



THE INTERNET INDUSTRY, OTHER INFORMATION TECHNOLOGIES AND SUSTAINABLE DEVELOPMENT

Abstract. We are currently in the midst of the formation of a new industry within the broader information technology (IT) sectors, the Internet industry. This industry is presently composed of a relatively small number of firms and a vast array of users who make worldwide transactions instantaneously escaping even from the most fundamental laws and/or regulations of the countries where transactions take place. The ever increasing demand for an array of commercial, educational and entertainment services and Mosaic's user-friendly interface has made the Internet an integral part of our social and economic activities with important ramifications for the broader information technologies sector. Internet's pervasiveness creates great opportunities as well as challenges to both developed and developing countries. It is expected that ITs would have an adverse effect on the wages of low-skilled workers in industrialized countries and a positive effect on the wages of high-skilled workers. This is so because competition from low-wage countries combined with wage rigidities in the labour markets in industrialized countries creates more unemployment in the low-skilled jobs in industrialized countries. Inequalities therefore become

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even worse with the introduction and the widespread application of ITs. The pattern of inequality becomes even worse in developing countries where the levels of education among groups of citizens are more unequal.

Introduction

In the past year or so a new industry has emerged in the information technology (IT) sector, the *Internet industry*. This industry is presently composed of a relatively small number of players (firms) and a vast array of users who make worldwide transactions instantaneously escaping even from the most fundamental laws and/or regulations of the countries where transactions take place.

Originally used almost exclusively by academicians and researchers for the exchange of information, data, and for bibliographical research in world libraries, it very soon became a powerful instrument for business firms in promoting their goods and services throughout the world. According to CERT (Computer Emergency Response Team, at Pittsburgh) the total number of servers connected to Internet increased by 4,700% in 1994 compared to 1988. The

Internet presently serves 150 countries. According to the same source, the number of users in 1994 surpasses 20 million (individuals and firms together), while in 1988 it was only 1 million. The number of servers doubles every three to four months, while the number of users increases by hundreds of thousands every month.

One of the most unexpected experiences with Internet is its rapid and intense use by firms for commercial purposes. Thus, in 1994 there were 21,700 firms connected to Internet, as compared to 9,000 in 1991. This is quite surprising because the Internet system was initially supposed to function for scientific and military purposes only. Since its foundation in 1969 with a specific goal to create an indestructible electronics network with a huge number

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of sites and users, the Internet has been quite discrete and its use has been limited to a very specific group of scientific users. At present, although its commercial use is overestimated, nevertheless, a growing number of firms are using it as a powerful tool for marketing and advertising their products or services worldwide. While it is very difficult to identify the profile of firms participating in the Internet, it seems that high-tech information technologies firms are Internet's natural first clients. Nevertheless, lawyers, libraries, doctors and vendors of such traditional products such as pizzas and arts collection pieces are susceptible to use this network as well.

This paper is organized as follows. Section I presents the major players in the Internet industry and their major characteristics. The demand and supply of services in the Internet market are analyzed and certain conjectures are presented concerning their growth and the impact they may have on business strategies and consumer welfare. Section II deals with the information highway and the Internet market and the major challenges coming from the blurring of boundaries between cable companies and telecommunication and information industries. Section IV analyzes the impact of the growth of the Internet market on sustainable development with respect to industrialized and industrializing countries. Section V presents the arguments for and against regulating the Internet market, while the last section concludes and provides some policy recommendations.

I. Internet's market structure

The industry players are presently competing over the key technologies to run the network, and these technologies will play a significant role in determining the industry's structure (the number of firms) and the number of services to be offered as well as their quality. *Netscape Communications*, thanks to its relatively sophisticated technologies, has managed, at present, to get a sound position in the Internet industry. On the

other hand, the most serious competitors, a dozen of companies such as *Spyglass*, *MKS*, *Wollongong*, *Spry*, *NetManage*, etc., are offering their own Mosaic version of the *National Centre for Supercomputing Applications*, a kind of a semi-standard technology of the industry. At present, the battle over which firm will first establish its own technology standard in the industry, is reminiscent of the one of the video recording industry. Experience has shown that the pioneering firms have, most of the time, a competitive edge over the late-comers. This *first-mover advantage* principle seems to be reflected in the Internet industry as well, if we judge from the number and the reputation of each player behind the major ones.

