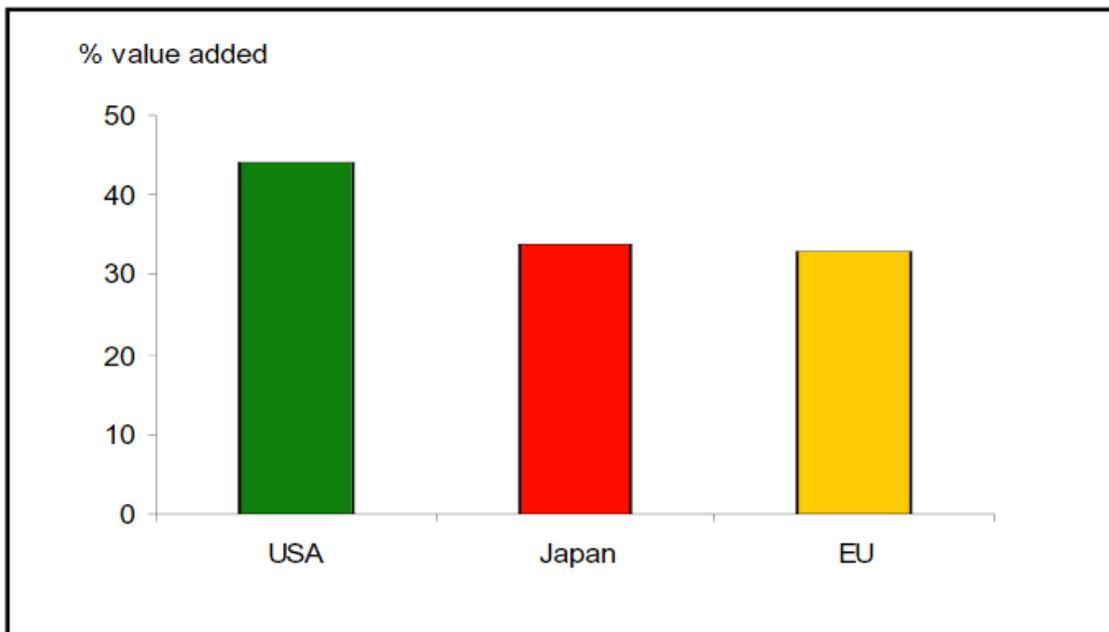


Figure 9.22 Barriers to (development of online technologies (all countries)



UNICE

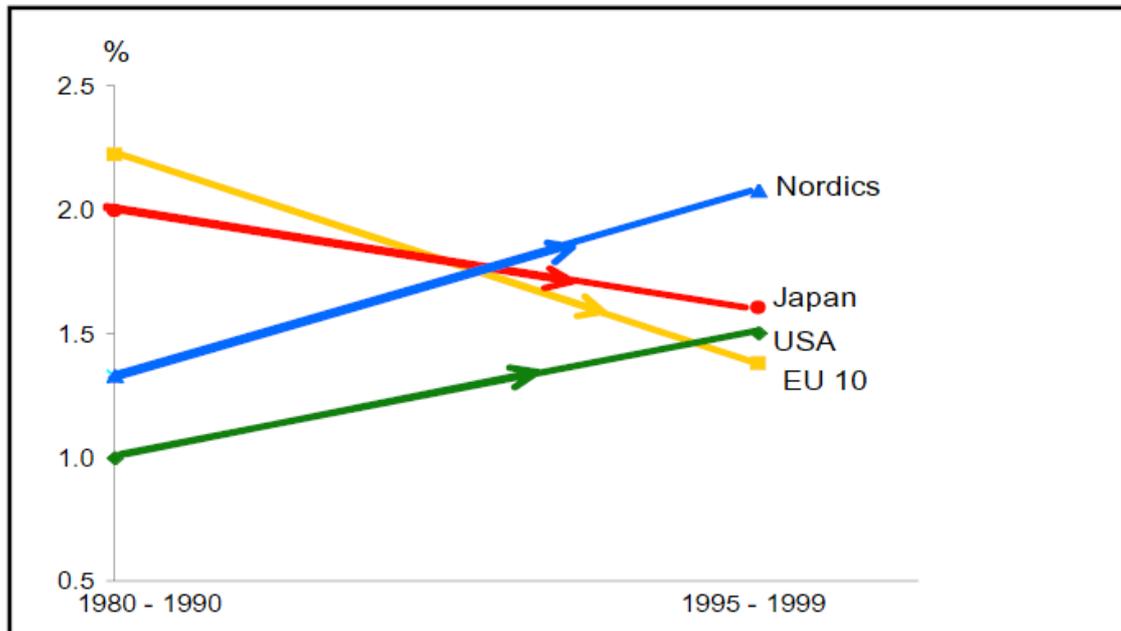
Indicator 3: *The share of knowledge-intensive sectors in total value-added, late 1990s*



Source: OECD STI (Science and Technology Indicators) Outlook, 2000.

Note: OECD definition of knowledge-intensive: high-tech + medium-high-tech + communications services + finance, insurance and other business services + community, social and personal services.

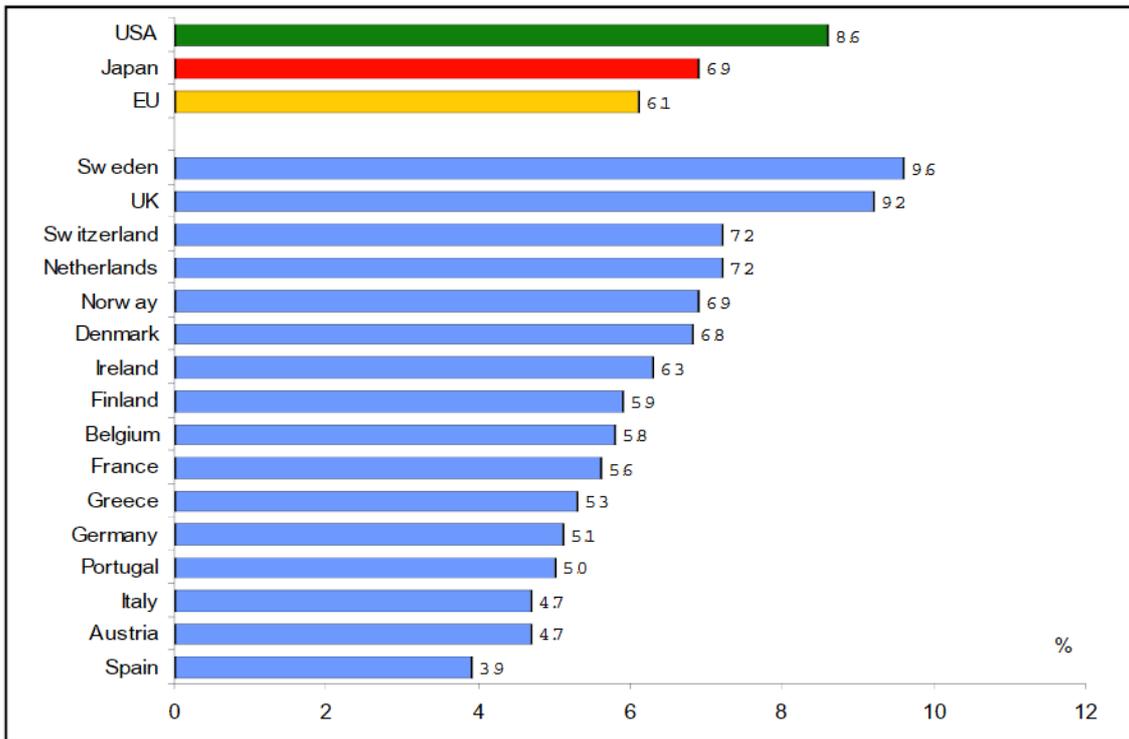
Indicator 4: Evolution of total factor productivity growth



Source: OECD, 2000.

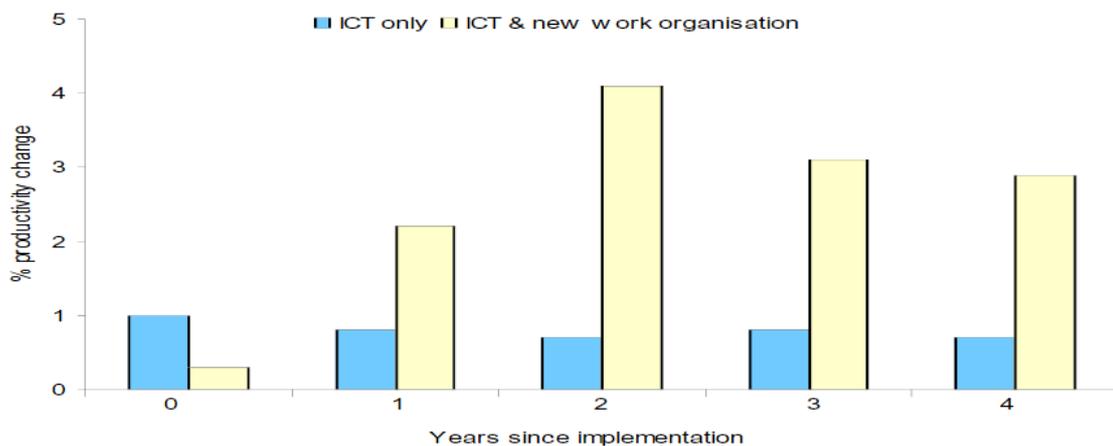
Note: Nordics refers to Denmark, Finland, Norway, Sweden.

Indicator 5: Total ICT expenditure as % GDP, 1999



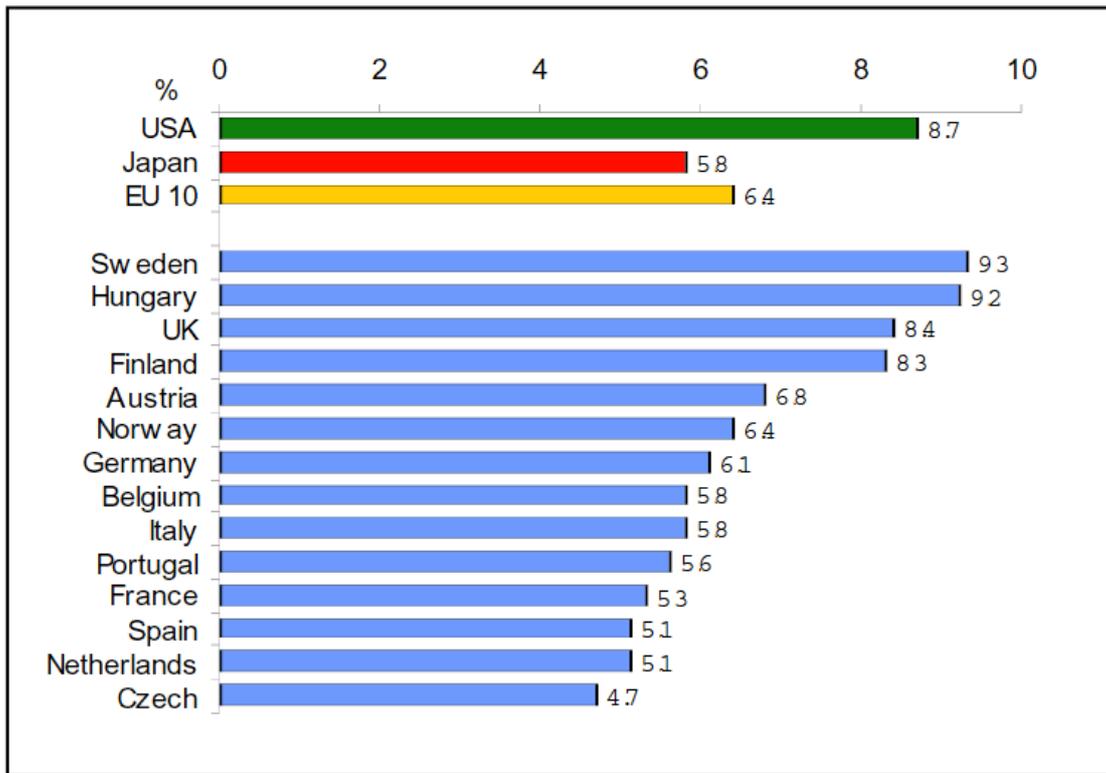
Source: IDC "Digital Planet".

Productivity gains of ICT with and without organisational change



Source: European Commission, 2000, based on a 1996 Danish survey of 1000 manufacturing companies.

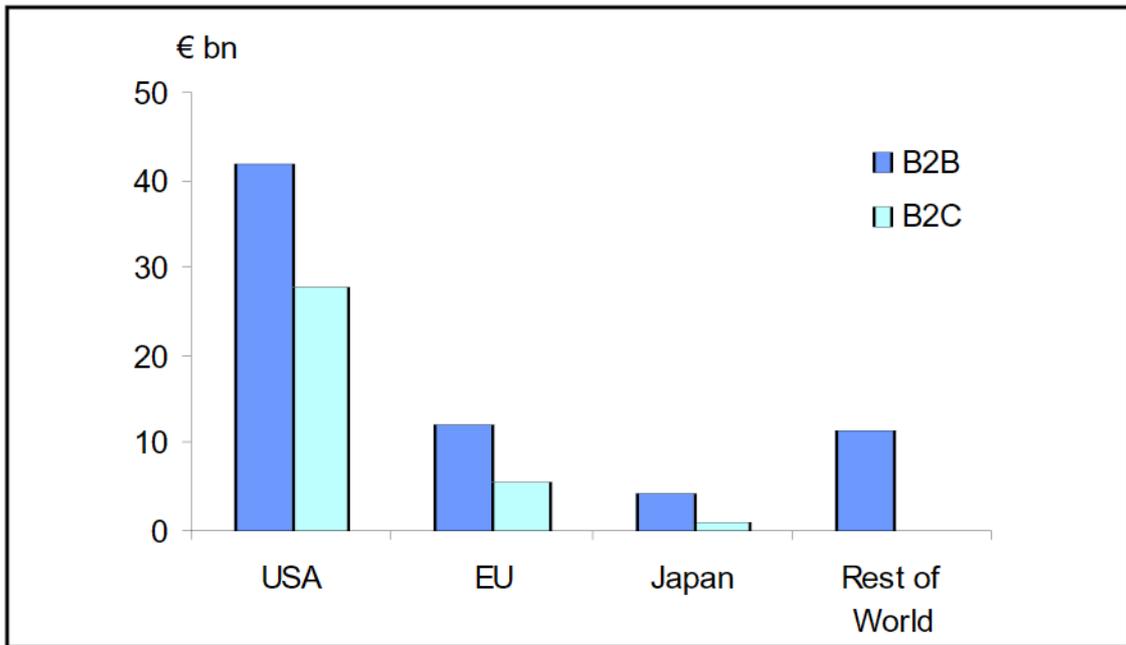
Indicator 6: Share of ICT value-added in total business sector (%) 1997



Source: OECD, 2000 (Spain: CEOE).

Note: Spain is not included in EU10.

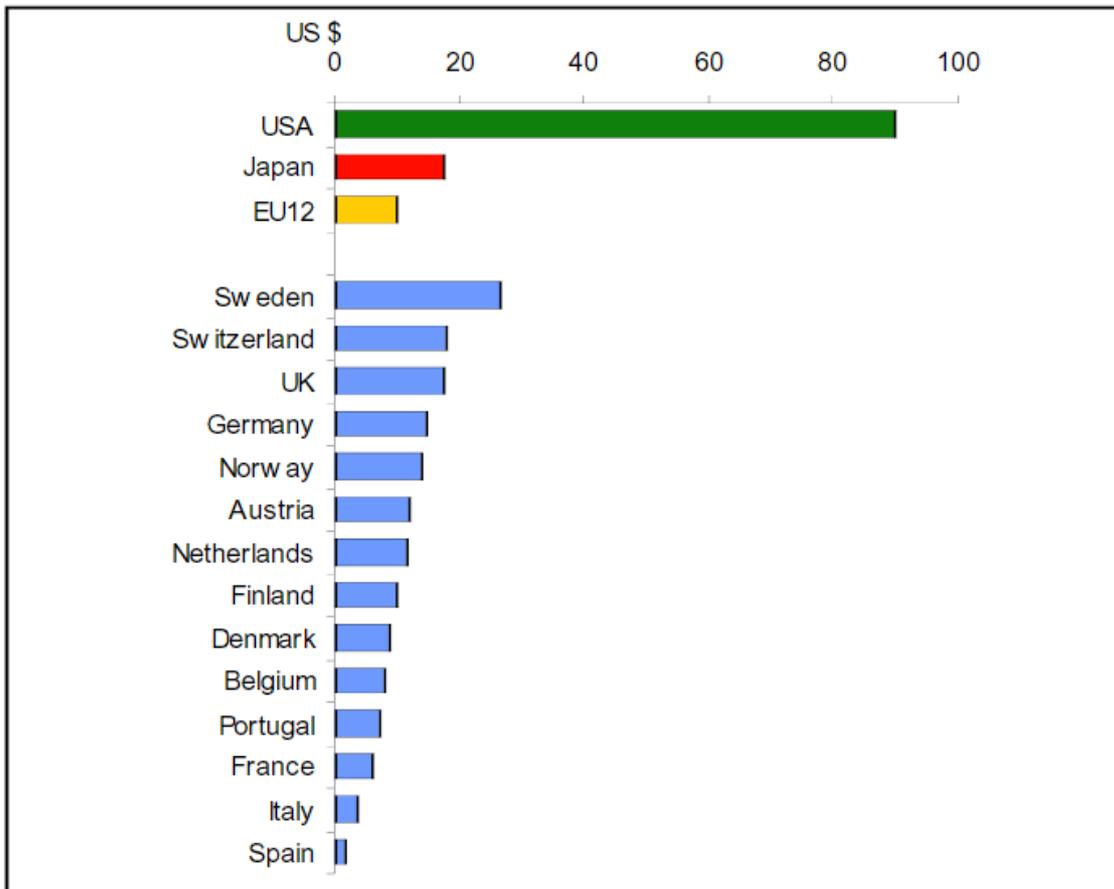
Indicator 7: e-commerce in major regions, 1999



Source: Booz-Allen & Hamilton, 2000.

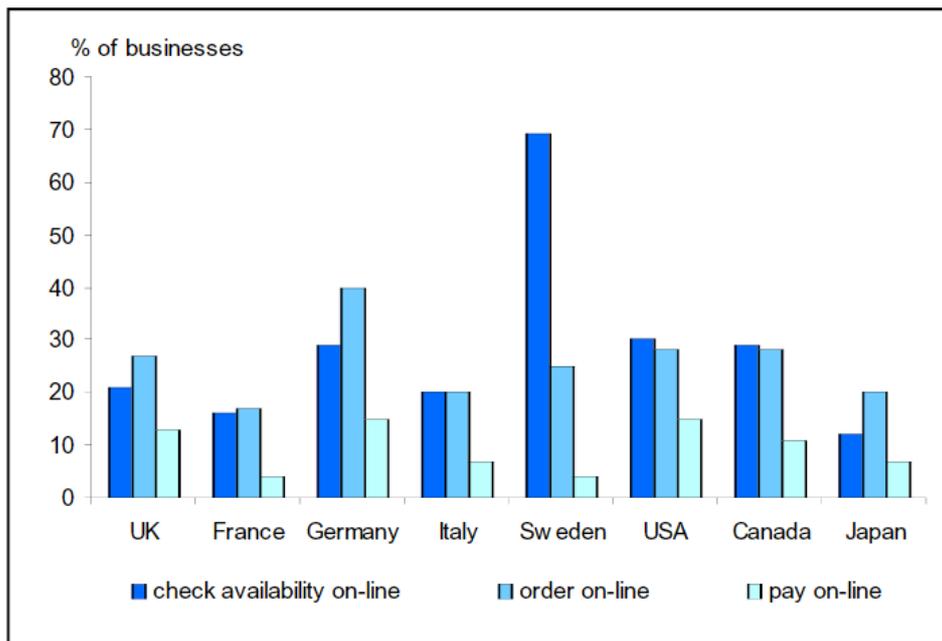
Note: Rest of World shows B2B+B2C combined.

Indicator 8: Value of business-to-consumer transactions per capita, 1999



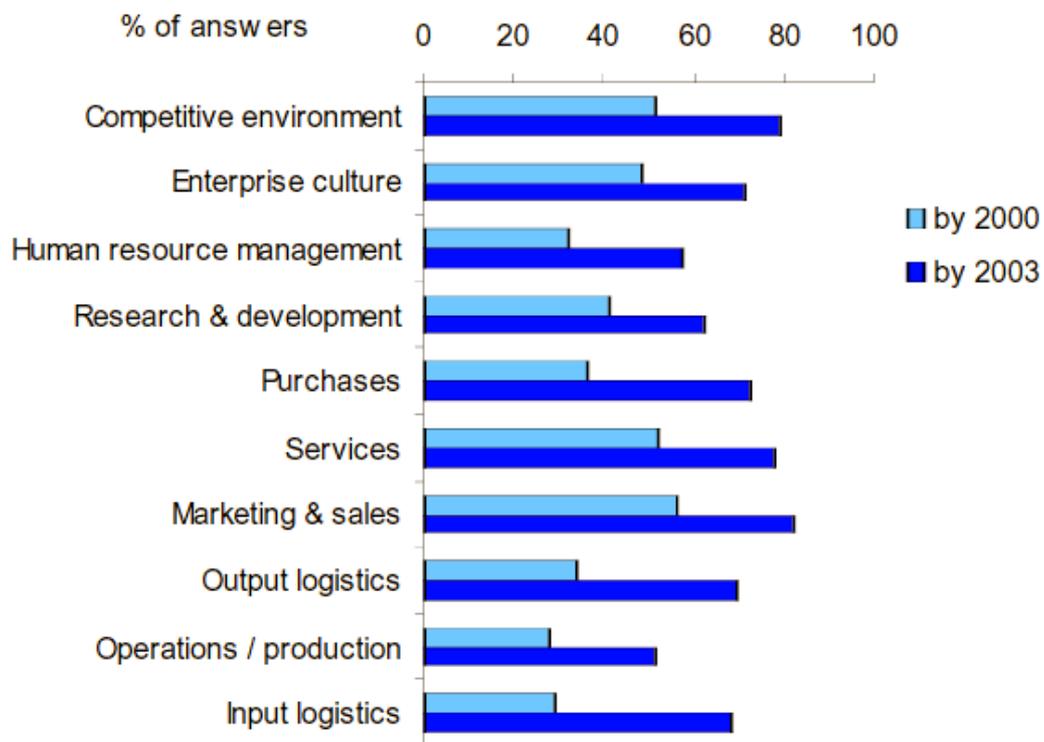
Source: OECD STI Department, 2000.

Indicator 9: Percentage of businesses that allow business-to-customer interaction on-line



Source: UK DTI, 2000.

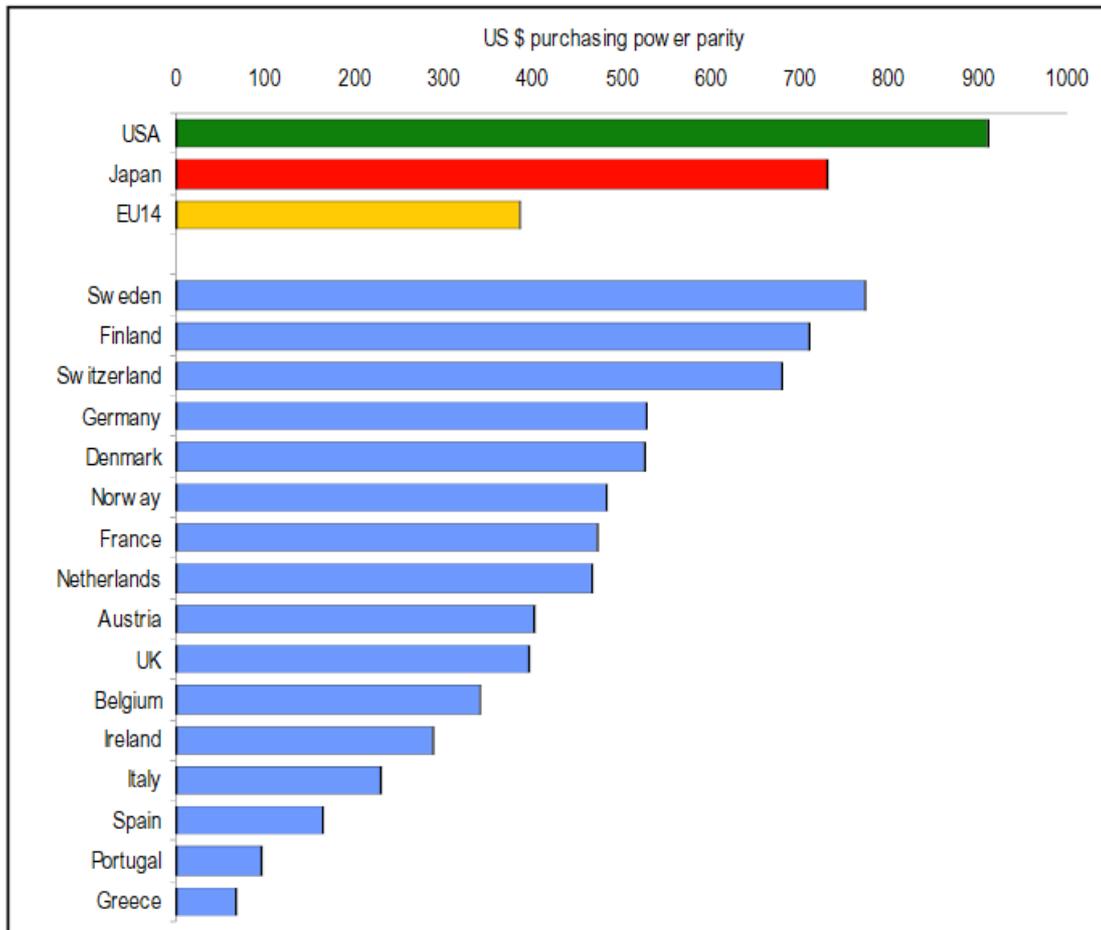
Impact of Internet technology on the value chain: percent of enterprises who believe that the Internet has brought or will bring a medium to significant change by 2003.



Source: In Sites 2000, FEB-VBO.

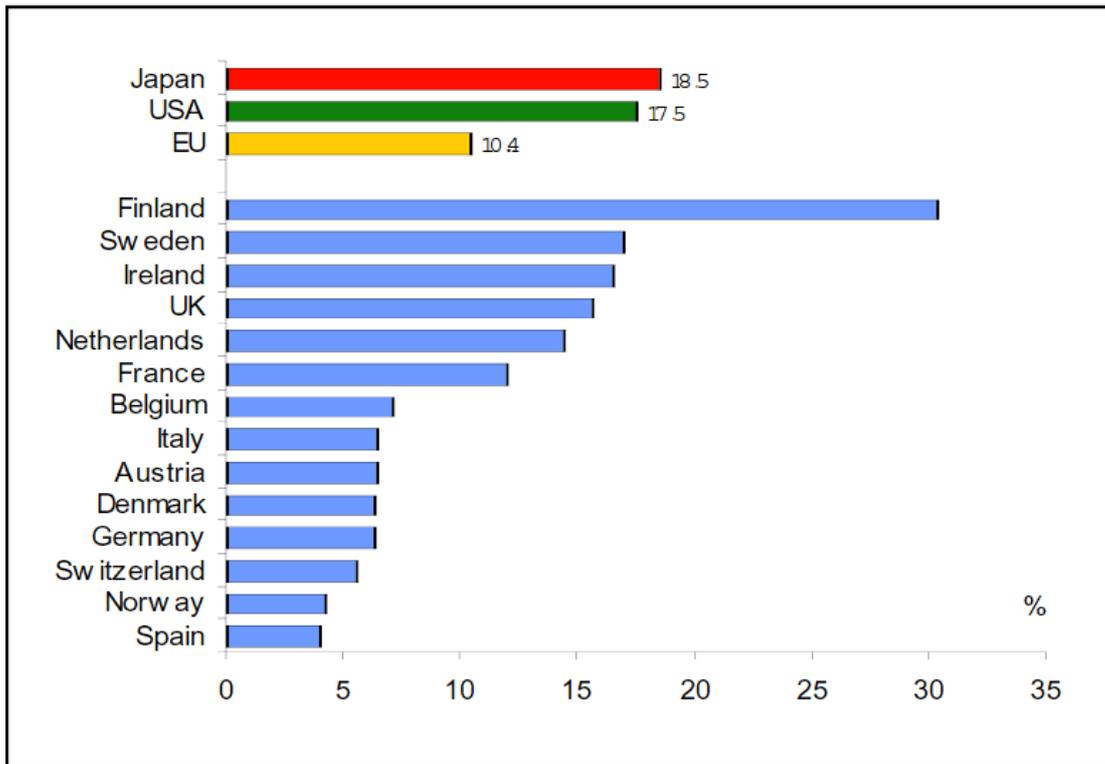
Note: Survey of top management of Belgium-based companies (163 respondents).

Indicator 14: *Research and Development expenditure per capita, 1998*



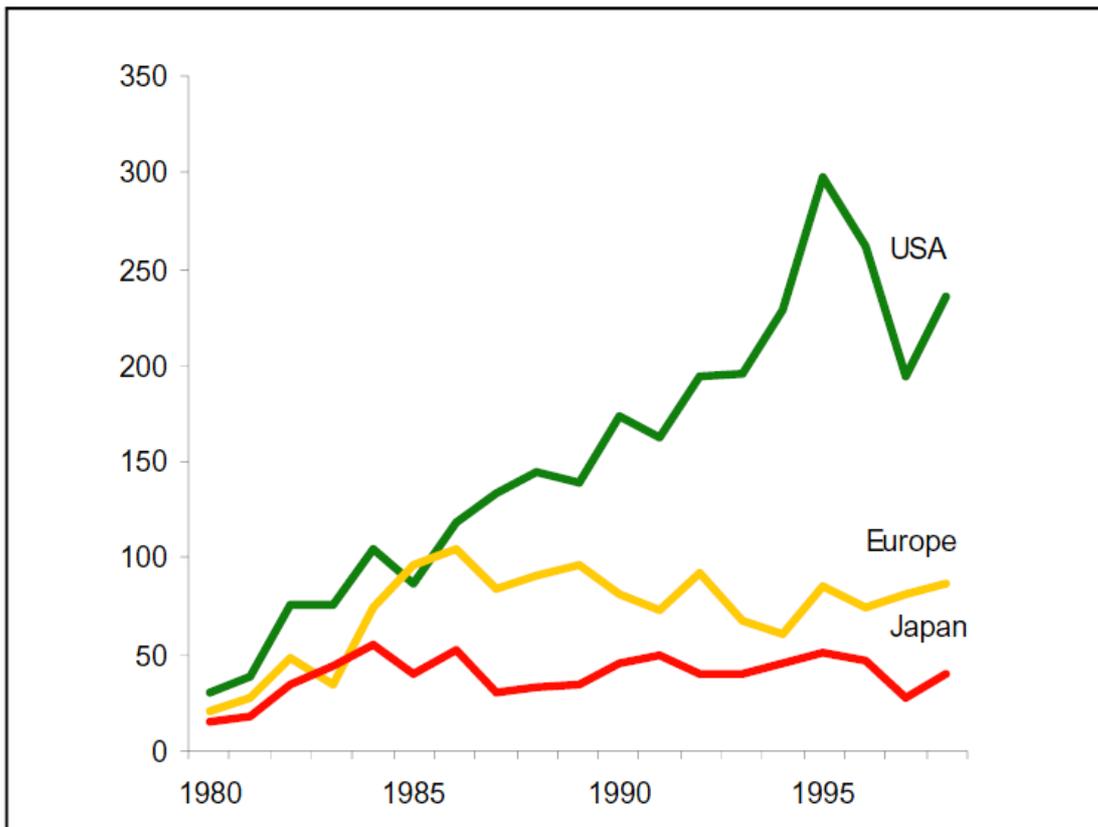
Source: OECD, STI, 2000.

Indicator 15: Share of ICT patents in total awarded by US Patents
and Trademarks Office, 1999



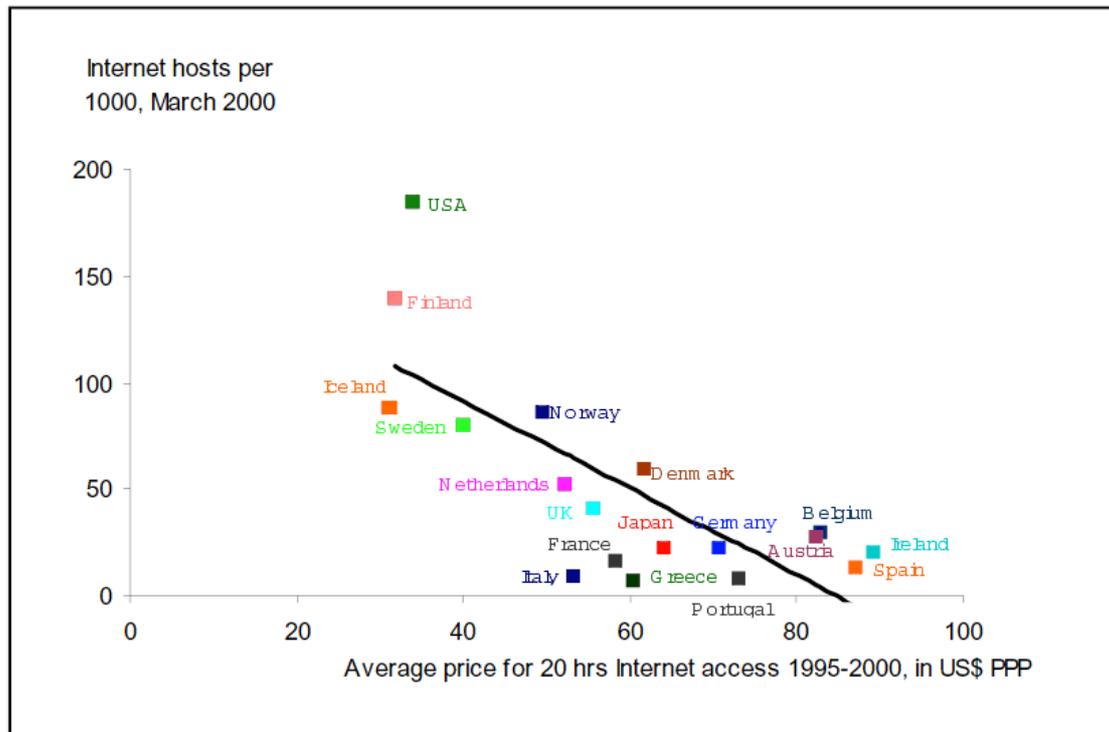
Source: OECD STI 2000.

Indicator 16: Number of strategic ICT technological alliances



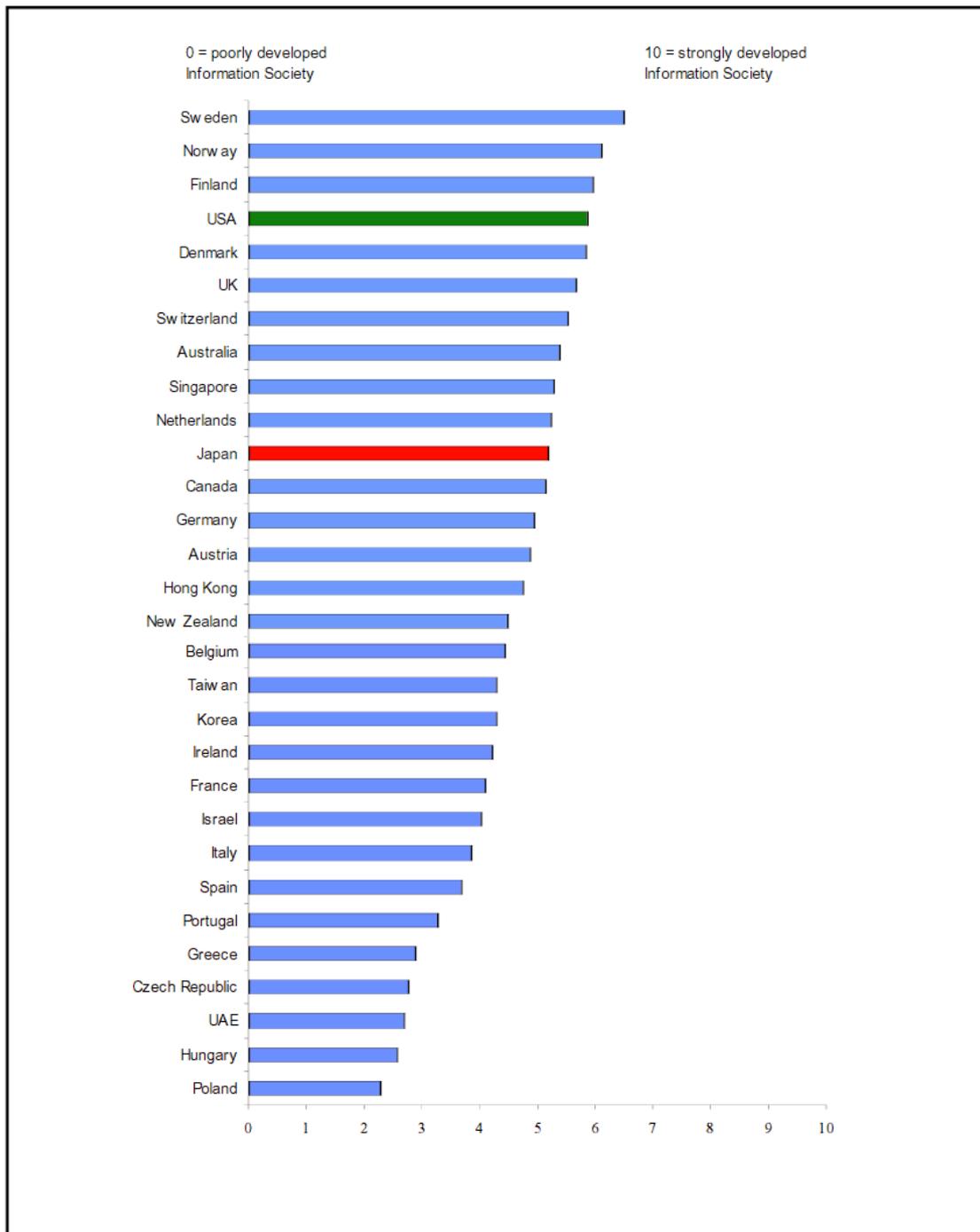
Source: National Science Board "Science and Engineering Indicators 2000"/Merit.

Indicator 17: Price of Internet access and Internet host penetration, 1995-2000



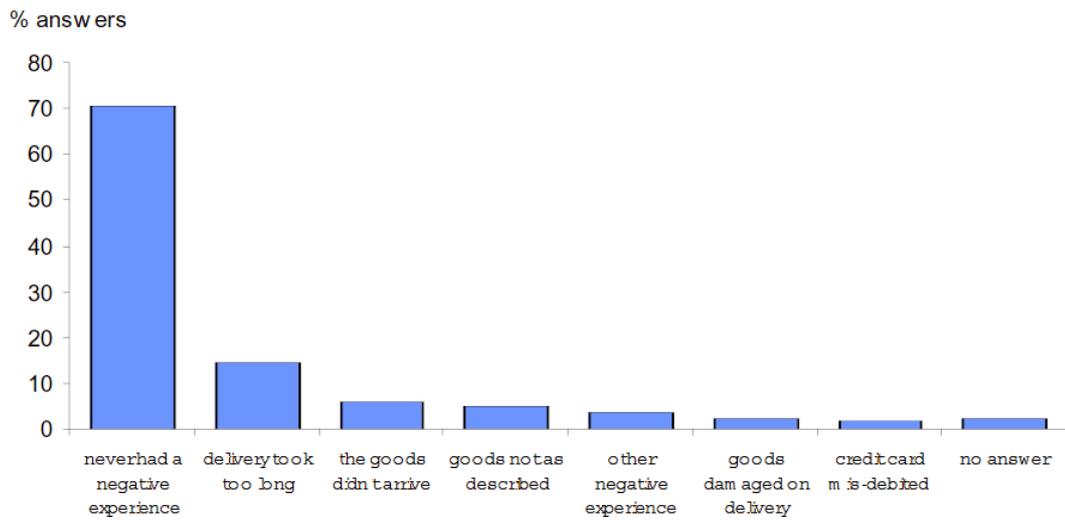
Source: OECD, Telecordia Technologies, 2000.