In the Internet arena the battle seems to be between two relatively small and unknown companies, Netscape Communications and Spyglass. Nonetheless, the reality is entirely different. Behind each player there is a major well known multinational with a dominant position in the "traditional" information technology industry. Behind Netscape is *Novell* while behind Spyglass is *Microsoft*. Spyglass, although less known than Netscape, managed to gain an enviable position in the Internet industry by acquiring from NCSA the exclusive right to distribute Mosaic licences to third parties. The development of its own Mosaic version, more robust and more secure, gave this company an advantage over its rivals and allowed it to increase its competitive position to a level almost comparable to the one achieved by Netscape. On the other hand, Netscape created its major rival, Spyglass, when the former rejected a proposition for collaboration from Bill Gates of Microsoft. Microsoft has since then adopted Spyglass' Mosaic version code as a platform of its Microsoft Network, bringing, in that way, Spyglass at the door of Netscape.

Admittedly, Netscape is already well established in the industry. On the other hand, Spyglass' backing by Microsoft is

not an absolute guarantee of success and some even doubt whether Spyglass would ever be able to effectively compete with Netscape. Microsoft has not managed as yet to get a significant market share with its Windows NT in the area of network exploitation systems and it had to acquire Intuit (at 1.5 billion dollars) in an effort to correct its weaknesses with personal finance programs. Many users see competition between Netscape and Spyglass as unhealthy, since the arrival of the latter may result in the introduction of a different standard than the one currently in use. It is already the case with the existing standards in making secure financial transactions via Internet. There are two standards, *Secure Sockets* and the *Http secure*, the first introduced by Netscape while the second by Spyglass. If the two standards do not converge into one, many services already available on Internet would be inaccessible either to Netscape users or to Spyglass users.

It is expected that the new Windows '95 version would hit hard Netscape but the longer Microsoft takes to launch its new version the better for Netscape. This is so because Netscape's users would become increasingly acquainted with its programs and the host of new services that would be provided by Netscape's technologies. In that case the first-mover advantage argument is fitting perfectly well to this case.

Demand for Internet services is growing quite rapidly. According to Jayne Levin (author of the *Internet Letter*), the number of servers connected to World Wide Web used by Mosaic as a gateway to have access to various services has increased by 8,000% (from 100 to 8,000) within a year. To be sure this demand has been created by the industry itself. From September 1993 to September 1994, NCSA's interface has been distributed free (100,000 copies each month. This number is, without doubt, underestimated given that users exchange a great number of copies as well). According to another source of information (Internet Info of Virginia) the number of companies connected to Internet in

1990 was only 93 and 20,000 in 1994.

This increase in demand is mostly attributed to Mosaic's user-friendly interface. Before Mosaic's arrival, Internet was accessible to specialists of the UNIX exploitation system only. The goal of Mosaic's founders (Jim Clark and Marc Andreessen) was to produce a commercially viable, more robust and higher performance versions of World Wide Web servers, Mosaic's interface. [The interface, called Netscape Navigator costs \$40US (until very recently it was distributed free), while the servers cost from \$1,500 to \$5,000 depending whether they are with or without a security system].

Mosaic Communications' (now called Netscape Communications) high quality products and its marketing strategies conquered a critical mass of users, getting thereby a dominant position in the market. Mosaic's new product, Netscape Navigator, not only offers more possibilities in realizing transactions safely through Internet but also accelerates considerably the speed of transmissions. For instance, transferring a document used to take 3 minutes with the old Mosaic version, with Netscape it now takes 40 seconds.

A number of new services are being attached to the Internet as the technology of the latter becomes better. Indeed, *MCI Communications*, a telephone company in the United States, has already announced a strategic alliance with Netscape for using the clients-servers product of the latter for its *InterMCI Service*. Bank of America and First data are using Netscape to offer safe financial transactions. MasterCard, has adopted Netscape for its electronic payments through Internet. Novell, the biggest US company in the local networks, has adopted Netscape Navigator for many of its products, such as Word Perfect Internet Publisher Pro for Windows. A division of the *Digital Equipment Company* (DEC) has signed a strategic alliance with Netscape with a goal to promote this company's tools to its own clients, to develop a bigger variety of new programs (product differ-

entiation strategies) and to refine existing ones for the Internet. *ChannelWorks* developed by DEC makes connection to the Internet possible provided one has a cable. Its price, \$7,000US is considered very affordable given that a telephone connection to the Internet for transmissions beyond one megabit/second is much more expensive indeed.

The supply of new services via the Internet is increasing constantly. *First Virtual Holdings* uses the Internet for electronic payments. Electronic payments are not a new service for the large networks. Nonetheless, until the introduction of First Virtual service, there was no safe system for the Internet. It is now possible, for instance to buy an article by using a credit card, and have the transaction registered at the *Compuserve* servers. In these circumstances, Compuserve serves as an intermediary verifying, on behalf of the merchant, the credit and the authenticity of the client. On the contrary, there is no authentication mechanism in the Internet system. Because of the high risks associated with illicit and financial crime, there are very few financial transactions in the Internet system. First Virtual's system resembles a miniCompuserve whose function is to provide the necessary protection needed by a client for making a financial transaction safely through the Internet.

II. The information highway and the internet

The delivery of a vast array of new services through the Internet is becoming possible thanks to the information highway. Many are still confused and wonder how this information highway will be built? Without doubt the tremendous quantity of data, images and texts to be transmitted through Internet need a high quality electronics infrastructure. This is especially true with the networks linking firms and especially homes with the providers of new services. Important investments are needed for improving the present infrastructure to the one of better quality

(higher speed, etc.) and higher reliability.

Many countries are already in the race to develop these new technologies. As is usually the case, most of these countries belong to the industrialized world. Some newly developing countries (Taiwan, South Korea, Singapore, etc.) are also investing huge amounts of money to convert their outdated information infrastructure. This reflects the increasing recognition of the importance of these technologies for growth and development and the implications they may have for future wealth creation and economic well-being (more leisure, higher quality of life, etc.). Therefore, an investment in these technologies should be valued very highly by the public sector (the government's point of view) as well as by the private sector (by a firm's point of view), given the potential for realizing high rates of return.

In Canada, the private sector has already been involved and undertaken huge investment projects in an effort to forestall the overtaking of this lucrative activity by foreign firms. *Stentor*, a private consortium regrouping the majority of major Canadian telecommunication companies announced recently a massive project named *Sirius*. Under this program, it plans to invest \$8 billion (\$5.2 billion for Bell Canada alone, the biggest telecommunications company in Canada) in upgrading and modernizing the Canadian telecommunications network.¹ This revamping of the Canadian infrastructure would enable telecommunications firms to provide fibre optic connection to at least 90% of the Canadian population in the coming ten years.

Despite the sophistication of the technologies for building the information highway, some problems still remain. The major difficulty with all these technologies lies with the commutators and not in the capacity of the transmission. Presently, with the OC-48 standard transmission the speed in the main telephone network routes is 2.48 gigabits (Gbs). This corresponds to 32,500 si-

1. As a matter of fact, Sirius is a project to build a broadband-to-the-home network.



multaneous telephone conversations. Bell Canada plans to introduce shortly the new OC-192 standard with a capacity of 128,000 simultaneous conversations in a single fibre optic line.