Indicator 20: Information society infrastructure index



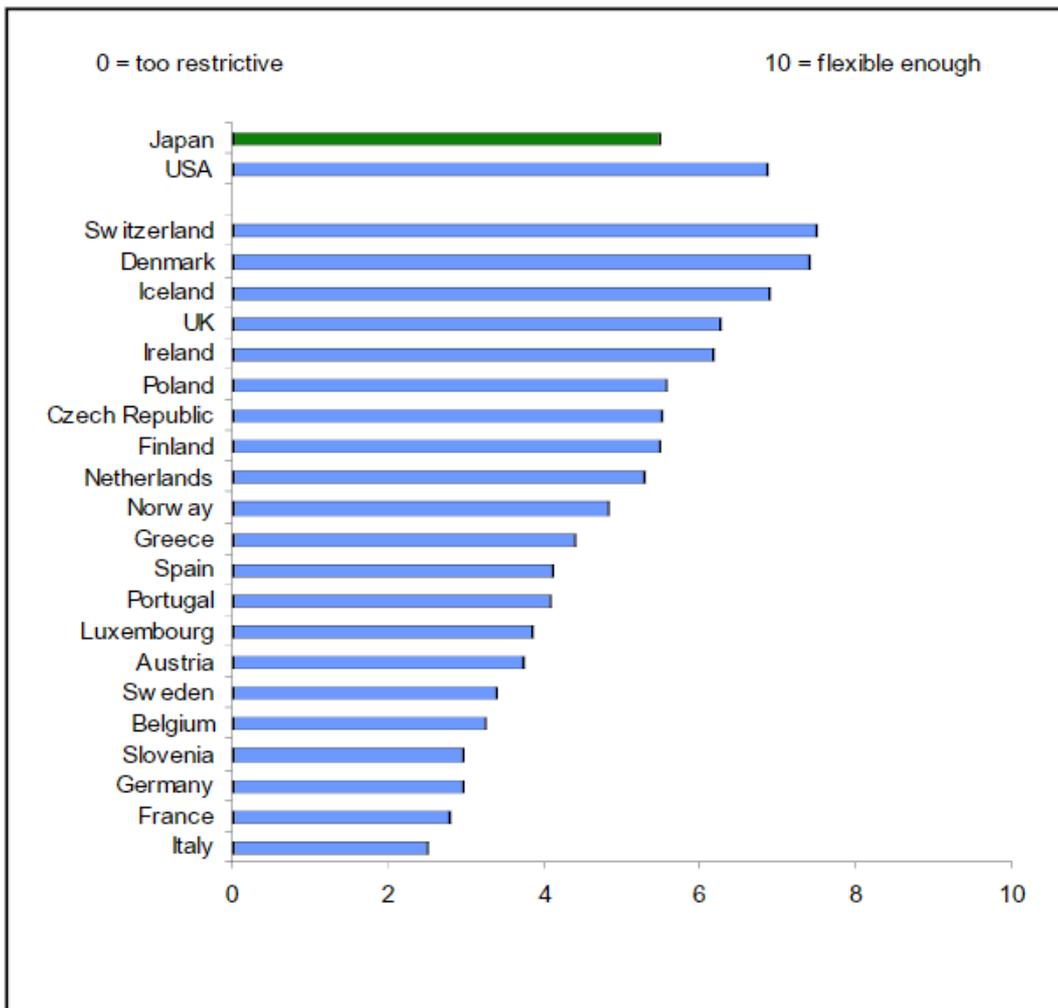
Source: IDC, 2000.

Box 5: Experiences of purchasing on-line, EU 15, October 2000



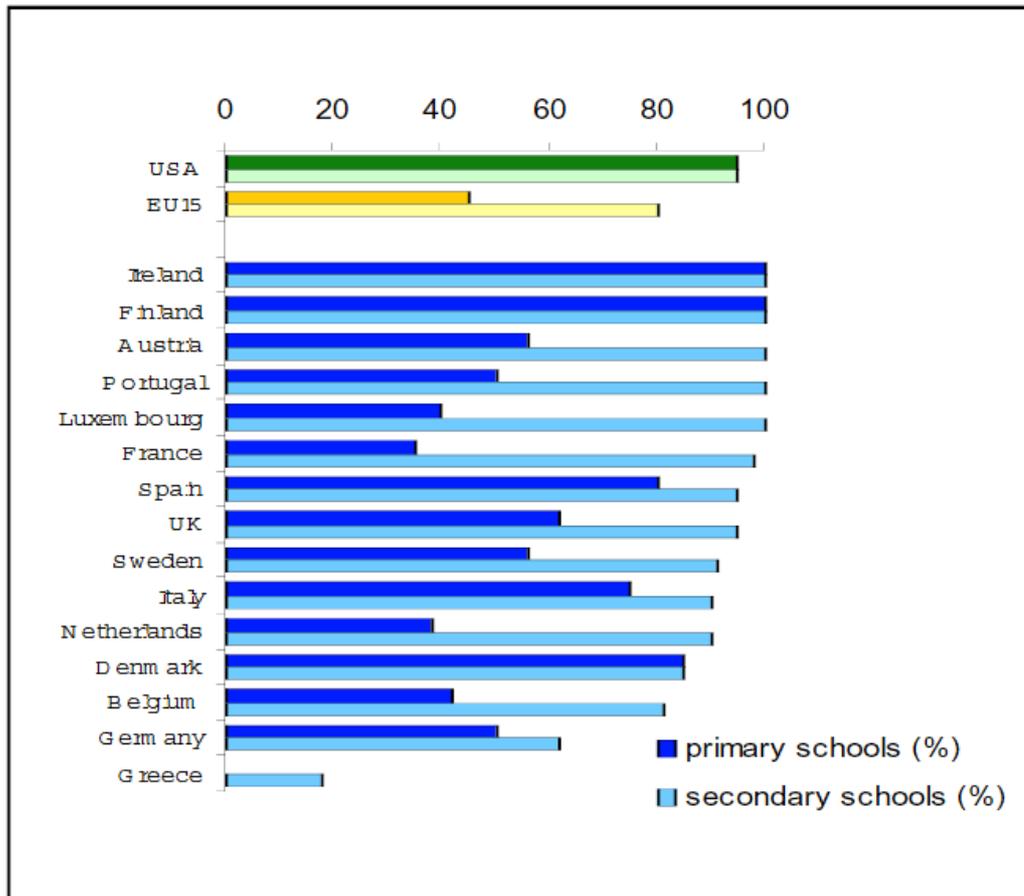
Source: Eurobarometer, October 2000.

Indicator 24: Labour Market Regulations



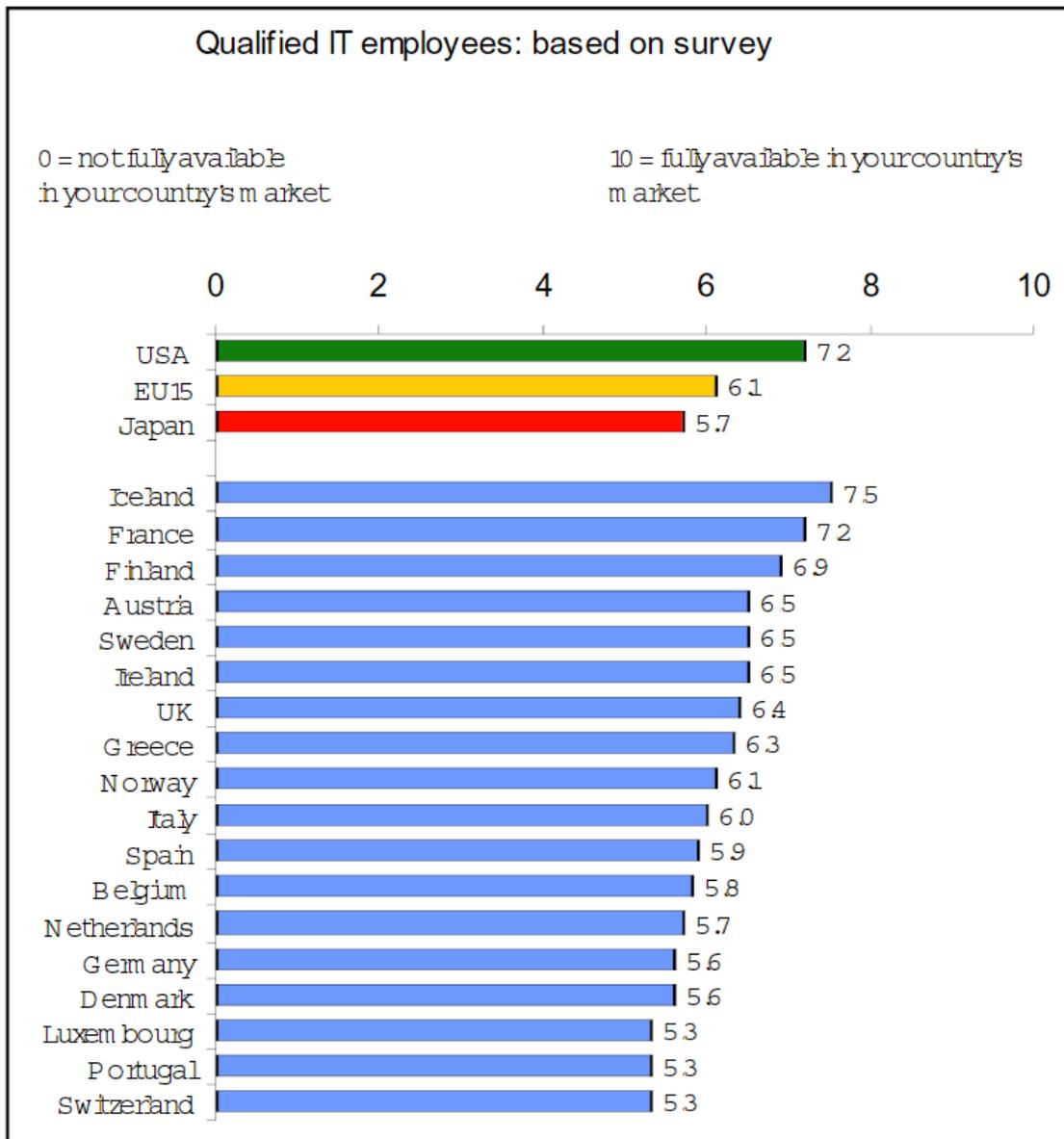
Source: IMD, World Competitiveness Report 2000.

Indicator 25: Education: % of schools with Internet access, 2000 (2nd half)



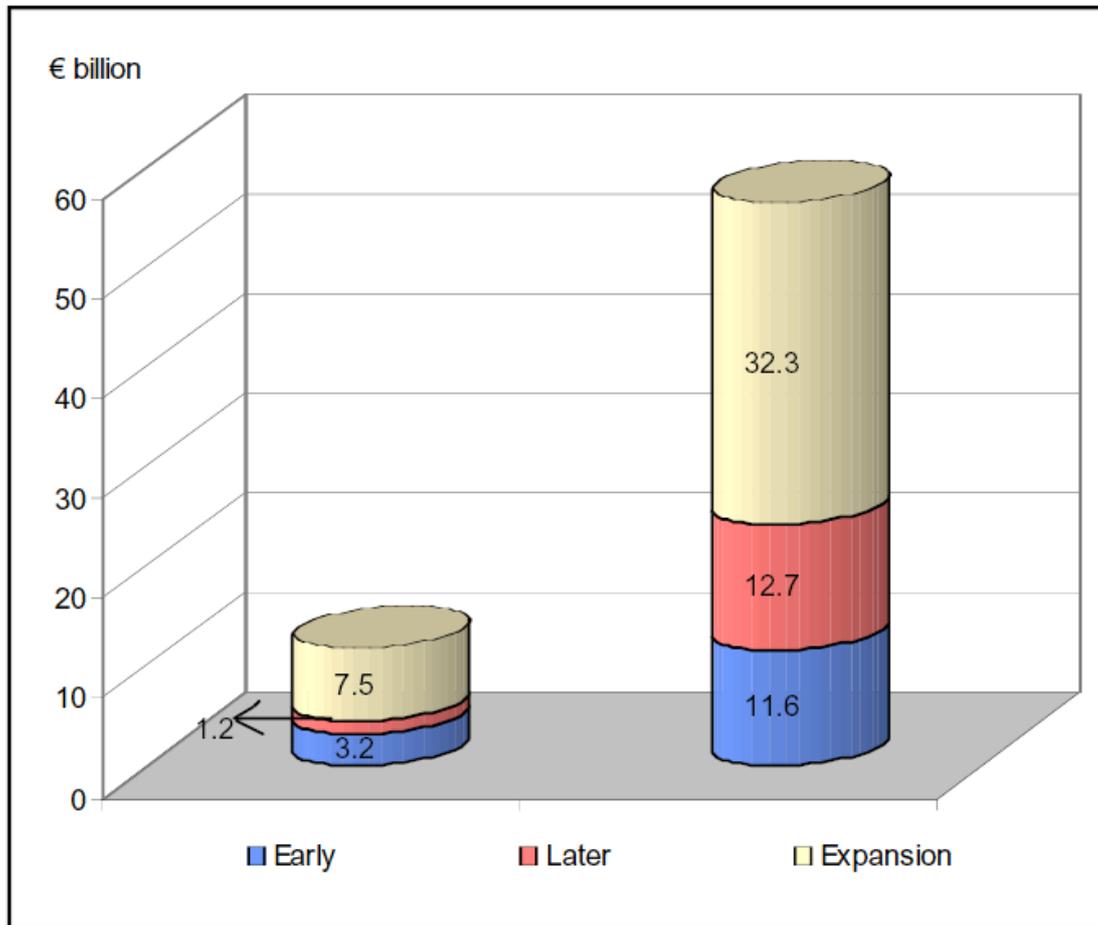
Source: European Commission, 2001.

Indicator 26: Availability of Information Technology skills, 1999



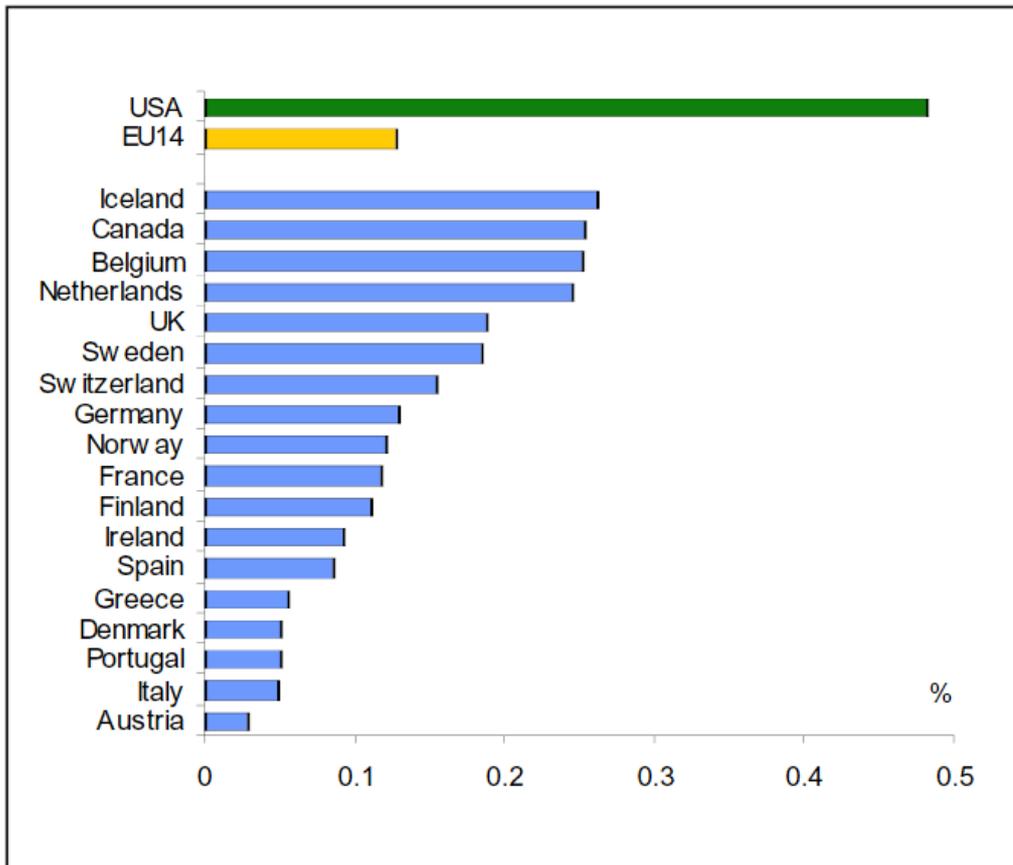
Source: IMD, World Competitiveness Report 2000.

Indicator 30: The venture capital market in Europe and the USA, 1999



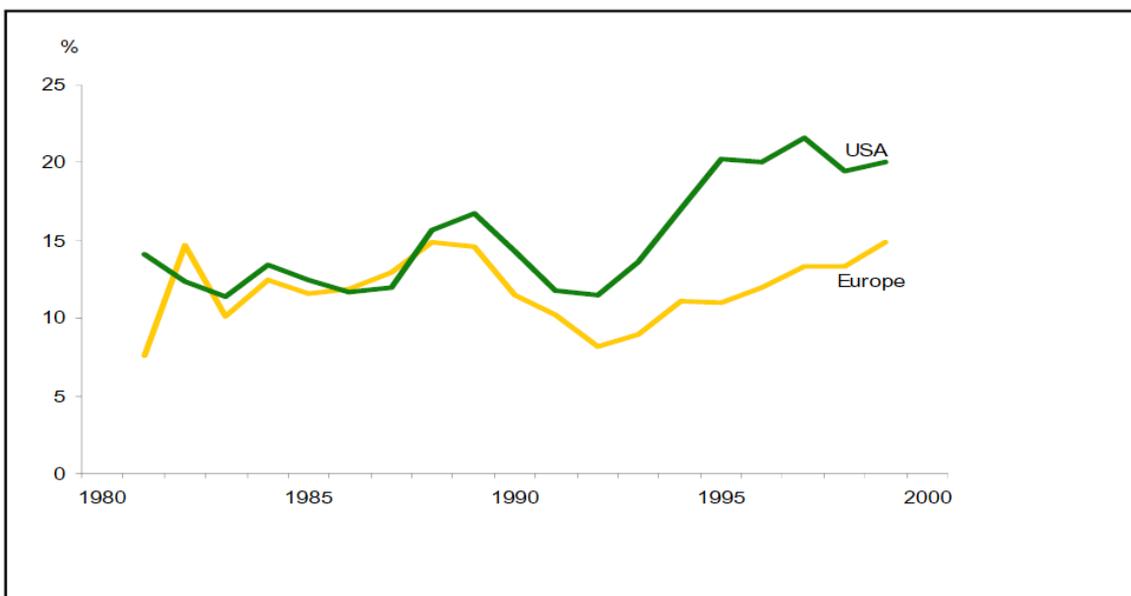
Source: EVCA, NVCA, 2000.

Indicator 31: Venture capital invested in early stages and expansion as % of GDP, 1999



Source: OECD 2000

Indicator 32: Reward risk: returns on equity investment



Source: Goldman Sachs, 2000.

TABLES AND FIGURES FROM INE

Table A.1. Personnel occupied in R&D (FTE) by sector and occupation. 2000

	Total	Researchers	Technicians	Assistants
Total	120,617.9	76,669.6	25,622.4	18,325.8
Government	22,399.9	12,707.7	4,760.1	4,932.1
Higher Education	49,470.1	42,063.8	3,326.9	4,079.4
Business	47,055.4	20,869.3	17,039.3	9,146.7
Private NPOs	1,692.5	1,028.8	496.1	167.6

Table A.2. Total internal expenditure on R&D by sector and scientific discipline. 2000

In '000 €						
	Total	Exact and Natural Sciences	Engineering and technology	Medical Sciences	Agricultural Sciences	Social Sciences and Humanities
TOTAL	5,718,988	1,016,796	3,111,817	757,332	386,068	446,975
Government	904,776	276,970	173,755	197,776	202,103	54,171
Higher Education	1,693,882	649,880	369,699	225,815	88,377	360,111
Business	3,068,994	82,863	2,559,541	322,244	95,139	9,207
Private NPOs	51,336	7,083	8,822	11,497	449	23,486

Table A.3. Expenditure on R&D in percentage of GDP in Spain. 1996-2000

	1996	1997	1998	1999	2000
TOTAL	0.83	0.82	0.9	0.89	0.94
Andalucía	0.62	0.61	0.68	0.65	0.67
Aragón	0.57	0.52	0.71	0.74	0.71
Asturias	0.57	0.51	0.54	0.55	0.81
Balearic Islands	0.21	0.23	0.29	0.25	0.25
Canary Island	0.5	0.44	0.53	0.48	0.49
Cantabria	0.53	0.58	0.83	0.6	0.47
Castille and León	0.52	0.52	0.52	0.62	0.64
Castille – La Mancha	0.4	0.51	0.48	0.33	0.57
Catalonia	0.92	0.93	1.08	1.06	1.11
Valencia(Community of)	0.56	0.57	0.63	0.62	0.74
Extremadura	0.34	0.39	0.43	0.41	0.54
Galicia	0.48	0.52	0.54	0.54	0.63
Madrid (Community of)	1.64	1.55	1.61	1.64	1.67
Murcia (Region of)	0.5	0.53	0.58	0.65	0.74
Navarra (Community of)	0.74	0.72	0.83	0.93	0.92
Basque Country	1.23	1.17	1.25	1.16	1.2
The Rioja	0.39	0.38	0.5	0.48	0.61

Table A.4. International expenditure indicators. 1997-2000

	Total internal expenditure x 100 /GDP at mkt prices 1998	Total internal expenditure x 100 /GDP at mkt prices 1999	Total internal expenditure x 100 /GDP at mkt prices 2000	Personnel R+D (FTE) x 1000/ Active population 1997	Personnel R+D (FTE) x 1000/ Active population 1998	Personnel R+D (FTE) x 1000/ Active population 1999
Sweden	..	3.8	..	15	..	15.2
Finland	2.89	3.19	3.36	16.4	18.4	19.6
Japan	3.04	3.04	..	13.2	13.6	13.6
Scandinavia	..	2.79	..	13.8	..	14.7
USA	2.6	2.64	..	..	..	..
Korea	2.55	2.46	..	6.3	6	6.4
Germany	2.31	2.44	2.46	11.5	11.6	11.6
Iceland	2.04	2.32	..	14.5	14.9	..
North America	2.23	2.24	..	..	..	..
OCDE	2.18	2.21	..	..	..	..
France	2.18	2.17	..	11.9	11.9	..
Denmark	1.92	2	..	12	..	..
UK	1.83	1.87	..	..	..	..
EU	1.81	1.85	..	9.4	..	..
Austria	1.8	1.8	1.77	..	..	..
Norway	..	1.7	..	10.9	..	10.9
Canada	1.71	1.66	1.66	..	..	..
Czech Republic	1.27	1.29	..	4.5	4.4	4.6
Italy	1.02	1.04	..	6.1	..	..
Spain	0.9	0.89	0.94	5.4	5.9	6.2
Portugal	..	0.77	..	3.6	..	..
Poland	0.72	0.75	..	4.9	4.9	..
Hungry	0.68	0.68	..	5.2	5.1	5.2
Mexico	0.46	0.4	..	..	..	..
Australia	1.49	..	..	..	9.7	..
Belgium	..	..	..	9	..	..
Greece	..	..	..	4.7	..	..
Ireland	..	..	..	7.8	..	..
Low Countries	1.95	..	..	10.9	11	..
New Zealand	..	..	..	6.9	..	..
Switzerland	..	..	..	..	..	..
Turkey	..	..	..	1	..	..