At present, therefore, there is no problem in transmitting messages, data or images in straight lines with a great reliability and with an extraordinary speed. The problem with the new technologies relies on the nodes and commutation (i.e. intersections). The current technology, called *ATM (Asynchronous Transfer Mode)* can transmit data regrouped in standardized packages of 53 kbs instead of transmitting them as it was done in the past in no standardized packets (in packets of variable length). This new method of transmission reduces costs by eliminating the need for a sophisticated electronic procedure to identify every time the beginning of the packages, by reducing the transmission delays and by simplifying the whole transmission of data, etc.

Nevertheless, the problem with the last kilometre still remains. Despite the fact that present commutators function with a capacity of 100 Gbs and bigger systems are about to be developed soon functioning with a capacity of 1,000 Gbs, there is still a problem linking home with a high speed technology. Most experts suggest that this is very costly. One solution could be a possible collaboration between cable and telecommunication companies. This is now possible in Canada thanks to a recent CRTC (the Canadian regulatory body of telecommunications) decision. Indeed, it seems that coaxial cables used by the cable companies suffice to satisfy the current and future needs of the most sophisticated households. The coaxial cables' transmission speed, in analogue mode is 200 to 550 MHz, which corresponds to approximately 3.5 to 4 Gbs in numeric mode. This can satisfy quite well the most demanding households.

Strategic alliances or even mergers and acquisitions in the telecommunications and cable companies that will follow after the liberalization of both mar-

kets will further blur the boundaries of these two industries in Canada and elsewhere where such deregulation takes place. This is already a reality in the U.K.. This test market, however, has been disappointing. Cable and telephone companies are losing money and customers have been reluctant to subscribe to new multimedia services. One wonders whether these new technologies will become commercially viable soon. This problem is even more serious for low-income countries. Moreover, for small nations and for those which are at the very early stages of the development process an inadequate cable and telephone infrastructure compounds the problem of wiring the last household by rendering it even harder and, without doubt, still more expensive. Foreign investment and know-how would be essential for setting up a such an infrastructure. Nevertheless, the adoption rates of new networks may be slow in less developed countries for a number of reasons. First, there is a limited advanced telecommunications infrastructure and a very low computer penetration rate. These two factors in conjunction with low incomes and literacy rates restrict the demand for more sophisticated communication services.

III. Internet, EDI and Other Information Technologies and the Firm

EDI (electronic data interexchange) allows two or more firms to realize commercial transactions by avoiding the use of paper. Although EDI was commercialized before the Internet, the rapid propagation of the latter and the increasing use of the information highway in general has made EDI's integration into the global network easier. EDI's penetration in business life, especially for food retailing, textile, professional services and banking industries, is so great that is currently transforming the entire way of doing business. In North America alone, the number of EDI users

has increased by 30% in 1994. According to the EDI Institute, in 1994, 79.5% of EDI users exchanged documents electronically with their clients while a mere 24.4% do it with their suppliers. Despite these achievements, EDI accounts no more than a mere 5% of all daily business transactions in the U.S.

Although EDI presents certain undeniable advantages, many firms decide to use EDI simply for satisfying the demands of their clients. Apparently, large retailing chains (Wal-Mart, Sears, A&P, etc.) exercise pressures to their suppliers to use EDI. However, many doubt the efficiency gains from the use of EDI. Moreover, many managers believe that EDI becomes advantageous only if it is applied to the entire firm and not only to certain of its divisions. This renders them hesitant in embracing EDI. This is quite comprehensible since EDI's application to the entire firm would bring about radical changes in business culture and a lot of resistance from its employees. Moreover, EDI's application to the entire firm requires huge investments, and most companies consider it as being out of their reach. This is particularly true for small and medium-sized firms (SMFs) which apply EDI because they are obliged to do so by their clients (Strandel is a case in point. It is a cloth company of Montreal asked to apply EDI by its major client, Eaton's). Moreover, many SMFs believe that EDI is for the exclusive use of large firms and multinationals and that EDI's application becomes profitable only if a large volume of transactions is realized between two or more firms. These misconceptions about EDI reduce its usage potential but the proliferation of new firms specialising in the provision of EDI services to other firms makes EDI more accessible to SMFs. The results of a recent study (Rivard, S. *et al.*, 1995) confirm this opinion. About 95% of 641 firms investigated, use the strategy of outsourcing for EDI services and other information activities. The economies of scale realized by these specialized firms are partially reflected in the costs of the

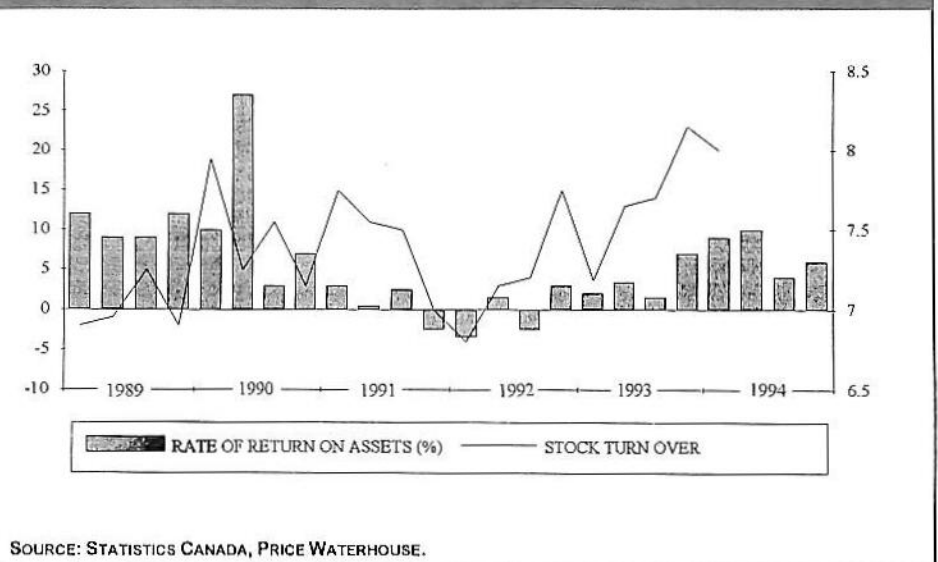
firms using the outsourcing strategy.

EDI's application increases a firm's productivity because many transactions can be made faster and more accurately. This increases the firm's competitiveness. For example, thanks to EDI a firm knows exactly the frequency with which a merchandise is sold and the locations with the highest turnover. At the time of sale it can place orders to its suppliers, diminishing thereby the need to keep high stocks. The supplier, on the other hand, after receiving the message can ship merchandise rapidly and to the appropriate division. Thanks to EDI a supplier could identify why the retailer is able to sell a certain type of merchandise in some locations and not in others. These economies of scope between suppliers-vendors have a positive impact on efficiency and profitability of both companies. Recent data from Statistics Canada demonstrate that in 1994, retailers using EDI realized a 30% profitability (rate of return on assets) while the national average was a mere 7% (see figure).

These companies had as well a better stock turnover. Although it is difficult to attribute this exceptional performance to the use of EDI alone (most of these companies using EDI were big retailer firms and they were using the new warehouse concept as a tool of aggressive marketing), it can be argued, nonetheless, that the EDI, combined with other management tools may be an efficient means for increasing efficiency and profitability.² All in all, the satisfaction of clients' particular and often-changing needs makes consumers better off because EDI reduces delivery lags considerably. Furthermore, by enabling lower retailers' stock EDI brings about important costs savings. Suppliers, on the other hand, manage to better plan their production.