Table A.5. Expenditure and employment. 2000

	Total internal expenditure ('000 €)	Total internal expenditure (%)	Total personnel FTE (number of people)	Total personnel FTE (%)	Researchers FTE (number of people)	Researchers FTE (%)
Total	3.068.994,0	100,0	47.055,4	100,0	20.869,3	100,0
Agriculture	22.892,0	0,7	478,8	1,0	112,5	0,5
Total industry	1.927.971,0	62,8	30.487,2	64,8	12.393,3	59,4
Extractive industries and oil	28.113,0	0,9	445,9	0,9	232,9	1,1
Extractive industries	4.989,0	0,2	86,9	0,2	37,1	0,2
Oil industries	23.124,0	0,8	359,0	0,8	195,8	0,9
Food, drink and tobacco	84.005,0	2,7	1.790,8	3,8	578,0	2,8
Food and drink	82.165,0	2,7	1.760,5	3,7	567,5	2,7
Tobacco	1.840,0	0,1	30,3	0,1	10,5	0,1
Textile industry, clothing, leather and shoes	76.151,0	2,5	1.395,6	3,0	469,2	2,2
Textile industry	35.832,0	1,2	607,7	1,3	187,8	0,9
Clothing and furs	31.793,0	1,0	679,5	1,4	245,0	1,2
Leather and shoes	8.526,0	0,3	108,4	0,2	36,4	0,2
Wood, paper, printing and graphic arts	38.682,0	1,3	647,8	1,4	248,8	1,2
Wood and cork	8.519,0	0,3	133,8	0,3	83,0	0,4
Cardboard and paper	16.422,0	0,5	187,3	0,4	81,1	0,4
Editing and printing	13.741,0	0,4	326,7	0,7	84,7	0,4
Chemical industry	388.692,0	12,7	5.645,0	12,0	2.418,3	11,6
Pharmaceutical products	233.352,0	7,6	2.917,1	6,2	1.360,4	6,5
Other chemical products	155.340,0	5,1	2.727,9	5,8	1.057,9	5,1
Rubber and plastics	50.441,0	1,6	907,6	1,9	316,1	1,5
Non metal mineral products	52.420,0	1,7	875,6	1,9	289,2	1,4
Metallurgy	37.064,0	1,2	443,0	0,9	156,4	0,7
Ferrous metallurgical products	24.980,0	0,8	304,2	0,6	119,1	0,6

Non-ferrous metallurgical products	12.084,0	0,4	138,8	0,3	37,3	0,2
Metal manufacturing	45.628,0	1,5	1.098,8	2,3	412,6	2,0
Machinery and transport material	1.084.398,0	35,3	16.388,2	34,8	6.947,4	33,3
Machinery and mechanical equipment	170.962,0	5,6	3.138,8	6,7	1.094,7	5,2
Office machinery, calculators and computers	26.039,0	0,8	319,9	0,7	221,4	1,1
Electrical equipment	118.325,0	3,9	1.901,1	4,0	783,2	3,8
Electronic equipment	278.463,0	9,1	4.304,0	9,1	2.409,8	11,5
Electrical components	36.675,0	1,2	716,5	1,5	181,9	0,9
Radio, TV and communication equipment	241.788,0	7,9	3.587,5	7,6	2.227,9	10,7
Instruments, optics, clocks and watches	59.293,0	1,9	1.478,2	3,1	880,1	4,2
Motor vehicles	198.765,0	6,5	2.013,4	4,3	671,0	3,2
Other transport material	232.551,0	7,6	3.232,9	6,9	887,2	4,3
Shipbuilding	65.305,0	2,1	954,3	2,0	108,2	0,5
Aeronautics and space	135.564,0	4,4	1.780,6	3,8	667,9	3,2
Other transport equipment	31.682,0	1,0	498,0	1,1	111,1	0,5
Manufacturing industries, various	26.031,0	0,8	654,0	1,4	228,4	1,1
Furniture	15.097,0	0,5	378,2	0,8	124,5	0,6
Other manufacturing activities	10.934,0	0,4	275,8	0,6	103,9	0,5
Recycling	1.594,0	0,1	41,7	0,1	14,6	0,1
Energy and water	14.752,0	0,5	153,2	0,3	81,4	0,4
Construction	33.654,0	1,1	580,3	1,2	218,9	1,0
Total services	1.084.477,0	35,3	15.509,3	33,0	8.144,6	39,0
Commerce and catering	14.792,0	0,5	295,0	0,6	135,1	0,6
Transportation, storage	11.851,0	0,4	233,4	0,5	75,2	0,4
Post and telecommunications	145.485,0	4,7	488,3	1,0	244,6	1,2
Financial brokering	39.077,0	1,3	1.119,4	2,4	292,3	1,4
Rents, services to business	854.815,0	27,9	12.871,8	27,4	7.157,5	34,3
Computer and related activities	234.526,0	7,6	5.881,9	12,5	2.903,9	13,9
Computer programs	157.497,0	5,1	4.355,9	9,3	2.021,8	9,7
Other computer activities	77.029,0	2,5	1.526,0	3,2	882,1	4,2
R+D services	464.831,0	15,1	5.139,9	10,9	3.251,0	15,6
Other services to	155.458,0	5,1	1.850,0	3,9	1.002,6	4,8

business						
Public, social and community services	18.457,0	0,6	501,5	1,1	239,9	1,1

Table A.6. Employment indicators by activity branches. 2000

	Hotels and equivalent	Travel agencies	Passenger transport	Goods transport	Other transport activities	Postal services	Telecommunications	Real estate	Hire of Transport, machinery and personal affects	Judicial and financial services	Technical services	Research and security services	Services to business, various
Number of workstations with computer or computer equipment	28.733	28.852	39.535	33.880	51.610	24.612	54.864	84.744	19.469	274.381	150.748	9.153	78.343
Number of stations with Internet access	11.691	13.452	9.880	14.744	25.049	4.158	35.626	32.929	6.147	126.175	69.774	2.803	38.937
Percentage of firms with LANs	12,2	24,7	0,7	1,6	19,9	8,5	43,0	8,2	5,8	17,4	12,4	12,8	7,9

Table A.7. Internet indicators by activity branches (%). 2000

	Hotels and equivalent	Travel agencies	Passenger transport	Goods transport	Other transport activities	Postal services	Telecommunications	Real estate	Hire of Transport, machinery and personal affects	Judicial and financial services	Technical services	Research and security services	Services to business, various
Telephone exchange installed	45,8	47,3	2,9	4,9	41,2	19,7	41,8	29,6	14,2	36,3	14,6	33,1	12,6
Call centre	9,4	4,1	2,4	0,9	3,7	4,7	17,2	2,4	2,2	2,3	1,2	5,5	1,2
Mobile phone service for firm's use	39,7	68,2	39,5	80,4	58,2	77,9	73,3	50,9	59,8	62,5	66,9	82,9	60,1
Voice message service	5,9	8,8	3,4	5,2	8,5	13,2	18,1	5,5	7,2	10,9	9,9	13,1	8,9
Paging service	7,3	0,8	0,9	1,3	3,7	12,3	12,5	0,8	2,3	1,4	0,9	15,2	0,6
Fax number	23,3	30,9	2,0	5,0	24,8	11,6	35,2	19,4	14,6	27,7	19,9	31,5	17,5
Mobile telephone services in closed user groups	6,1	4,6	6,9	1,2	5,5	8,0	10,8	2,6	1,8	3,0	1,4	8,0	1,2
Data transmission service contracted	6,3	19,5	0,8	1,4	13,9	6,1	28,4	4,8	4,0	8,5	5,8	11,8	5,9
Some form of data transmission via telecommunications	19,0	39,5	5,4	4,7	31,8	19,0	54,3	16,9	13,1	35,9	36,4	31,0	24,7
Email	31,5	52,2	1,7	4,7	34,9	18,8	64,3	22,8	14,3	47,8	47,9	42,6	33,5
Internet connection	34,5	55,5	2,1	6,1	38,9	20,6	65,1	26,2	17,1	53,6	51,2	50,2	37,2

**Table A.8. Sales volume and expenditure of businesses using the Internet.
2000**

in '000 €	Spending on acquisition via e-commerce	Sales turnover via e-commerce	Sales turnover to business	Sales turnover to individuals	Personnel employed in e-commerce activities
Hotels and equivalent	112	3.385	1.520	1.865	797
Travel agencies	1.598	1.946	972	974	407
Passenger transport	14	7.313	14	7.298	131
Goods transport	67	558	326	232	421
Other transport activities	176	891	796	95	459
Postal services	1	0	0	0	120
Telecommunications	506	857	589	268	346
Real estate	138	391	153	237	648
Hire of Transport, machinery and personal affects	129	708	379	329	258
Judicial and financial services	226	1.882	1.811	71	1.573
Technical services	504	554	551	3	1.131
Research and security services	6	3	3	0	88
Services to business, various	368	1.013	810	203	1.563

Table A.9. Reasons for using the Internet (%). 2000

	To publicise services	To obtain purchases and supplies	To sell own products	Forecast of Internet use in 2000
Hotels and equivalent	24,9	1,6	5,9	13,5
Travel agencies	20,5	5,7	5	19,8
Passenger transport	0,6	0,1	0,1	0,7
Goods transport	1,2	0,3	0,2	1,7
Other transport activities	11,9	1,5	1	8,2
Postal services	6,9	0,5	0,2	6,7
Telecommunications	38,7	20,6	15,8	32,7
Real estate	5,7	0,6	0,6	7,8
Hire of Transport, machinery and personal affects	6,1	1,3	0,7	6,8
Judicial and financial services	5,2	1,8	0,5	9
Technical services	4,3	2,5	0,3	8
Research and security services	17,6	3,1	1,8	17,3
Services to business, various	7,6	3,1	1,5	9,6

Table A.10. Employment by activity branch. 2000

	0.Total employment	1.Paid	2.Unpaid
Hotels and equivalent	235.585	223.926	11.659
Travel agencies	37.812	34.591	3.221
Passsenger transport	229.971	167.175	62.796
Goods transport	297.989	176.993	120.996
Other transport activities	126.702	120.146	6.556
Postal services	107.741	102.765	4.976
Telecommunications	74.372	73.687	685
Real estate	169.465	117.106	52.359
Hire of Transport, machinery and personal affects	59.728	46.086	13.642
Judicial and financial services	286.825	176.048	110.778
Technical services	173.456	101.746	71.710
Research and security services	82.882	81.753	1.129
Services to business, various	147.714	91.466	56.248

Table A.11. Innovation in businesses. 2000

	Fewer than 250 employees	More than 250 employees	Total 2000
TOTAL FIRMS			
(A) Innovative firms in the period 1998-2000	27.862	1.366	29.228
(B) Non-innovating firms with ongoing or unsuccessful innovations	2.379	96	2.475
(C) Firms cooperating in innovation in 1998-2000	2.395	500	2.894
(D) EIN firms receiving public funding for innovation in 1998-2000	6.730	572	7.301
(E) Firms carrying out R+D in 2000	8.376	871	9.247
(F) Firms with non-technological innovations in 1998-2000	61.211	2.024	63.235

Table A.12. EIN penetration. 2000

	Fewer than 250 employees	More than 250 employees	Total 2000
TOTAL EMPRESAS			
% of non-EIN firms that consider very significant the obstacle: excessive financial risk	13,91	9,10	13,85
% of non-EIN firms that consider very significant the obstacle: costs of innovation too high	19,65	13,00	19,56
% of non-EIN firms that consider very significant the obstacle: lack of appropriate sources of funding	12,07	10,20	12,05
% of non-EIN firms that consider very significant the obstacle: firm too rigidly organised	5,29	4,70	5,28
% of non-EIN firms that consider very significant the obstacle: lack of qualified staff	10,81	6,62	10,75
% of non-EIN firms that consider very significant the obstacle: lack of information on technology	7,94	3,95	7,89
% of non-EIN firms that consider very significant the obstacle: lack of information on markets	6,36	3,13	6,32
% of non-EIN firms that consider very significant the obstacle: rules and regulations not sufficiently flexible	7,76	5,33	7,72
% of non-EIN firms that consider very significant the obstacle: lack of customer readiness	8,83	7,33	8,81
Consequences in non-EIN firms (%) these obstacles have impeded innovation	20,53	22,13	20,55
Consequences in non-EIN firms (%) no need to innovate due to previous innovations	41,72	41,05	41,71
Consequences in non-EIN firms (%) no need to innovate due to state of the market	22,71	17,90	22,65
% of EIN firms that consider very significant the obstacle: excessive financial risk	18,10	13,53	17,89
% of EIN firms that consider very significant the obstacle: costs of innovation too high	32,15	21,87	31,68
% of EIN firms that consider very significant the obstacle: lack of appropriate sources of funding	18,71	12,74	18,44
% of EIN firms that consider very significant the obstacle: firm too rigidly organised	5,06	6,47	5,13
% of EIN firms that consider very significant the obstacle: lack of qualified staff	13,24	7,58	12,98
% of EIN firms that consider very significant the obstacle: lack of information on technology	8,15	2,80	7,91
% of EIN firms that consider very significant the obstacle: lack of information on markets	9,13	4,05	8,89
% of EIN firms that consider very significant the obstacle: rules and regulations not sufficiently flexible	11,10	8,80	10,99
% of EIN firms that consider very significant the obstacle: lack of customer readiness	9,62	6,70	9,49
Consequences in EIN firms (%) on some innovation activity: seriously delayed	12,63	12,49	12,62
Consequences in EIN firms (%) on some innovation activity: not begun	7,44	7,17	7,43
Consequences in EIN firms (%) on some innovation activity: prevented by other problems	18,25	19,37	18,30
% EIN firms believing there has been a significant impact on: increase in range of goods or services	23,05	32,09	23,47
% EIN firms believing there has been a significant impact on: increase in market or market share	17,48	21,02	17,64
% EIN firms believing there has been a significant impact on: improvement in quality of goods or services	40,61	41,16	40,63

% EIN firms believing there has been a significant impact on: improvement in flexibility of production	19,29	25,11	19,56
% EIN firms believing there has been a significant impact on: increase in production capacity	25,99	29,13	26,14
% EIN firms believing there has been a significant impact on: Reducc. costes laborales (unidad produc.)	12,73	17,04	12,93
% EIN firms believing there has been a significant impact on: Reducc. material/energía (unidad produc.)	7,12	10,19	7,26
% EIN firms believing there has been a significant impact on: Mejora impacto medioamb./salud/seguridad	15,15	21,01	15,42
% EIN firms believing there has been a significant impact on: adherence to rules and regulations	23,78	25,75	23,87
% EIN firms considering very important information sources: within the firm	31,50	53,81	32,53
% EIN firms considering very important information sources: other firms in the same group	9,98	27,59	10,79
% EIN firms considering very important information sources: suppliers of material, equipment and components	24,06	27,70	24,23
% EIN firms considering very important information sources: customers	16,79	24,12	17,13
% EIN firms considering very important information sources: competitors/other firms in the same activity	10,40	11,81	10,46
% EIN firms considering very important information sources: universities/institutions of higher education	2,27	6,34	2,46
% EIN firms considering very important information sources: public R+D bodies/technology centers	4,19	7,57	4,34
% EIN firms considering very important information sources: conferences, meetings, professional publications	10,28	12,03	10,36
% EIN firms considering very important information sources: trade fairs and exhibitions	15,77	10,93	15,54

1) EIN= Innovative Firms (Empresas Innovadoras) in the period 1998-2000 with ongoing or as yet unsuccessful innovations

Table A.13. Innovation in business. 2000

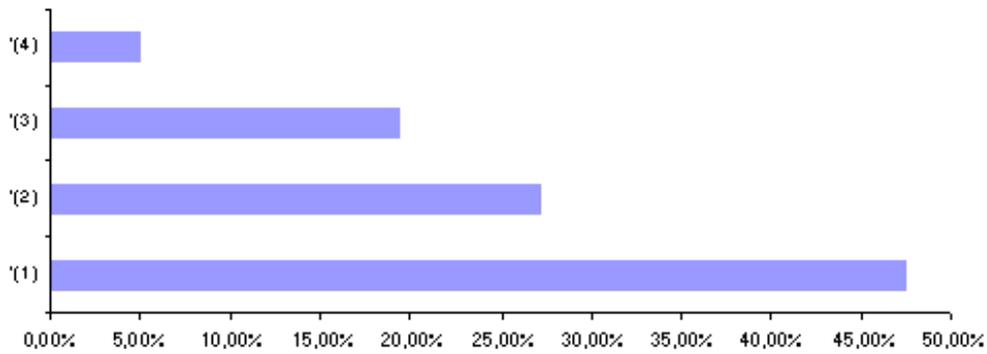
	Fewer than 250 employees	More than 250 employees	Total 2000
TOTAL FIRMS			
Total spending on innovation in 2000 ('000 euros)	4.864.061,00	5.310.198,00	10.174.259,00
Distribution (%) by innovative activity: internal R+D	27,01	38,16	32,83
Distribution (%) by innovative activity: external R+D	5,34	11,62	8,62
Distribution (%) by innovative activity: acquisition of machinery and equipment	49,21	25,29	36,73
Distribution (%) by innovative activity: acquisition of other, external knowledge	5,84	12,40	9,26
Distribution (%) by innovative activity: design, other preparations for production and/or distribution	4,68	4,45	4,56
Distribution (%) by innovative activity: Training	2,37	2,10	2,23
Distribution (%) by innovative activity: marketing	5,56	5,97	5,78
% of business in 2000 in EIN firms due to: new or considerably improved products	17,31	26,21	23,46
% of business in 2000 in EIN firms due to: unaltered or only slightly altered products	82,69	73,79	76,54
% of business in 2000 in EIN firms due to: new products for the firm	11,99	12,35	12,24
% of business in 2000 in EIN firms due to: new product on the market	5,32	13,86	11,22
Intensity of innovation (spending on innovation / business total)x100: all firms	0,86	1,00	0,93
Intensity of innovation (spending on innovation / business total)x100: EIN firms in 2000	2,71	1,33	1,76
Intensity of innovation (spending on innovation / business total)x100: firms carrying out systematic R+D	4,34	2,13	2,50
Intensity of innovation (spending on innovation / business total)x100: other innovative firms	2,23	0,52	1,22
Spending on innovation in firms carrying out systematic R+D ('000 euros)	1.769.501,00	4.261.236,00	6.030.737,00
(1): Internal R+D	1.049.196,00	1.996.906,00	3.046.103,00
(2): External R+D	124.326,00	550.383,00	674.709,00
(3): Acquisition of machinery and equipment	346.473,00	819.222,00	1.165.695,00
(4): Acquisition of other, external knowledge	58.682,00	384.717,00	443.399,00
(5): Design, other preparations for production and/or distribution	52.186,00	205.731,00	257.917,00
(6): Training	37.109,00	87.852,00	124.961,00
(7): Marketing	101.530,00	216.425,00	317.954,00
Intensity of systematic R+D: (R+D spending/business total)x100: all firms	0,19	0,37	0,28
Intensity of systematic R+D: (R+D spending/business total)x100: EIN firms in 2000	0,59	0,50	0,53
Intensity of systematic R+D: (R+D spending/business total)x100: firms carrying out systematic R+D	2,58	1,00	1,26

1) EIN= Innovative Firms (Empresas Innovadoras) in the period 1998-2000 with ongoing or as yet unsuccessful innovations

Table A.14. Firms with patents. 2000

	TOTAL EMPRESAS		
	Fewer than 250 employees	More than 250 employees	Total 2000
(A): Firms applying for patents in 1998-2000	3.900	306	4.206
(A1): Innovative	2.651	251	2.902
(A2): Non-innovative	1.250	54	1.304
(A3): % of firms applying for patents	2,69	10,33	2,84
(B): Firms with current patents at end of 2000	5.591	407	5.998
(B1): Innovative	3.492	317	3.809
(B2): Non-innovative	2.099	90	2.189
(B3): % of firms with current patents	3,86	13,77	4,08
(C): Number of applications for patents in 1998-2000	10.099	2.817	12.916
(C1): From innovative firms	7.319	2.677	9.996
(C2): From non-innovative firms	2.781	140	2.920
(D): Number of current patents in 1998-2000	22.581	7.551	30.132
(D1): From innovative firms	15.541	7.177	22.718
(D2): From non-innovative firms	7.040	373	7.414
Firms protecting their inventions or innovations in 1998-2000 via: registration of model or design	4.349	292	4.641
Firms protecting their inventions or innovations in 1998-2000 via: trademark	5.854	364	6.218
Firms protecting their inventions or innovations in 1998-2000 via: copyright	1.270	122	1.391
Firms protecting their inventions or innovations in 1998-2000 via: trade secret	5.673	409	6.082
Firms protecting their inventions or innovations in 1998-2000 via: complexity of design	5.585	415	6.000
Firms protecting their inventions or innovations in 1998-2000 via: time leading over competitors	6.409	455	6.864
(%) protecting and considering very important the method: registration of model or design	10,85	12,59	10,94
(%) protecting and considering very important the method: trademark	21,52	21,98	21,54
(%) protecting and considering very important the method: copyright	3,62	5,68	3,73
(%) protecting and considering very important the method: trade secret	13,11	24,31	13,72
(%) protecting and considering very important the method: complexity of design	9,76	17,71	10,19
(%) protecting and considering very important the method: time leading over competitors	13,83	20,85	14,20

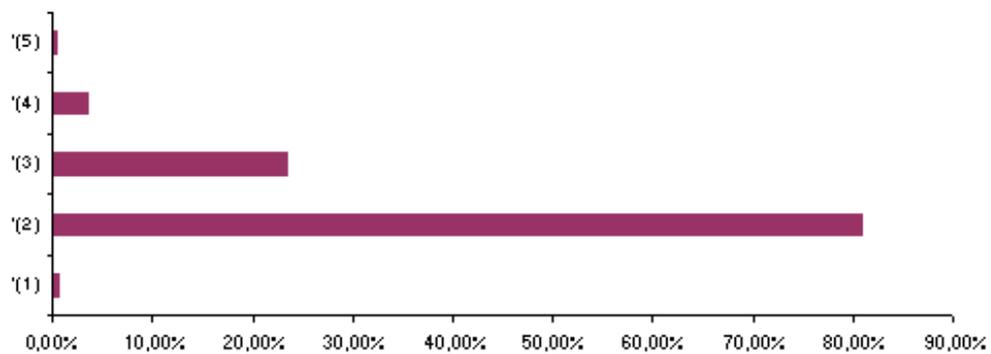
Figure A.15. Businesses use of ICTs. 2000



(1). Intranet. (2). E-mail. (3). Internet. (4). PC's.