Because of the intensification of competition and sweeping transformations in consumer attitudes, firms are continuously searching for better ways to reduce production and administration costs. The increasing availability and management of better and instantaneous

FIGURE 1. RETAILERS' FINANCIAL PERFORMANCE



information make the development of firms' competitive strategies and marketing policies more effective. The ERC (Efficient Consumer Response) at retail level, something like just-in-time at the manufacturing level, is increasingly used in the USA. This is possible by combining EDI systems with data banks available on the information highway. Nevertheless, the marriage of the information highway and Internet would be possible only if there will exist procedures which guarantee the security of all commercial transactions that circulate through the information highway. If such applications are possible, it is estimated that the number of EDI users in the next five years will be approximately half a million in North America only, a formidable increase from 50,000 which are currently using EDI (according to Gartner Group, a consultancy firm in the USA).

IV. Internet and sustainable development

As noted above the Internet and other information technologies contribute to the integration of markets within a country and among nations. Given the very low sunk costs in entering the Internet (apparently it costs only \$1,000 US to open an electronic storefront on the Internet with a potential of reaching a market of 20 million people worldwide) barriers to entry are greatly re-

duced in many markets rendering them more contestable at both national and local levels. The increase in markets' contestability and the presumable improvement in productivity bring about major changes in the organization of firms' activities and business strategies. A major impact will be on the organization of labour. It has been argued that the ubiquitous presence of information technologies and their negative effect on employment (most of the time the introduction of new technologies is usually accompanied by major lay offs), put a country's development at stake. There are increasingly fears among LDCs that the introduction of IT will result in a major decrease in jobs retarding further a country's development. These negative effects may be outweighed, however, by the positive effect the IT may have in bringing about productivity improvements and an increase in social well-being. Many economists have attempted

2. Although it is generally expected that EDI and other information technologies would have a positive impact on a firm's productivity and thereby its competitiveness, some recent but but highly controversial studies challenge this expectation. However, the traditional techniques applied to evaluate the benefits of these technologies are totally inadequate because they are failing to take into account the multitude of benefits these technologies provide to the entire organization (and not limited to an isolated section of the business).

to measure the impact of IT and especially of Internet on job creation and social welfare.

To be sure, most of these studies were chiefly realized in developed economies where the technology-penetration index is much higher than the one of less developed countries. Recent statistics (IMD; World Economic Forum) indicate that, on average, the major industrialized countries in the world have a ratio of 15 computers per 100 people, the two extremes being the United States with 30 computers and Italy with 7 per 100 people (see table 1).

Judging by this index, one would expect no significant changes to occur in economic or social lives of individuals from the use these technologies. However, despite the apparently low technology-penetration index in the industrialized countries, the ITs have a tremendous impact on the economy, because ITs, compared to other technologies, differ in a number of respects. There are essentially two particular characteristics which make ITs entirely different from previous technologies (*The Economist*, February 11th, 1995).

First, ITs are been very pervasive and have been introduced much faster than other new technologies. To the extent that computer prices decline at the pace we have experienced recently, more computers will be used by firms and households. Apparently, 60% of industrial investments in the USA were in

information technologies in 1994. This means that countries would have less time to replace the jobs that are lost and to train people for the new jobs that might be created. Structural unemployment would be a major problem for the countries not having an adequate training program. Obviously, continuing education is a means to make the labour force more responsive to the economy's changing needs.

Second, ITs have a major impact on both manufacturing and service sectors. The impact on the latter is even more perverse given that it makes labour more portable. Indeed, trade in services does not demand necessarily physical contact with customers. The possibility of tele-working is now a reality. People, in India or Costa Rica with lower salaries than the ones in industrialized countries end up writing software programmes for multinationals or preparing tax returns for them. Tele-working therefore makes the supply of labour more abundant.