Source: INE.

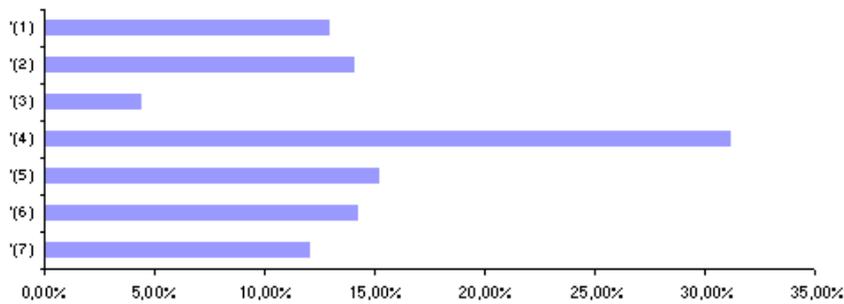
Figure A.16. Connectivity. 2000



(1). Other broadband connections (>2 Mbps). (2). xDSL (ADSL, ...) (3). ISDN. (4). Via modem. (5). Mobile phone.

Source: INE.

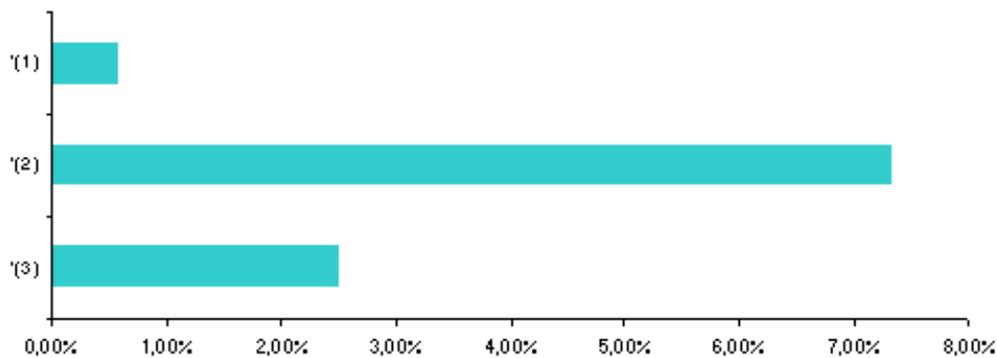
Figure A.17. Barriers to the use of Internet. 2000



(1). Lack of security (viruses, hackers...). (2). Very slow unreliable lines of communication. (3). Waste of time as Internet use low. (4). Lack of tangible benefits for the firm. (5) Lack of expert personnel, or not knowing how to go about it. (6) Internet charges too high. (7) High cost of making it possible.

Source: INE.

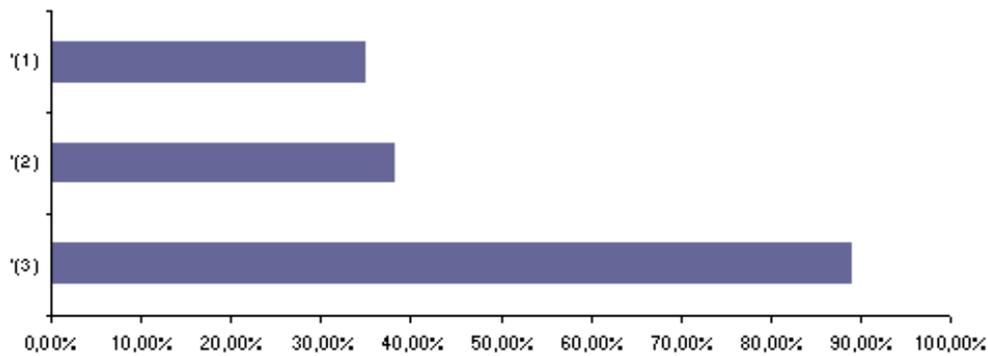
Figure A.18. Businesses using e-commerce. 2000



(1). Make purchases via vertical portals. (2). Intend to make purchases via the Internet. (3). Use e-commerce to make purchases.

Source: INE.

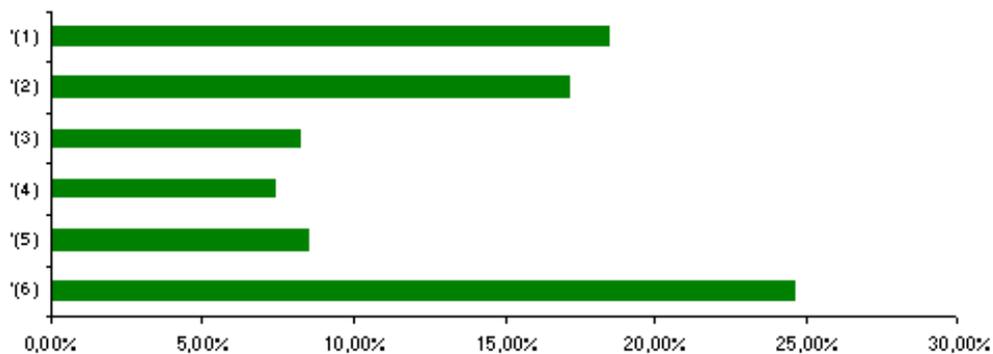
Figure A.19. Processes for which e-commerce is used, 2000



(1). Electronic receipt of goods and services. (2). Making payments. (3). Requesting goods and services.

Source: INE.

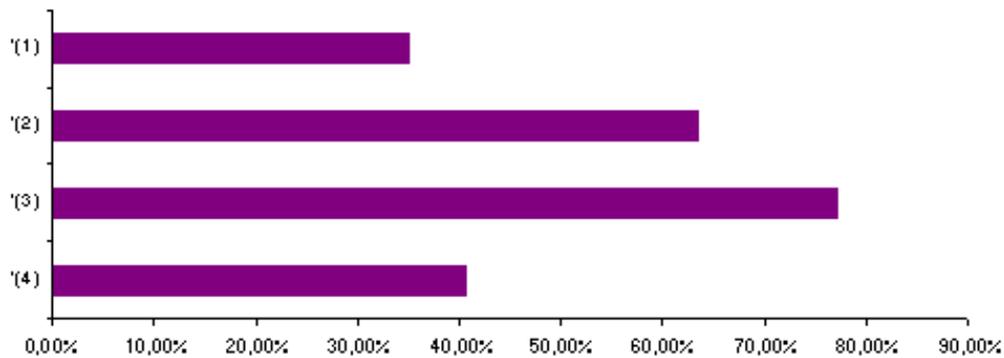
Figure A.20. Reasons for not adopting e-commerce, 2000



(1). Uncertainty of contracts, guarantees... (2). Uncertainty of payments. (3). Logistical problems (speed and delivery deadline). (4). Costs of delivery or distribution. (5) Few possible suppliers. (6) Goods and services cannot be bought via e-commerce.

Source: INE.

Figure A.21. Advantages of using e-commerce to make purchases. 2000



(1).More possible suppliers available. (2). Simplification of tasks. (3). Speed of processes. (4). Saving of costs.

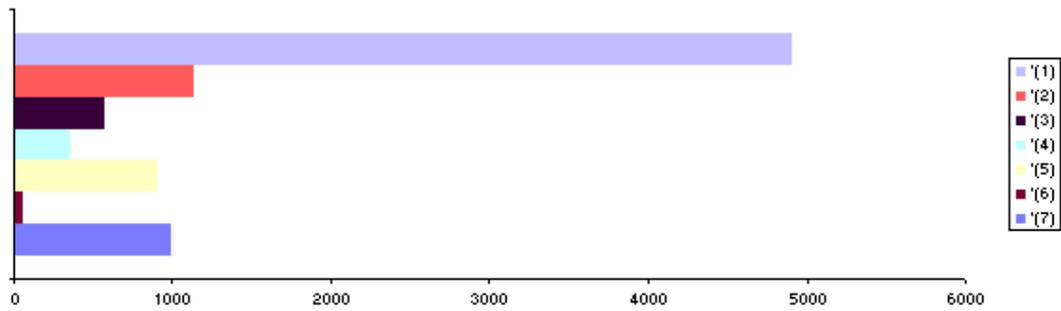
Source: INE.

Table A.22. ICT use and equipment. International comparison (%)

	Germany	France	Italy	UK	Sweden	USA	Canada	Cat. Tot. 10-20	Cat. Emp.
Internet connection	74	80	91	90	93	93	93	84	78
Email	83	76	71	88	90	93	92	83	76
Website	66	49	44	66	76	68	65	50	42
Intranet	51	44	29	51	56	56	59	38	31
Purchases by Internet	38	13	25	38	45	48	37	10	9
Sales by Internet	33	10	26	20	21	21	22	9	8

Source: DTI and IDESCAT.

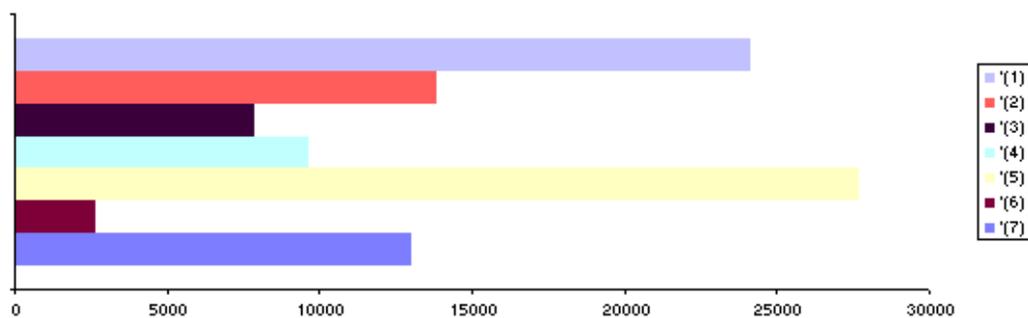
Figure A.23. Establishments by activity in Catalonia. 1998



(1). Computer services. (2). Telecommunications. (3). Precision instruments. (4). Electronics. (5) Machinery. (6) Office and computer equipment. (7) Editing and printing.

Source: IDESCAT and INE.

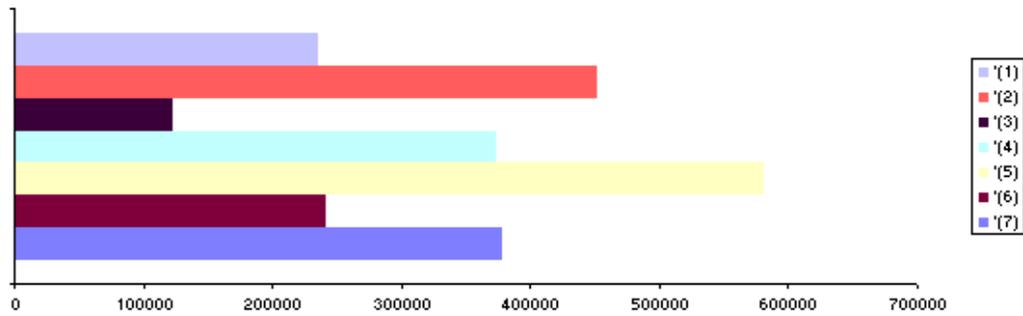
Figure A.24 Employment by activity in Catalonia. 1998



(1). Computer services. (2). Telecommunications. (3). Precision instruments. (4). Electronics. (5) Machinery. (6) Office and computer equipment. (7) Editing and printing.

Source: IDESCAT and INE.

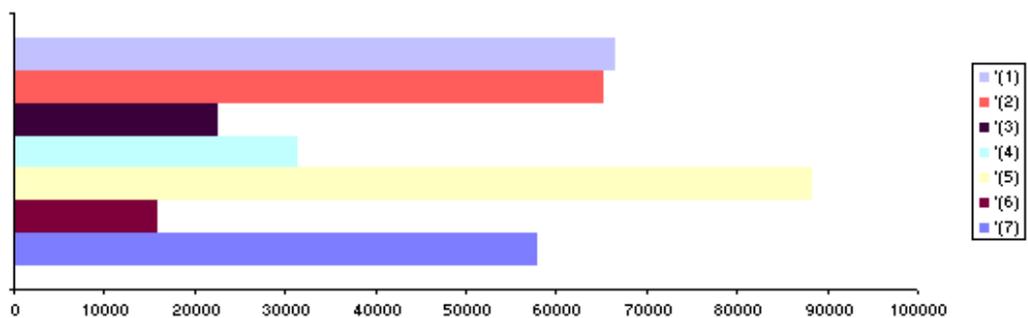
Figure A.25. Sales value by activity in Catalonia (in million ptas). 1998



(1). Computer services. (2). Telecommunications. (3). Precision instruments. (4). Electronics. (5) Machinery. (6) Office and computer equipment. (7) Editing and printing.

Source: IDESCAT and INE.

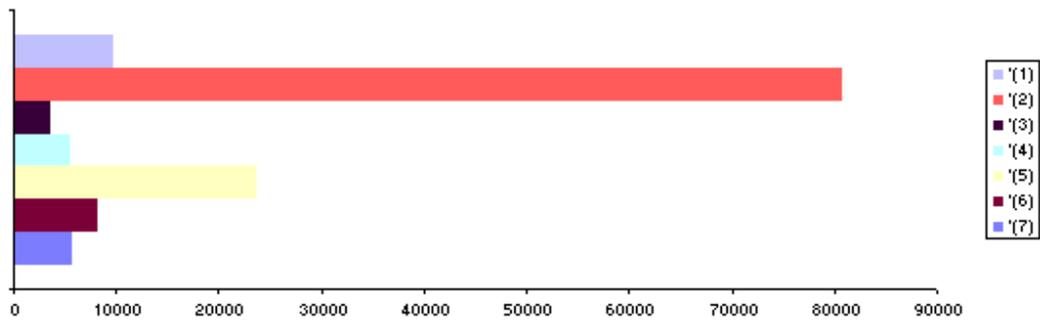
Figure A.26. Wages by activity in Catalonia (in million ptas). 1998



(1). Computer services. (2). Telecommunications. (3). Precision instruments. (4). Electronics. (5) Machinery. (6) Office and computer equipment. (7) Editing and printing.

Source: IDESCAT and INE.

Figure A.27. Investment by activity in Catalonia (in million ptas). 1998

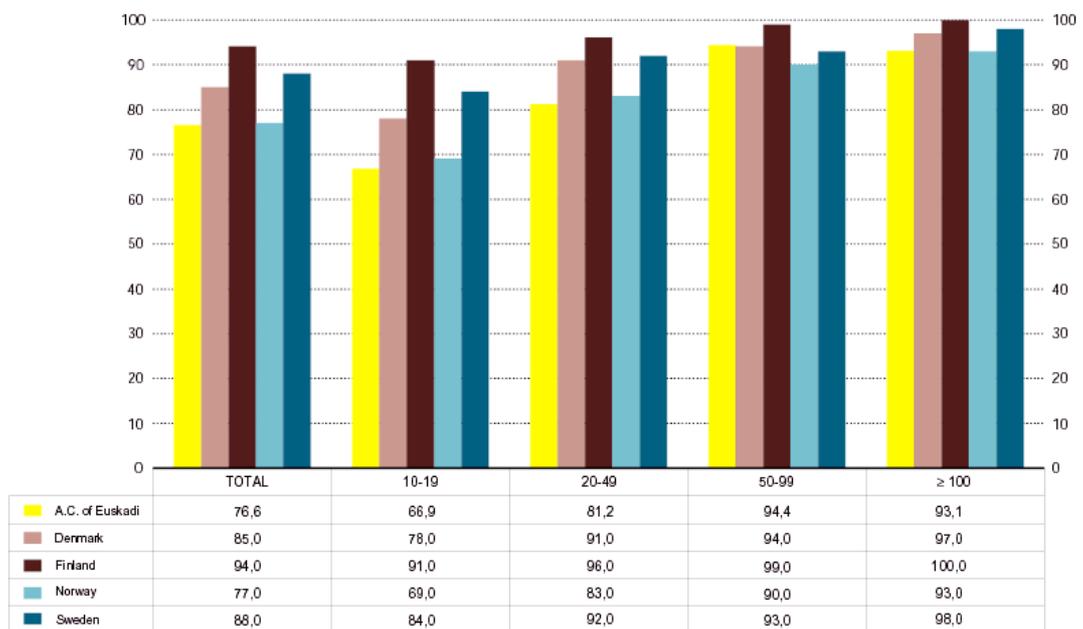


(1). Computer services. (2). Telecommunications. (3). Precision instruments. (4). Electronics. (5) Machinery. (6) Office and computer equipment. (7) Editing and printing.

Source: IDESCAT and INE.