Such an abundance of labour does not necessarily mean that unemployment will increase. Casual evidence is provided by the United States. This country has experienced the highest investment rate in IT industry and its current unemployment rate is around 5 1/2%, the same as in the 1960s. On the other hand, Europe with lower investments in ITs has presently an unemployment rate of around 11%. This may indicate that Europe, by failing to convert itself from a traditional products and service producer to a high-tech more information technology producer (compared to the USA) creates more unemployment and balance of payments deficits. On the other hand, the USA by investing more intensively in ITs, is becoming more able to replace lost jobs and satisfy external demand, creating thereby more jobs domestically. This is entirely plausible given that demand for traditional products and services is shrinking everywhere, yet these products are necessarily produced by countries investing

less in ITs (the less information technology-inclined countries in Europe).

The impact of ITs on productivity and the creation of new demand for new products and services as well as for established ones is tremendous. Productivity means producing more with less resources, labour for example. The reduction of costs which results from the increase in productivity would either reduce the price of the new goods or services, or would increase income. In any case, demand would increase and hence output and jobs. Because of the pervasiveness of ITs, its impact would be greater on the economy as a whole compared to the previous technologies.

Although it is difficult to predict which industrial sectors would be mostly affected positively or negatively from these new technologies, it is, however, possible to make some projections. Take for example the Internet service. To the extent that its use becomes pervasive for commercial purposes, demand will increase not only for the new products and services but also and most importantly for traditional ones such as collections of art articles or the supply of tourist services. The Bureau U.S. of Labour Statistics forecasts that the employment in industrial sectors such as computer systems, analysts and programmers will have the highest job growth rate, slightly surpassed by home-health workers, 118% vs. 140% between 1992-2005 (see table 2).

These projections confirm the findings of recent OECD studies. They conclude that the United States and Japan, the most successful countries in creating jobs, are also the countries with the fastest shift in their industrial structure towards a high-tech, knowledge-based economy (see figure). The number of industrial robots in Japan surpasses any other industrialized country, yet Japan has the lowest unemployment rate. Canada has started converting its industrial base from resource-production to information technology industries at a high rate. The production of services and manufactured products with more value added

TABLE 1

NUMBER OF COMPUTERS PER 100
PEOPLE, 1993

U.S.	30
AUSTRALIA	20
CANADA	19
U.K	16
SWEDEN	15
SWITZERLAN	13
HOLLAND	13
FRANCE	12
GERMANY	12
BELGIUM/LUX	11
JAPAN	10
SPAIN	8
ITALY	7

SOURCE: IMD, WORLD ECONOMIC FORUM.

has been Canada's priority in the past few years. Such a strategy is reflected as well in the composition of the Canadian exports, where the share of new products and services exported is increasing constantly.

There are signs as well that ITs have a major impact on productivity improvement in the service sector. It has been observed in the past that productivity gains were higher in manufacturing rather than in the service sector (0.8% a year, despite the fact that service industries have absorbed 85% of the \$1 trillion invested in ITs in the United States). Productivity has picked up in the 1990s to an annual average of almost 2% (problems of measuring productivity in the service sector are notorious). Furthermore, ITs have increased the quality of the services offered, an aspect grossly neglected in traditional measures of productivity.