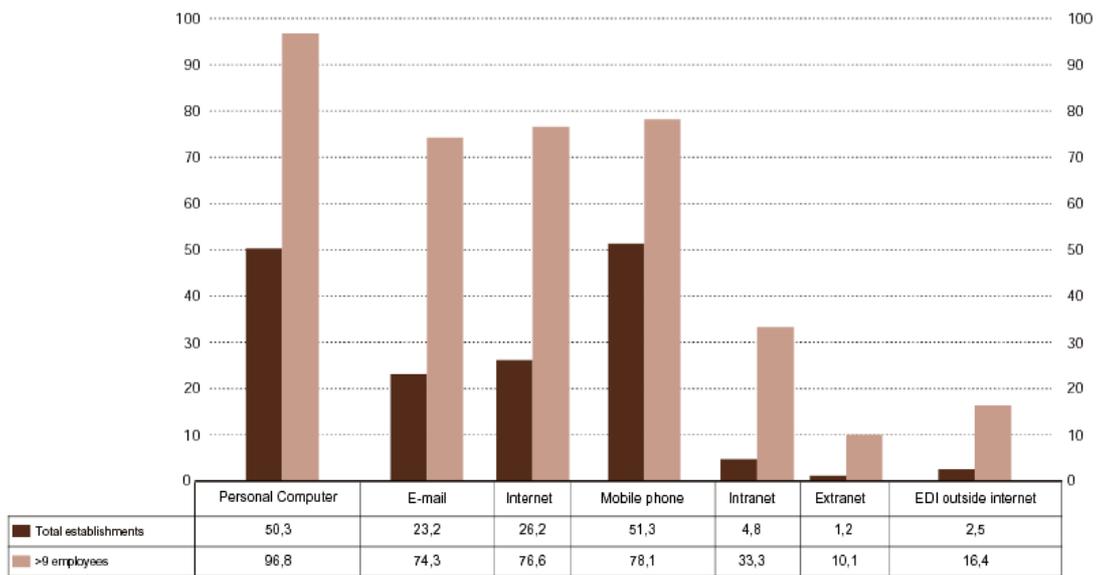
EUSTAT

GRAPH 1: Companies with over 9 employees with access to the Internet by employment strata. 2000(%)



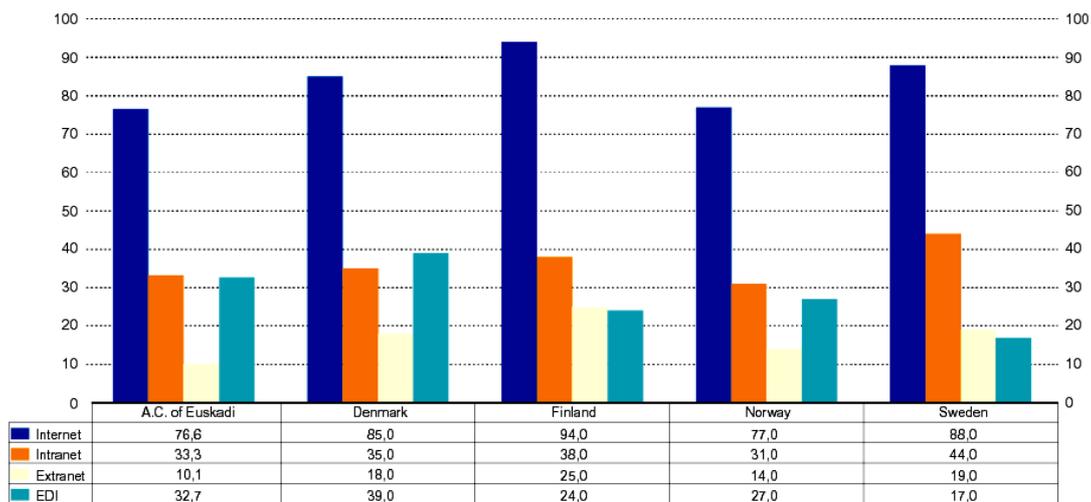
Source: Nordic Countries: Use of ICT in Nordic enterprises 1999/2000. Statistics Denmark, Finland, Norway and Sweden.
 A.C. of Euskadi: ESI - Companies. 2000 Eustat

GRAPH 2: ICT equipment in business establishments in the A.C. of Euskadi. 2000. (%)



Source: ESI- Companies. 2000 Eustat

GRAPH 3: Companies with over 9 employees by ICT equipment. 2000. (%)



Source: Nordic Countries: Use of ICT in Nordic enterprises 1999/2000. Statistics Denmark, Finland, Norway and Sweden.
 A.C. of Euskadi: ESI - Companies. 2000 Eustat

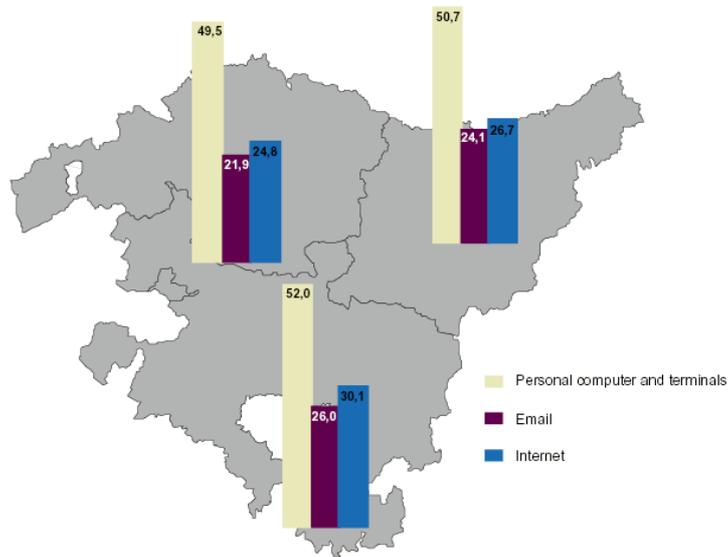
TABLE 1. INFORMACIÓ D'EMPRESES I BURUJOS DE LA INFORMACIÓ ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACIÓN		2000														
USE OF ICT BY EMPLOYMENT STRATA. A.C. OF EUSKADI. 2000. (%)	TOTAL				0-9 employees				10-19 employees				20 or more employees			
	Use foreseen				Use foreseen				Use foreseen				Use foreseen			
	Used	<1 yr	>1 yr	Unforeseen	Used	<1 yr	>1 yr	Unforeseen	Used	<1 yr	>1 yr	Unforeseen	Used	<1 yr	>1 yr	Unforeseen
Mobile phone & other personal communication services	51,3	0,8	0,2	47,7	49,7	0,7	0,2	49,4	74,2	2,3	0,8	22,7	81,8	1,0	0,2	17,0
E-mail	23,2	9,2	2,1	65,5	20,0	9,2	2,1	68,6	63,6	11,8	3,7	20,9	84,6	4,5	1,7	9,2
Personal computers and terminals	50,3	3,6	1,8	44,4	47,4	3,8	1,8	47,0	94,9	0,7	0,4	4,0	98,6	-	0,0	1,4
Company computer networks: local network	8,8	1,3	0,4	89,4	6,3	1,2	0,4	92,1	38,5	3,7	1,1	56,7	61,1	2,4	1,7	34,8
Internet	26,2	7,4	2,5	63,9	23,1	7,4	2,5	67	66,9	9,5	3,1	20,4	86	3,8	1,8	8,4
Intranet	4,8	0,8	0,4	94,1	3	0,6	0,2	96,2	21,9	2,9	2,3	72,9	44,3	4,7	4,1	46,9
Extranet	1,2	0,4	0,3	98,1	0,7	0,3	0,2	98,9	5,1	0,9	1,1	93	15	4,3	4,1	76,6
Electronic transfer of funds	18,2	0,7	0,3	80,8	16,6	0,6	0,2	82,6	40,8	3,2	0,7	55,3	46,5	2	2,4	49,1
Computer data exchange by the Internet	8,2	0,9	0,3	90,6	6,7	0,8	0,2	92,3	25,1	1,6	2,1	71,2	40,1	3,4	2,5	54
Computer data exchange by a means other than the Internet	2,5	0,1	0,2	97,2	1,6	0,1	0,1	98,2	12,2	0,9	1	85,9	20,5	0,9	1,7	76,9

Source: ESI - Companies. 2000 Eustat

TABLE 2. INFORMACIÓ D'EMPRESES I BURUJOS DE LA INFORMACIÓ ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACIÓN		2000					
BUSINESS ESTABLISHMENT AND EMPLOYMENT BY ICT EQUIPMENT. A.C. OF EUSKADI. 2000. (%)	Personal computers and terminals		E-mail		Internet		Mobile phone
	% By establishment	% By employment	% By establishment	% By employment	% By establishment	% By employment	% By establishment
TOTAL	50,3	46,7	23,2	26,0	26,2	23,5	51,3
Industry	63,0	34,0	35,6	20,5	39,7	16,5	58,9
5. Food industry	49,0	23,9	15,8	12,2	21,4	10,3	49,1
6. Textiles and clothing	55,9	25,2	23,5	11,4	26,3	13,7	40,6
8. Timber industry	50,8	22,8	16,9	7,5	19,7	8,4	63,1
9. Paper, publishing and graphic arts	72,2	42,8	47,1	22,4	49,5	23,9	59,8
11. Chemicals industry	77,0	44,7	74,3	30,4	73,5	24,0	64,3
12. Rubber and plastic	64,0	31,3	40,6	17,0	46,0	11,2	53,5
13. Non-metal industry	90,8	34,2	72,6	20,5	76,2	14,3	94,7
14. Metallurgy and Metal articles	71,9	27,5	36,2	15,7	42,4	11,6	59,6
15. Machinery	73,4	35,9	57,2	22,4	60,6	20,0	64,4
16. Electric material	66,3	41,4	45,3	30,3	48,0	26,8	54,3
17. Transport material	64,6	48,0	39,0	36,3	46,4	17,6	89,0
18. Other manufactured	37,0	27,2	19,8	17,4	20,0	14,0	51,9
Other industries	44,2	66,5	40,4	27,4	40,4	45,8	69,3
Construction	44,6	27,6	12,2	12,1	14,4	13,1	70,9
20. Construction	44,6	27,6	12,2	12,1	14,4	13,1	70,9
Services	49,5	54,8	23,3	30,2	26,2	28,0	47,7
21. Trade and repairs	46,4	45,7	18,8	17,5	21,3	17,2	40,5
22. Hotel and catering	7,5	9,0	1,9	2,7	3,2	3,0	20,5
23. Transport & communications	27,9	39,8	11,7	23,4	13,3	20,9	85,6
24. Banking & insurance	95,3	97,6	63,4	71,7	54,4	42,8	57,7
25. Services to companies	87,7	70,6	48,3	48,4	55,2	48,7	64,9
26. Public Administration	98,9	80,8	79,0	36,7	78,5	25,9	64,2
27. Education	79,1	72,2	46,7	44,6	53,0	49,4	33,8
28. Health and Social Services	65,3	52,2	19,4	25,4	25,2	23,3	46,8
29. Personal services	36,3	40,8	14,9	22,8	17,4	22,7	30,8

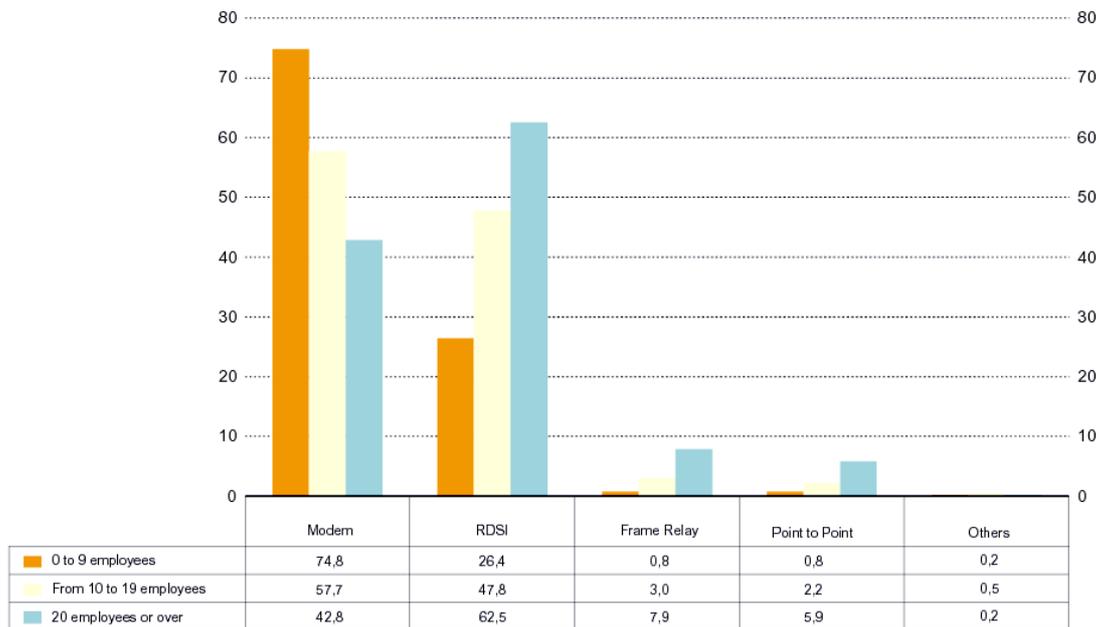
Source: ESI - Companies. 2000 Eustat

GRAPH 4: ICT Equipment in companies by Provinces. 2000. (%)



Source: ESI - Companies. 2000 Eustat

GRAPH 5: Access to the Internet by employment stratum. A.C. of Euskadi. 2000. (%)



Source: ESI - Companies. 2000 Eustat

Source: ESI - Companies. 2000 **Eustat**

TABLE 3. INFORMAZIOAREN GIZARTEARI BURUZKO INKESTA ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACION		2000			
USE OF THE INTERNET BY ACTIVITIES AND SIZE OF COMPANY. A.C. OF EUSKADI. 2000. (%)	TOTAL	0 to 9 employees	10 to 19 employees	Over 20 employees	
Document search	82,7	82,5	79,2	86,8	
E-mail	84,3	82,3	92,8	96,4	
Electronic file exchange	48,9	44,8	65,7	73,8	
Access to supplier databases	19,0	17,8	22,6	27,0	
Access to client databases	14,9	14,2	15,2	20,5	
Research and development in conjunction with others	7,6	6,7	9,6	13,9	
Training: interactive access to training material through online courses	9,4	7,8	12,5	21,3	
Automation or elimination of supplier production/distribution phases	2,6	2,3	3,7	4,4	
Automation or elimination of client production/distribution phases	2,6	2,2	5,6	4,1	
Advertising/marketing	18,1	15,2	25,3	38,3	
Purchase of goods and services	5,8	5,0	11,5	9,2	
Sale of goods and services	3,0	2,7	4,9	4,4	
Obtaining information relating to the Administration and Public Sector in general	43,2	38,7	59,2	73,2	
Bureaucratic procedures with the Administration	22,5	18,3	32,3	52,8	

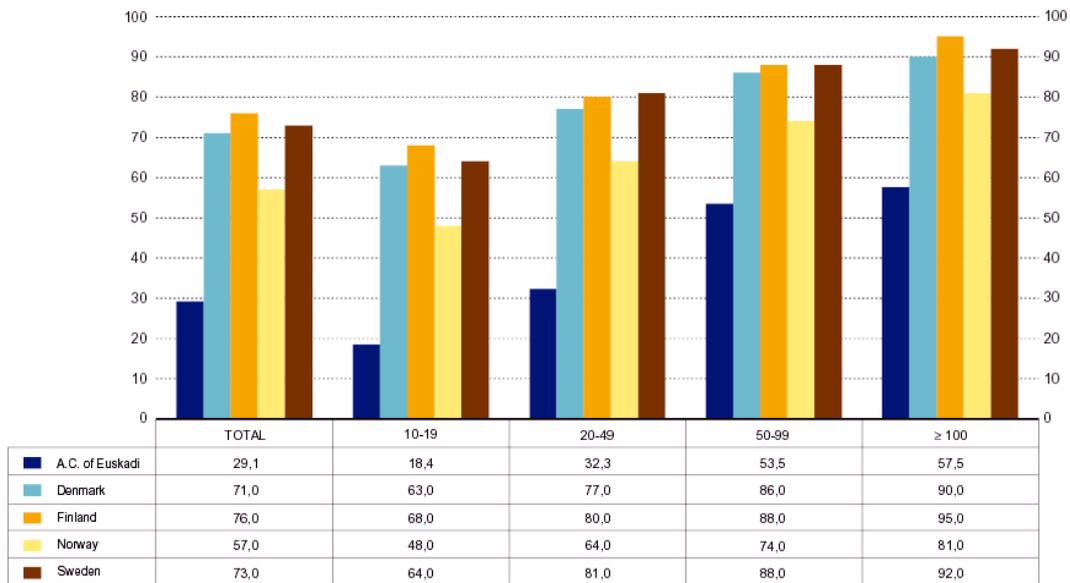
Source: ESI - Companies. 2000 **Eustat**

TABLE 4. INFORMAZIOAREN GIZARTEARI BURUZKO INKESTA ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACION		2000		
USE OF THE INTERNET BY COMPANIES WITH OVER 9 EMPLOYEES. A.C. OF EUSKADI. 2000. (%)	General Information	Administrative procedures	Purchase of goods and services	
A.C. of Euskadi	83,5	43,9	9,6	
Denmark	99,0	64,0	39,0	
Finland	95,0	56,0	38,0	
Norway	91,0	62,0	37,0	
Sweden	90,0	–	52,0	

Source: Nordic Countries: Use of ICT in Nordic enterprises 1999/2000. Statistics Denmark, Finland, Norway and Sweden.

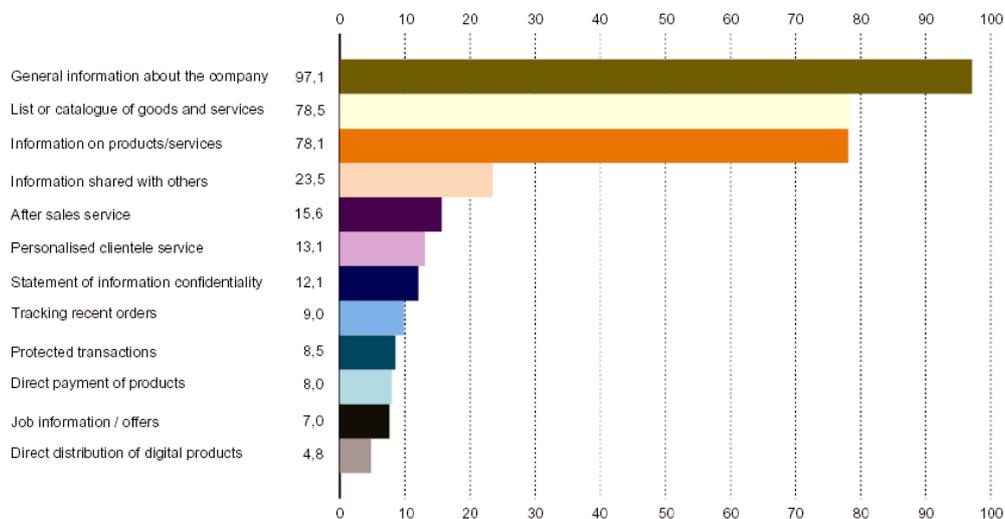
A.C. of Euskadi: Survey on the Information Society. -ESI- Companies. 2000 **Eustat**

GRAPH 6: Companies with over 9 employees and a Web site. 2000 (%)



Source: Nordic Countries: Use of ICT in Nordic enterprises 1999/2000. Statistics Denmark, Finland, Norway and Sweden.
 A.C. of Euskadi: ESI - Companies. 2000 Eustat

GRAPH 7: Services offered by companies with a Web site. A.C. of Euskadi. 2000 (%)



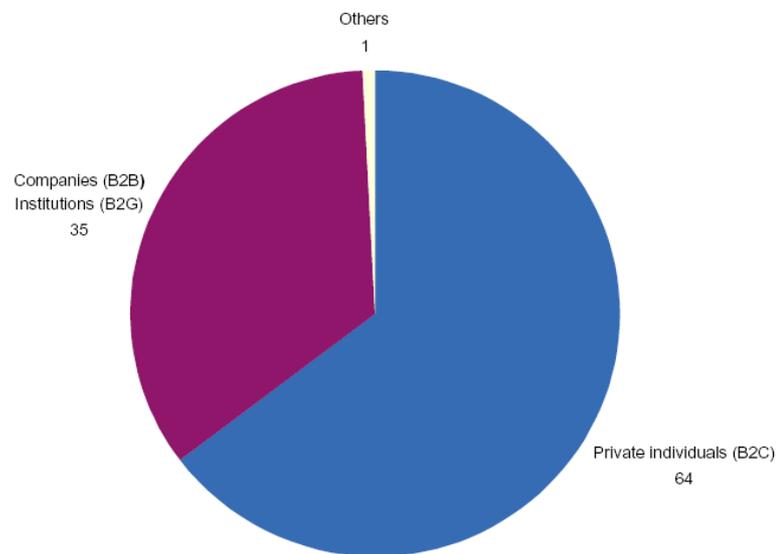
Source: ESI - Companies. 2000 Eustat

TABLE 5	INFORMAZIOAREN GIZARTEARI BURUZKO INKESTA ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACION	2000
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SERVICES ON THE WEB SITE OF COMPANIES WITH OVER 9 EMPLOYEES. 2000 (%)	Marketing	After sales service	Distribution of digital products	Direct payment of products and services
A.C. of Euskadi	81,1	14,1	5,9	6,1
Denmark	93,0	40,0	18,0	24,0
Finland	93,0	43,0	25,0	22,0
Norway	98,0	43,0	19,0	15,0
Sweden	96,0	47,0	8,0	10,0

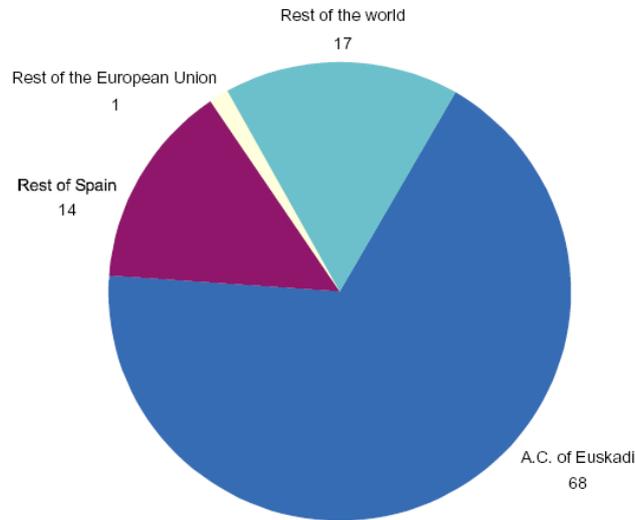
Source: Nordic Countries: Use of ICT in Nordic enterprises 1999/2000. Statistics Denmark, Finland, Norway and Sweden.
 A.C. of Euskadi: Survey on the Information Society. -ESI- Companies. 2000 **Eustat**

GRAPH 8: Distribution of sales through the Internet by type of clients.
A.C. of Euskadi. 2000. (%)



Source: ESI - Companies. 2000 **Eustat**

**GRAPH 9: Distribution of sales through the Internet according to geographic origin of clients.
A.C. of Euskadi. 2000 (%)**



Source: ESI - Companies. 2000 **Eustat**

TABLE 6

INFORMAZIOAREN GIZARTEARI BURUZKO INKESTA
ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACION

2000

FACTORS THAN STIMULATE THE DEVELOPMENT OF E-COMMERCE. A.C. OF EUSKADI. 2000 (%)

Speed	29,7%
Market expansion	28,4%
Advertising	28,3%
Improving client services	27,1%
Image	26,8%
Simplification of purchase-sales process	20,9%
Reducing costs	19,8%

Source: ESI - Companies. 2000 **Eustat**

TABLE 7

INFORMAZIOAREN GIZARTEARI BURUZKO INKESTA
 ENCUESTA SOBRE LA SOCIEDAD DE LA INFORMACION

2000

OBSTACLES FACING E-COMMERCE. A.C. OF EUSKADI. 2000 (%)

Due to the nature of the goods and services	59,5%
Prefer the current model	55,1%
Clients unprepared	39,4%
Risk of fraud and related costs	25,4%
Question of security and confidentiality	23,9%
Very high cost of technology	23,4%
Lack of personnel to use the technology	22,5%
Very high cost of maintenance	22,3%
Possible analysis of information by competitors	21,3%
Uncertainty on advantages of the technology	20,8%
Uncertainty with regard to national and foreign laws	20,7%
Lack of reliability of the Internet	19,5%
Opposition to technological changes among personnel	18,2%
Slowness of Internet	16,6%
Investment in networks other than the Internet	9,3%

Source: ESI - Companies. 2000 Eustat

APPENDIX III. QUESTIONNAIRES

DTI

Interview introduction

Good morning/afternoon. May I speak to **[NAMED CONTACT]**? My name is [#]. I'm calling from Total Romtec, on behalf of the Department of Trade and Industry **[FOREIGN INTERVIEWS: the trade and industry department of the UK government]**. The Government is conducting a survey about businesses's use of online technologies such as e-mail and the Internet. They want to understand how your business uses these technologies for communicating and e-business. The interview should take no more than 15 minutes. Would you be prepared to help us?

NB. IF CLOSE TO REFUSAL BECAUSE BUSINESS DOES NOT USE IT, THEN SAY: We are also interested in your opinions of these technologies, and whether you have considered implementing them and what are the barriers against your business developing your capabilities in this area.

Please answer the questions I will ask you, based on your entire business in **[INSERT COUNTRY]**, including all its locations and branches.

NOTE TO CATI: PLEASE KEEP ALL SAMPLE DETAILS IN THE FILE (INCLUDING NAME, ADDRESS, SOURCE OF SAMPLE, TURNOVER AND NUMBER OF EMPLOYEES)

Section A: Respondent details

A1. ASK ALL.

Can I just check: Do you have responsibility for the strategic use of information technology in your business?

01 If Yes **CONTINUE**

02 If No **ASK FOR CONTACT DETAILS OF SOMEONE WHO HAS.**

A2. ASK ALL.

Firstly, could you give me your job title? **UNPROMPTED, CODE AS APPLICABLE.**

01 IT/MIS/Computer service manager/director **CONTINUE**

02 Network manager/director **CONTINUE**

03 Information systems manager/director **CONTINUE**

04 Operations manager/director **CONTINUE**

05 (Tele) Communications manager/director **CONTINUE**

06 Managing director **CONTINUE**

07 Director **CONTINUE**

08 Partner **CONTINUE**

09 President **CONTINUE**

10 Owner **CONTINUE**

11 Chief executive **CONTINUE**

12 Other (please specify) **CONTINUE**

99 Don't know **CONTINUE**

Section B: Business details

B1. ASK ALL, READ OUT, CODE ALL THAT APPLY.

And does your business have #?

01 One location only **CONTINUE**

02 More than one location in **[INSERT COUNTRY eg UK] CONTINUE**

03 At least one location in **[INSERT COUNTRY eg UK]** and at least one location internationally **CONTINUE**

B2. ASK ALL. CATI TO RECORD THE ACTUAL NUMBER OF EMPLOYEES THEN CODE IN BANDS.

How many employees does your business have in **[INSERT COUNTRY eg UK]** including the owner?

01 1 **CONTINUE**

02 2-5 **CONTINUE**

03 6-9 **CONTINUE**

04 10-25 **CONTINUE**

05 26-50 **CONTINUE**

06 51-100 **CONTINUE**

- 07 101-250 **CONTINUE**
- 08 251-500 **CONTINUE**
- 09 501-1000 **CONTINUE**
- 10 1001-5000 **CONTINUE**
- 11 5001+ **CONTINUE**
- 99 Don't know **CLOSE**

B3. ASK ALL: Can I check that your sector is the following **[AND READ OUT SECTOR INFORMATION FROM D&B]**?

B3A. IF INCORRECT: What is your main business activity?

B4. ASK ALL.

Within your market would you describe yourself as #

- 01 A specialist provider in this context. Specialist means you supply 10 units or less units or services/contracts per week
- 02 A small/medium volume provider, that is between 11 and 1000 units or services/contracts per week
- 03 A large volume provider which means you supply over 1000 units or services/contracts per week
- 99 Don't know

Section C: Technology

LINK. The next section is about the technologies your business uses.

C1. ASK ALL.

Does your business have or use any of the following technologies?

- 01 X Y Access to the Internet
- 02 X Y A website
- 03 X EDI (**IF YES, ASK:** Do you have Internet EDI - yes/no/both?)
- 04 X Intranet
- 05 X Y Extranet
- 06 X Internal E-mail (ie to contact others within your business)
- 07 X Y External E-mail (ie to contact others outside your business)
- 08 X Local Area Network (network connecting computers at one building or site)
- 09 X Wide Area Network (network connecting computers between multiple sites)
- 10 X Interactive (automated) telephony
- 11 Video conferencing
- 12 X **FRANCE ONLY:** Minitel (**IF YES,** Is this provided on the Internet - yes/no/both?)
- 13 None of the above

C2. ASK THOSE BUSINESSES WHO SAID 01 AT C1.

When did your business connect to the Internet?

- 01 Less than a year ago **CONTINUE**
- 02 Between 1 and 3 years ago **CONTINUE**
- 03 Over 3 years ago **CONTINUE**

C3. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED Y AT C1.

And how is your Internet connection provided?

- 01 With a dial-up modem to a PSTN [**PUBLIC SWITCHED TELEPHONE NETWORK**]
- 02 With a leased line
- 03 With an ISDN line [**INTEGRATED SERVICES DIGITAL NETWORK - TURNS A COPPER PHONE LINE INTO A HIGH SPEED DIGITAL LINK**]
- 04 With an ADSL [**DIGITAL SUBSCRIBER LINE**]
- 05 With cable modem
- 06 With wireless broadband or satellite
- 99 Don't know

C3A. IF SAID CABLE MODEM OR LEASED LINE And what bandwidth do you have?

- 01 Less than 385 kbits **CONTINUE**
- 02 385kbits to 2 Mbit/s **CONTINUE**
- 03 Over 2 but less than 10 Mbit/s **CONTINUE**
- 04 Over 10 Mbit/s **CONTINUE**
- 99 Don't know

C4. ASK THOSE BUSINESSES WHO SAID 01 AT C1. RECORD APPROXIMATE PERCENTAGE. NOTE TO CATI/DP PLEASE INSERT 0% FOR ANY RESPONDENTS WHO SAY THEY DO NOT USE THE INTERNET AT C1.

What percentage of your employees use the Internet at work at least once a month?

IF NECESSARY, By the Internet I mean "surfing the web", not purely e-mail?

C5. ASK ALL BUSINESSES WHO USED A TECHNOLOGY MARKED X AT C1.

Can your employees access your computer system remotely from non-business locations when they're away from the office?

- 01 Yes **CONTINUE**
- 02 No **CONTINUE**
- 99 Don't know **CONTINUE**

C6. ASK WHO SAID THEY USED EXTERNAL E-MAIL AT C1. ENTER APPROXIMATE %, CODE ALL NON USERS AS 0%.

What percentage of your employees make daily use of external e-mail for communication with suppliers, customers and others outside your business?

C7. ASK ALL BUSINESSES WHO SAID THEY DIDN'T HAVE A WEBSITE AT C1.

You mentioned earlier that your business doesn't have a website. Do you intend to set one up?

- 01 Yes **CONTINUE**
- 02 We are currently setting up a website **CONTINUE**
- 03 We are considering setting up a website **CONTINUE**
- 04 No **CONTINUE**
- 99 Don't know **CONTINUE**

C8. ASK ALL WHO HAVE A WEBSITE: How often is information on your website updated?

- 01 Constantly by staff dedicated to website development **CONTINUE**
- 02 Frequently (daily) **CONTINUE**
- 03 Quite often (between 1 and 4 times a week) **CONTINUE**
- 04 Occasionally (between 1 and 3 times a month) **CONTINUE**
- 05 On an ad hoc basis **CONTINUE**
- 99 Don't know **CONTINUE**

C9. ASK THOSE BUSINESSES WHO SAID THEY HAVE WEBSITE.

Does your business evaluate the effectiveness of your website? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK** Could you tell me in which of the following ways you evaluate it? **READ OUT 02-07 AND CODE AS APPLICABLE.**

- 01 Don't evaluate effectiveness of website **GO TO C10**
- 02 Record the number of hits or visitors to your website **CONTINUE**
- 03 Analyse the individual web pages viewed by visitors to your website **CONTINUE**
- 04 Analyse the financial value of orders received via your website **CONTINUE**
- 05 Evaluate the number of hits which result in further communication **CONTINUE**
- 06 Analyse cookie information **CONTINUE**
- 07 Other (please specify) **CONTINUE**
- 99 Don't know **CONTINUE**

C10. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Do you provide any of the following to people outside your business using online technologies?

- 01 Information on goods and services **CONTINUE**
- 02 Information on your purchasing requirements **CONTINUE**
- 03 Information on your operation, or goods/service development **CONTINUE**
- 04 Information on availability, terms and conditions, or pricing information **CONTINUE**
- 05 Delivery schedules and delivery costs **CONTINUE**
- 06 After-sales service information **CONTINUE**
- 07 Business accounts and other financial information **CONTINUE**
- 08 Information on vacancies or jobs **CONTINUE**
- 09 Other (please specify) **CONTINUE**

C11. ASK THOSE BUSINESSES WHO MENTIONED ONE OF THE TECHNOLOGIES MARKED X AT C1.

Do you use online technologies to collect information in any of the following areas?

- 01 Market research or other marketing information **CONTINUE**
- 02 Information for use in developing goods and services **CONTINUE**
- 03 Banking, investment or financial information **CONTINUE**
- 04 Government information and services **CONTINUE**
- 05 Information on training and staff development **CONTINUE**

Section D: Marketing and sales

D1. ASK THOSE BUSINESSES WHO MENTIONED ONE OF THE TECHNOLOGIES MARKED X AT C1.

Can your customers do either of the following online?

- 01 Order goods and services **CONTINUE**
- 02 Make payments **CONTINUE**
- 03 Automatically re-order supplies **CONTINUE**

D2. ASK THOSE WHO ALLOW ORDERING ONLINE AT D1, OTHERWISE CONTINUE TO D5. LIST TO BE FILTERED FROM RESPONSES FROM C1.

Can customers order goods and services using the following online technologies?

- 01 Email **CONTINUE**
- 02 Website/Internet **CONTINUE**
- 03 EDI **CONTINUE**
- 04 Interactive telephony **CONTINUE**
- 05 FOR FRANCE ONLY: Minitel **CONTINUE**
- 06 Other (please specify) **CONTINUE**
- 99 Don't know **CONTINUE**

D3. ASK THOSE WHO ALLOW ORDERING ONLINE AT D1.

Can you tell me what percentage of the value of sales are ordered using online technologies?
N.B. THIS DOES NOT INCLUDE ORDERS MADE BY TELEPHONE ONCE THE CUSTOMER HAS CHECKED THE WEBSITE - ONLINE ORDERS ONLY.

D4. ASK THOSE WHO ALLOW ORDERING ONLINE AT D1.

Of the total value of online orders made by your business, what proportion are made to households? For example, if all your [INSERT PERCENTAGE FROM D3] was to households then say 100%.

D5. ASK THOSE WHO ALLOW PAYING ONLINE AT D1.

What percentage of the value of all your business's sales are paid for online?

D6. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Does your business use online technologies to change or transform the way it undertakes its marketing and sales activities? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK How? READ OUT 02-08 AND CODE AS APPLICABLE.**

01 We don't **SKIP TO NEXT QUESTION**

02 By e-mailing customers about goods and services **CONTINUE**

03 By undertaking online advertising **CONTINUE**

04 With incentives to encourage customers to purchase online **CONTINUE**

05 By providing goods and services for sale at an e-marketplace **CONTINUE**

06 By enabling customers to specify their own designs or requirements for goods and services **CONTINUE**

07 By gathering information on customers during online communication to target marketing activities **CONTINUE**

08 Any other (specify) **CONTINUE**

Section E: Business functions: logistics and delivery

E1. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Does your business use online technologies to change or transform the way you provide your goods or services? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK And how do you use them? READ OUT 02-06 AND CODE AS APPLICABLE**

01 We don't **SKIP TO NEXT QUESTION**

02 To improve communication with your customers about the delivery of goods and services **CONTINUE**

03 To improve the speed of delivery **CONTINUE**

04 To let customers track progress of goods on order **CONTINUE**

05 To enable customers to specify online where, when and how their purchase is delivered **CONTINUE**

06 Any other? (specify) **CONTINUE**

Section F: Business functions: after-sales service

F1. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Does your business use online technologies to change or transform its after-sales service activities? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK In which of the following ways? READ OUT 02-06 AND CODE AS APPLICABLE.**

01 We don't **SKIP TO NEXT QUESTION**

02 By responding online to individual after-sales queries **CONTINUE**

03 Through a frequently asked questions page online **CONTINUE**

04 Through an online search facility to find relevant information to respond to customer queries **CONTINUE**

05 By hosting a user or chat group to discuss goods or services **CONTINUE**

06 By collecting customer feedback online manually to monitor product or service quality **CONTINUE**

07 By collecting customer feedback online automatically to monitor product or service quality

CONTINUE

09 Other (please specify) **CONTINUE**

Section G: E-commerce: supplies

LINK. Now I'd like to ask you about how you work with your suppliers.

G1. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Which of the following activities do you carry out online?

02 Identify suppliers or gathering pre-purchase information **CONTINUE**

03 Check the availability of supplies **CONTINUE**

04 Order supplies

05 Make payments **CONTINUE**

06 Track the progress of goods on order **CONTINUE**

07 Use after-sales support services, such as technical support **CONTINUE**

08 Automatically re-order supplies **CONTINUE**

09 Enable automatic adjustment of supplies to meet fluctuations in requirements **CONTINUE**

10 Other (please specify) **CONTINUE**

G2. ASK THOSE WHO ORDER ONLINE AT G1, OTHERWISE CONTINUE TO H1 Which technologies are you using to order supplies? READ OUT LIST.

01 E-mail **CONTINUE**

02 Internet technologies **CONTINUE**

03 EDI **CONTINUE**

04 FOR FRANCE ONLY: Minitel **CONTINUE**

05 Other (please specify) **CONTINUE**

99 Don't know **CONTINUE**

G3. ASK THOSE WHO ORDER ONLINE AT G1(04), OTHERWISE CONTINUE TO H1. N.B. THIS DOES NOT INCLUDE ORDERS MADE BY TELEPHONE ONCE THEY HAVE CHECKED THE SUPPLIER'S WEBSITE - ONLINE ORDERS ONLY.

What percentage of the total value of the goods and services **ordered** by your business are made using online technologies?

G4. ASK THOSE WHO PAY ONLINE AT G1, OTHERWISE CONTINUE TO H1.

And what percentage of the total value of the goods and services made by your business are **paid** for using online technologies?

Section H: Business functions: operations, processing and assembly

Now, thinking about the way you produce your goods and services.

H1. Does your business use online technologies to change or transform the way it produces its goods or services? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK How? READ OUT 02-03 AND CODE AS APPLICABLE.**

01 We don't **SKIP TO NEXT QUESTION**

02 To enhance flexibility in operations and production methods **CONTINUE**

03 To automate supplier relationships, and provide customers with greater flexibility in what they can order **CONTINUE**

04 Other (please specify) **CONTINUE**

H2. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Does your business use the online technologies to change or transform the way you develop your goods and services? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK** In which of these ways? **READ OUT 02-07 AND CODE AS APPLICABLE.**

01 We don't **SKIP TO NEXT QUESTION**

02 By more communication with partners when developing goods and services **CONTINUE**

03 Through more collaboration between your design system and those of partners **CONTINUE**

04 Through faster incorporation of new materials, components or services **CONTINUE**

05 To reduce development lead times **CONTINUE**

07 Any other (please specify) **CONTINUE**

99 Don't know **CONTINUE**

Section I: Business functions: finance (other than online payment for goods and services)

H1. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Does your business use online banking or investment services?

01 Yes **CONTINUE**

02 No **CONTINUE**

99 Don't know **CONTINUE**

H2. ASK THOSE BUSINESSES WHO SAID ONE OF THE TECHNOLOGIES MARKED X AT C1.

Does your business use online technologies to change or transform the way it undertakes financial activities? **IF NO, CODE 01 AND SKIP TO NEXT QUESTION, IF YES ASK** How? **READ OUT 02-05 AND CODE AS APPLICABLE.**

01 We don't **SKIP TO NEXT QUESTION**

02 By accessing accounts and cash flow **CONTINUE**

03 By getting real-time knowledge of your business's financial situation **CONTINUE**

04 By using all your financial information to optimize the business's cash flow situation in real time **CONTINUE**

05 Any other (please specify) **CONTINUE**

Section J: E-commerce: barriers and enablers

Now, I'd like to ask you a few questions about some of the factors which have influenced the use of online technologies within your business.

J1. FILTER LIST FROM C1 ASK ABOUT TECHNOLOGIES NOT CURRENTLY USED.

Has your business ever considered using any of the following technologies?

- 01 Access to the Internet
- 02 Website
- 03 EDI
- 04 Intranet
- 05 Extranet
- 06 Internal E-mail (ie to contact others within your business)
- 07 External E-mail (ie to contact others outside your business)
- 08 Local Area Network (network connecting computers at one building or site)
- 09 Wide Area Network (network connecting computers between multiple sites)
- 10 Interactive (automated) telephony
- 11 Video conferencing
- 12 **FRANCE ONLY:** Minitel
- 13 None of the above

J2. **ASK ALL X AT C1:** Please tell me if you strongly agree, agree, neither agree nor disagree, disagree or disagree strongly that the following are barriers to increased use of online technologies.

ASK ALL WHO DON'T USE A TECHNOLOGY X AT C1: Please tell me if you strongly agree, agree, neither agree nor disagree, disagree or disagree strongly that the following are barriers to your use of online technologies.

- 01 Online technology set-up costs **CONTINUE**
- 02 Online technology running costs **CONTINUE**
- 03 Concerns about the risk of fraud **CONTINUE**
- 04 Concerns about confidentiality **CONTINUE**
- 05 Not enough of your customers have online access **CONTINUE**
- 06 Your employees don't have the IT skills **CONTINUE**
- 07 You don't have time to understand **CONTINUE**
- 08 It isn't relevant to your business **CONTINUE**
- 09 It offers no tangible benefits **CONTINUE**
- 10 Other (please specify) **CONTINUE**

J3. **ASK ALL:** And, using the same scale, how far would you agree that online technologies will #

- 01 Increase business turnover significantly **CONTINUE**
- 02 Increase your customer base in existing markets significantly **CONTINUE**
- 03 Increase your customer base in overseas markets significantly **CONTINUE**
- 04 Improve the quality of goods and services **CONTINUE**
- 05 Help you to communicate better with customers **CONTINUE**
- 06 Help you to communicate better with your workforce **CONTINUE**
- 07 Help you operate more effectively with your suppliers **CONTINUE**

- 08 Help you undertake operations more efficiently **CONTINUE**
- 09 Help you improve your delivery of goods and services **CONTINUE**
- 10 Enable better financial management **CONTINUE**
- 11 Help you better integrate all your business processes **CONTINUE**

J4. ASK ALL:

Which of the following best describes the attitudes of your business regarding technologies mentioned in the survey?

- 01 Don't believe it is useful to our business
- 02 Never really thought about it
- 03 Too difficult to implement
- 04 It could offer some benefits
- 05 It is definitely the way forward

Section K: Sources of advice

LINK: Finally, I'd like to ask a few questions where you obtain IT advice from.

K1. ASK ALL:

Do you obtain advice from any of the following sources? **READ OUT LIST.**

- 01 Experts within your organisation **CONTINUE**
- 02 Technology suppliers **CONTINUE**
- 03 Government business support organisations **CONTINUE**
- 04 General media **CONTINUE**
- 05 Specialist journals and books **CONTINUE**
- 06 Don't know **CONTINUE**

K2. How would you rate the quality of IT advice your business is getting?

- 01 Very poor
- 02 Poor
- 03 Adequate
- 04 Good
- 05 Very good

K3.. Do you have any online interaction with local or central government? For example, do you:

- 01 Communicate with them by e-mail **CONTINUE**
- 02 Access regulatory information from government sources **CONTINUE**
- 03 Make tax or other payments to government **CONTINUE**

K4. Finally, would you be willing to discuss these types of issues again in the future?

- 01 Yes
- 02 No

EUSTAT



**SURVEY ON
THE
INFORMATION SOCIETY**

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Section A- Use of communication and information technology.

A.1. Indicate whether your establishment uses or foresees using the following communication and information technology:

	In Use	Use foreseen		
		Under 1 year	Over 1 year	Use unforeseen
1.- Mobile phone or other personal communication services (pagers, ...)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.- Electronic mail/e-mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.- Personal computers: PCs, laptops; terminals belonging to a large computer (screens depending on a computer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.- Company computer networks: LAN-Local Area Network or WAN-Wide Area Network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.- Internet / www	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.- Intranet (internal communications network based on the same protocol as the Internet and that enables communications on an internal level within an organization)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.- Extranet (protected extension of an Intranet that enables outside users to have access to certain Intranet elements of an organization)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.- Electronic funds transfer (with the aid of an electronic terminal, phone, computer and a magnetic strip)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.- EDI-Electronic Data Interchange through the Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.- EDI-Electronic Data Interchange through a means other than the Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A.2. What percentage of your staff usually use personal computers, terminals, etc.? %

A.3. What percentage of your staff has access to:

- E-mail %

- Internet %

Section B- Internet Users (Fill in if your establishment uses the Internet; otherwise go to section F)

B.1. Access to the Internet in your establishment is carried out through:

1.- Ordinary telephone lines with a modem

2.- RDSI

3.- Frame Relay

4.- Point to Point

5.- Others. Specify

B.2. State whether your establishment uses Internet or not in the following activities:

	Yes	No
1.- Document search	<input type="checkbox"/>	<input type="checkbox"/>
2.- E-mail (send/receive messages without attached files)	<input type="checkbox"/>	<input type="checkbox"/>
3.- Electronic file interchange (including files attached to e-mail messages)	<input type="checkbox"/>	<input type="checkbox"/>
4.- Access to supplier databases	<input type="checkbox"/>	<input type="checkbox"/>
5.- Access to client databases	<input type="checkbox"/>	<input type="checkbox"/>
6.- Research and development in conjunction with others	<input type="checkbox"/>	<input type="checkbox"/>
7.- Training: interactive access to training material through online courses	<input type="checkbox"/>	<input type="checkbox"/>
8.- Automation or elimination of production/distribution phases with suppliers	<input type="checkbox"/>	<input type="checkbox"/>
9.- Automation or elimination of production/distribution phases with clients	<input type="checkbox"/>	<input type="checkbox"/>
10.- Advertising/marketing	<input type="checkbox"/>	<input type="checkbox"/>
11.- Buying goods and services	<input type="checkbox"/>	<input type="checkbox"/>
12.- Sale of goods and services (transactions not necessarily finalised/paid for)	<input type="checkbox"/>	<input type="checkbox"/>
13.- Obtaining information relating to the Administration and Public Sector in general (Official Gazettes, subsidies, statistical information, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
14.- Administrative procedures (Treasury, INEM, Social Security, Town Councils, etc.)	<input type="checkbox"/>	<input type="checkbox"/>

B.3. Has the use of the Internet replaced any communication technology or service used previously?

- Yes, completely → Which? _____
- Yes, partially → Which? _____
- No

B.4. Has the use of the Internet replaced any kind of advertising used previously?

- Yes, completely → Which? _____
- Yes, partially → Which? _____
- No

B.5. Does your establishment have a Web site?

- Yes → **Fill in Section C**
- No → **Fill in Section E**

Section C- Internet Web site (To be filled in if you have an Internet Web site).

C.1. State whether your Web site offers any of the following services:

	Yes	No
1.- General information about the company.....	<input type="checkbox"/>	<input type="checkbox"/>
2.- List or catalogue of goods and services	<input type="checkbox"/>	<input type="checkbox"/>
3.- Information about products/services in the catalogue.....	<input type="checkbox"/>	<input type="checkbox"/>
4.- Direct payment for products/services acquired.....	<input type="checkbox"/>	<input type="checkbox"/>
5.- Tracking the status of orders.....	<input type="checkbox"/>	<input type="checkbox"/>
6.- After-sales service (e.g. a space directed at clients' comments).....	<input type="checkbox"/>	<input type="checkbox"/>
7.- Personalised service for clientele (e.g. personalised presentation of products/services)	<input type="checkbox"/>	<input type="checkbox"/>
8.- Direct distribution of digital products or services supplied on the network (software, reports, music, games, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
9.- Protected transactions (e.g. security passages or protected servers)	<input type="checkbox"/>	<input type="checkbox"/>
10.- Declaration of confidentiality of confidential data information/protection	<input type="checkbox"/>	<input type="checkbox"/>
11.- Job information/offers	<input type="checkbox"/>	<input type="checkbox"/>
12.- General information (about the sector, products) that are shared on the web for free with others (clients or competitors)	<input type="checkbox"/>	<input type="checkbox"/>

C.2. Does your Web site include "links" or direct connections to other Web sites?

- Yes → How many?.....
- No

C.3. Does your establishment subcontract the creation, maintenance and/or set up of your Web site?

- Yes
- No

C.4. In which year was your Web site set up?

- Before 1999 → **Fill in question C.5**

- In 1999 → **Fill in question C.6**

- In 2000 → **Fill in question C.7**

C.5. How much did the maintenance/improvement of your Web site cost in 1999 (including salaries)?

thousand pesetas **(Go to question C.8)**

C.6. How much was expenditure (including salaries) in:

- 1999 for the installation of your Web site thousand pesetas

- The forecast for 2000 for the maintenance/improvement of your Web thousand pesetas **(Go to question C.8)**

C.7. How much was expenditure (including salaries) in the year 2000 for the installation of your Web site?

Thousand pesetas

C.8. Can your products/services be bought through the Internet with or without direct payment (on line)?

- Yes → **Fill in section D.**

- No → **Fill in section E.**

Section D-. Trade through the Internet – Sales
(Fill in if your products and/or services may be purchased through the Internet).

D.1. What percentage of the complete range of products and/or services your establishment offers may be bought through your Web site on the Internet?.

- From 1 to 33%.....

- From 34 to 66%.....

- From 67 to 99%.....

- 100%

D.2. Distribute by percentage the products and/or services sold by your establishment over 1999 and your forecast for the year 2000.

	1999	Forecast 2000
1.- Internet sales (with or without payment through this means).....	<input type="text"/> %	<input type="text"/> %
2.- Sales through the traditional trade model (e.g. by telephone, fax, order, etc.).....	<input type="text"/> %	<input type="text"/> %
	1 0 0 %	1 0 0 %

D.3. Distribute by percentage the Internet sales made and forecast according to the method of payment.

1.- Direct payment on the Internet (card).....	<input type="text"/> %	<input type="text"/> %
2.- Other methods of payment (payment on delivery, bank cheque, traditional bank transfer, etc.).....	<input type="text"/> %	<input type="text"/> %
	1 0 0 %	1 0 0 %

D.4. Distribute by percentage the Internet sales made and forecast according to the type of clients.

1.- Private individuals	<input type="text"/> %	<input type="text"/> %
2.- Companies/Institutions.....	<input type="text"/> %	<input type="text"/> %
3.- Others.....	<input type="text"/> %	<input type="text"/> %
	1 0 0 %	1 0 0 %

D.5. Distribute by percentage the Internet sales made and forecast according to the geographic origin of the clients:

1.- A.C. of Euskadi.....	<input type="text"/> %	<input type="text"/> %
2.- Rest of Spain	<input type="text"/> %	<input type="text"/> %
3.- Rest of the European Union	<input type="text"/> %	<input type="text"/> %
4.- Rest of the World.....	<input type="text"/> %	<input type="text"/> %
	1 0 0 %	1 0 0 %

Section E-. Internet Trade – Sales/Purchases
(Fill in if your establishment purchases products and/or services through the Internet).

E.1. Distribute by percentage the value of the products and/or services purchased in 1999 and forecast for the year 2000 by your establishment		1999	Forecast 2000
1.-	Purchase/acquisition by Internet (with or without payment through this means).....	[] %	[] %
2.-	Purchase/acquisition using the traditional trade model (e.g. by telephone, fax, order, etc)	%	%
		1 0 0 %	1 0 0 %
E.2. Distribute by percentage the Internet purchases/acquisitions made and forecast according to the geographic origin of your suppliers.			
1.-	A.C. of Euskadi.....	%	%
2.-	Rest of Spain.....	[] %	[] %
3.-	Rest of the European Union.....	[] %	[] %
4.-	Rest of the World.....	[] %	[] %
		1 0 0 %	1 0 0 %

Section F-. Stimuli for the development of electronic trade.

F.1. Which of the following factors stimulate, in your opinion, the development of electronic trade (purchase-sale) in your establishment?		Yes	No
1.-	Market expansion.....	<input type="checkbox"/>	<input type="checkbox"/>
2.-	Improving customer service.....	<input type="checkbox"/>	<input type="checkbox"/>
3.-	Speed.....	<input type="checkbox"/>	<input type="checkbox"/>
4.-	Reduction in costs.....	<input type="checkbox"/>	<input type="checkbox"/>
5.-	Simplification of the purchase/sale process.....	<input type="checkbox"/>	<input type="checkbox"/>
6.-	Advertising.....	<input type="checkbox"/>	<input type="checkbox"/>
7.-	Image.....	<input type="checkbox"/>	<input type="checkbox"/>
8.-	Others. Specify _____	[]	[]

Section G-. Obstacles facing the development of electronic trade.

G.1. Do you consider the following factors to be obstacles to the practice of electronic commerce in your establishment?		Yes	No
1.-	The nature of our goods and services hinders transactions through the Internet.....	<input type="checkbox"/>	<input type="checkbox"/>
2.-	Our clients are not prepared to use commerce through the Internet.....	<input type="checkbox"/>	<input type="checkbox"/>
3.-	Preference to keep the current commercial model (e.g. personal contact).....	<input type="checkbox"/>	<input type="checkbox"/>
4.-	Staff opposition to technological changes.....	<input type="checkbox"/>	<input type="checkbox"/>
5.-	Uncertainty regarding the advantages of technology.....	<input type="checkbox"/>	<input type="checkbox"/>
6.-	Distrust in Internet.....	<input type="checkbox"/>	<input type="checkbox"/>
7.-	High cost of technology.....	<input type="checkbox"/>	<input type="checkbox"/>
8.-	High maintenance costs.....	<input type="checkbox"/>	<input type="checkbox"/>
9.-	Lack of staff capable of developing and using technology.....	<input type="checkbox"/>	<input type="checkbox"/>
10.-	Significant investment in already existent networks other than Internet.....	<input type="checkbox"/>	<input type="checkbox"/>
11.-	Internet slowness.....	<input type="checkbox"/>	<input type="checkbox"/>
12.-	Uncertainty about national and foreign laws regarding commerce through the Internet.....	<input type="checkbox"/>	<input type="checkbox"/>
13.-	Risk of fraud and related costs.....	<input type="checkbox"/>	<input type="checkbox"/>
14.-	Questions of security and confidentiality (e.g. non-authorized exchange of data).....	<input type="checkbox"/>	<input type="checkbox"/>
15.-	Possible analysis of company information by competitors (e.g. prices).....	<input type="checkbox"/>	<input type="checkbox"/>
16.-	Others. Specify _____	[]	[]

Section H-. Sales and operating costs.

H.1. What is your establishment's turnover?			
-	In 1999.....	[]	thousand pesetas
-	Forecast for 2000.....	[]	thousand pesetas
H.2. What are the operating costs (exterior purchases and services: Accounts 60 and 62 of the General Accounting Plan) of your establishment?			
-	In 1999.....	[]	thousand pesetas
-	Forecast for 2000.....	[]	thousand pesetas

URL list:

[url1]:<http://ebusiness.mit.edu/erik>
[url2]:<http://www.nber.org/papers/w7136>
[url3]:<http://www.nber.org>
[url4]:<http://www.imf.org>
[url5]:<http://ebusiness.mit.edu>
[url6]:http://www.oecd.org/dsti/sti/prod/sti_wp.htm
[url7]:<http://www.quantos-stat.com>
[url8]:<http://www.tecsysip.com>
[url9]:<http://www.upc.es>
[url10]:<http://www.idescat.es>
[url11]:<http://www.upcnet.es>
[url12]:<http://www.uva.nl>
[url13]:<http://www.arcs.ec.at>
[url14]:<http://www.inist.fr>
[url15]:<http://www.dti.gov.uk>
[url16]:http://www.stat.fi/tk/yr/tietoyhteiskunta/ict_nordic01.pdf
[url17]:<http://dursi.gencat.net>
[url18]:<http://www.idescat.es>
[url19]:<http://www.ine.es>
[url20]:<http://www.ine.es>
[url21]:<http://www.eustat.es>

Bibliography:

Baily M.N.; Lawrence, R.Z. (2001). "Do we have a new e-economy?", NBER working paper 8423, Cambridge, Massachusetts. [On-line, www.nber.org/papers/w8423].

Bresnahan, T.F.; Brynjolfsson, E.; L.M. Hitt (1999). "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-level Evidence", NBER working paper 7136, Cambridge, Massachusetts. [On-line, www.nber.org/papers/w7136].

Brynjolfsson, E. (1996). "The Contribution of Information Technology to Consumer Welfare", *Information Systems Research*, 8 (setembre), 281-300.

Brynjolfsson, E.; Kahin, B. (2000). "Understanding the Digital Economy", MIT Press, Cambridge, Massachusetts.

Brynjolfsson, E.; Hitt, L.M. (2000a). "Computing Productivity: Firm-level Evidence", MIT Working Paper, Cambridge, Massachusetts. [On-line] available on: <http://ebusiness.mit.edu/erik>.

Brynjolfsson, E.; Hitt, L.M. (2000b). "Beyond Computation: Information Technology, Organizational Transformation and Business Performance". *The Puzzling Relations Between Computer and the Economy*, MIT Press, Cambridge, Massachusetts.

Castells, M.; Diaz, M. I. (2001) "Diffusion and uses of Internet in Catalonia and Spain. A commented summary of available evidence, as of 2001" IN3-working paper. Published and available on-line: www.uoc.edu

Castells, M. (2001). *La galaxia Internet. Reflexiones sobre Internet, empresa y sociedad*. Ed. Plaza&Janés, Madrid.

Castells, M (2000). *The Information Age: Economy, Society and Culture. Volume III: End of Millennium*, Blackwell Publishers, Cambridge, Massachusetts.

Castells, M (1998). *The Information Age: Economy, Society and Culture. Volume III: End of Millennium*, Blackwell Publishers, Cambridge, Massachusetts.

Castells, M (1997). *The Information Age: Economy, Society and Culture. Volume II: The Power of Identity*, Blackwell Publishers, Cambridge, Massachusetts.

- Chandler, A. (2000) *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*, The MIT Press, Massachusetts.
- CIDEM (2000) "Innovation Plan Of Catalonia 2001-2004". [On-line] available on: www.gencat.es/cidem
- Colecchia, A. (2001). "The Impact of Information and Communications Technologies on Output Growth: Issues and Preliminary Findings", STI Working Papers 11, OECD, Paris. [On-line]. available on: www.oecd.org/dsti/sti/prod/sti_wp.htm.
- Colecchia, A.; Schreyer, P. (2001). "ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case?. A comparative study of nine OCDE Countries", STI Working Papers 2001/7, OECD, Paris. [On-line] available on: www.oecd.org/dsti/sti/prod/sti_wp.htm.
- COTEC (2001) Several reports. [On-line] Available on: www.cotec.es
- Council of Economic Advisors (2001). *Annual Report*, United States Government Printing Office, Washington D.C.
- Daveri, F. (2001). "Information Technology and Growth in Europe", University of Parma, mimeo, Parma.
- DTI (2001) "Business in the information age", DTI, London. [On-line] available on: www.dti.gov.uk
- DURSI (2001) "la Societat de la Informació a Catalunya", [On-line] available on: www.gencat.es/dursi
- (2000) "Use of ICT in Nordic enterprises 1999/2000". Denmark statistics, Statistics Finland, Statistics Norway, Statistics Sweden. [On-line] Available on: www.scb.se/publkat/Int/it_use.pdf
- European Central Bank (2001). "Nuevas tecnologías y productividad en la zona del Euro", on Bulletin of July 2001, ECB, Frankfurt am Main. [On-line]. available on: www.ecb.int.
- EUSTAT (2001) "The Information Society 2000" EUSTAT. [On-line] Available on: www.eustat.es
- Gordon, R.J. (2000). "Does the "New Economy" Measure Up the Great Inventions of the Past?", *Journal of Economic Perspectives*, 14 (autumn), 49-74.
- Gordon, R.J. (1999). "Has the "New Economy" Rendered the Productivity Slowdown Obsolete?", Working Paper, Northwestern University, June 14.
- Hodge, B.J.; Anthony, W.P.; Gales, L.M. (1998). *Teoría de la Organización. Un enfoque estratégico*, Prentice Hall, Madrid
- IDESCAT (2000) "L'estadística oficial sobre la implantació de les TIC i sobre la recerca a Catalunya", IDESCAT, Barcelona.
- Johnson, G.; Scholes, K. (1996) *Dirección Estratégica. Análisis de la estrategia de las organizaciones*, Prentice Hall, Madrid.
- Jorgenson, D. W.; K. J. Stiroh (2001). "Information Technology and the US Economy", *American Economic Review*, 91 (march), 1-32.
- Jorgenson, D. W.; K. J. Stiroh (2000). "Raising the Speed Limit: US Economic Growth in the Information Age", *Brookings Papers on Economic Activity*: 1, Brookings Institution, 161-167.
- Jorgenson, D. W.; K. J. Stiroh (1999). "Productivity Growth: Current Recovery and Longer-term Trends", *American Economic Review*, 89 (2), Papers and Proceedings, 109-115.
- INE (2001) Several statistics. [On-line] Available on: www.ine.es
- Lucas, H. C. Jr. (1999). *Information Technology and the Productivity Paradox. Assessing the Value of Investing in IT*. Oxford University Press, Oxford and New York.
- Mintzberg, H.(1991). *Mintzberg y la Dirección*, Ed. Díaz de Santos, Madrid
- Navas, J.E. (1994). *Organización de la Empresa y Nuevas Tecnologías*, Ed. Pirámide,

Madrid.

Nordhaus, W.D. (2001). "Productivity Growth and the New Economy", NBER working paper 8096, Cambridge, Massachusetts. [On-line, www.nber.org/papers/w8096].

Oliner, S. D.; Sichel, D. E. (2000). "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story", *Journal of Economic Perspectives*, 14 (autumn), 3-22.

Pilat, D.; Lee, F.C. (2001). "Productivity Growth in ICT-Producing and ICT-Using Industries. A Source of Growth Differentials in the OCDE?", STI Working Papers 2001/4, OECD, Paris. [On-line]. Available at: www.oecd.org/dsti/sti/prod/sti_wp.htm.

Porter, M. (1985). *Competitive Advantage. Creating and Sustaining Superior Performance*, The Free Press, New York.

Porter, M. (2001). "Strategy and the Internet", *Harvard Business Review*, March, 63-78.

Retevisión (2001), "e-España 2001", Retevisión, Madrid. [On-line] available on: www.fundaciónretevision.es

Roeger, W. (2001). "The Contribution of Information and Communication Technologies to Growth in Europe and the United States: A Macroeconomic Analysis", *Economic Papers* nº 147, European Commission.

Schreyer, P. (2000). "The Contribution of Information and Communication Technologies to Output Growth", STI working paper 2000/2, OCDE, Paris. [On-line]. available on: www.oecd.org/dsti/sti/prod/sti_wp.htm.

SEDISI (2000) "Las tecnologías de la Sociedad de la Información en la Empresa Española, 2000", [On-line] Available on: www.sedisi.es

Stiroh, K. J. (2001). "Information Technology and the U.S. Productivity Revival: What Do the Industry Data Say?", Staff Report 115, Federal Reserve Bank of New York, New York.

UNICE (2001) "The renewed economy. Business for a dynamic Europe" [On-line] Available on: www.unice.org

US Department of Labor (2002). *Multifactor Productivity Measures for Three-digit SIC Manufacturing Industries, 1990-1999*, Bureau of Labor Statistics, Report 956, January. [On-line] available on: <http://stats.bls.gov/mfp/home.htm>.

Valdaliso, J.M.; López, S. (2000). *Historia econòmica de la empresa*, Editorial Crítica, Barcelona.

Van Ark, B. (2001). "The Renewal of the Old Economy: Europe in an Internationally Comparative Perspective", University of Groningen, mimeo, Groningen.

Whelan, K. (2000). "A Guide to the Use of Chain Aggregated NIPA Data", Finance and Economics Discussion Paper 2000/35, Board of Governors of the Federal Reserve System, Washington D.C.

Yang, S.; Brynjolfsson, E. (2001). "Intangible Assets and Growth Accounting: Evidence from Computer Investments", MIT Working Papers, Cambridge, Massachusetts. [On-line] available on: <http://ebusiness.mit.edu/erik>.

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