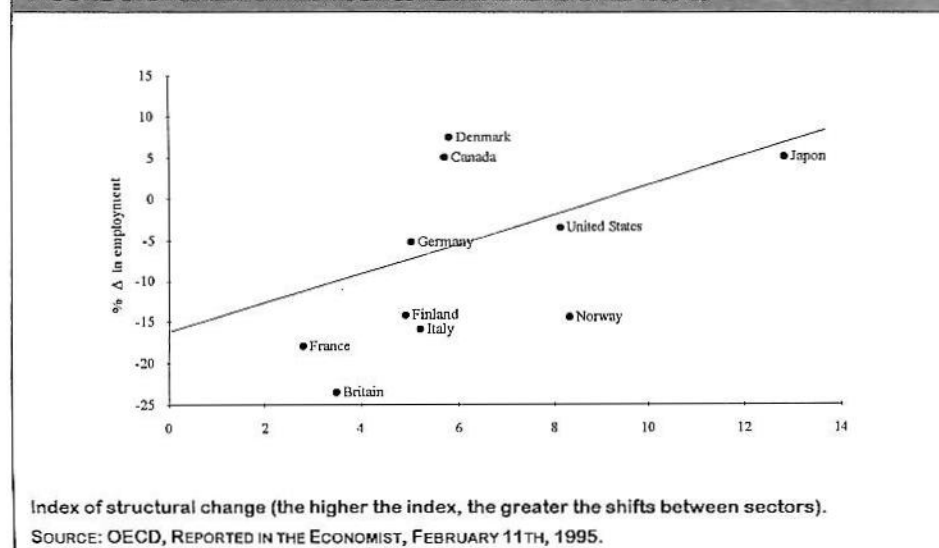
The introduction of ITs in various sectors of the economy have had a dramatic effect on employment. Computerization in telecommunications (Bell Canada announces 10,000 lay offs for the three coming years), air transport, a host of services offered by governments and other organizations, etc., as well as the recent trend of delayering (the elimination of entire layers of middle-managers) have had a dramatic effect on employment. While these technologies destroy jobs, they create jobs well, although workers losing jobs do not necessarily have the required skills for the new jobs. This mismatch could be resolved by adopting measures for education and training and by removing obstacles in labour and in goods and services markets. Furthermore, if governments try to reduce the period of structural adjustments via subsidies, strict regulations or other protectionist barriers, the effect on employment would be perverse. Theory and empirical evidence demonstrate that unemployment may be explained by restrictions imposed on products and trade as well as on labour markets.

All in all, even if ITs do have a little effect on the level of employment as a

TABLE 2				
SELECTED OCCUPATIONS IN AMERICA				
PERCENTAJE CHANGE 1992-2005 F'CAST				
F'CAST CHANGE			F'CAST CHANGE	
HOME-HEALTH WORKERS	140	479	BANK TELLERS	-5 -24
COMPUTER SYSTEMS	118	733	ELECTRICAL & ELECTRONIC ASSEMBLERS	-15 -21
TRAVEL AGENTS	72	76	TYPISTS/WORD PROCESSOR	-18 -125
CHILDREN WORKERS	72	450	MACHINE TOOL OPERATORS	-19 -19
GUARDS	58	408	TEXTILE WORKERS	-20 -35
RESTAURANT COOKS	50	97	SWITCHBOARD OPERATORS	-22 -51
NURSES	46	765	PACKING & FILLING MACHIN OPERATORS	-22 -71
GARDENERS/GROUND KEEPERS	40	311	TELEPHONE & CABLE TV INSTALLERS AND REPAIRS	-25 -40
LAWYERS	38	185	DIRECTORY ASSISTANCE OPERATORS	-58 -14
TEACHERS	36	773		
JANITORS & CLEANERS	94	548		

SOURCE: THE ECONOMIST, FEBRUARY 11, 1995.

FIGURE 2. STRUCTURAL CHANGE AND EMPLOYMENT IN MANUFACTURING: 1980-89



whole, they do have a major effect on the composition of employment and the patterns of wages. Statistics for Canada for example, indicate that while the employment compound growth rate for the whole economy was 2.1% and for wages and salaries it was 9.1% from 1976 to 1990, the compound growth rate for the IT sector was 3.1% and its growth in wages and salaries 11.1% (Gentzoglani, 1993). ITs have an adverse effect on the wages of low-skilled workers in industrialized countries and a positive effect on the wages of high-skilled workers. This is so because competition from low-wage countries combined with stringencies in the labour

markets (wages are less flexible in these markets in industrialized countries) creates more unemployment in the low-skilled jobs in industrialized countries. Inequalities therefore become even worse with the introduction and the widespread application of ITs. The pattern of inequality becomes even worse in developing countries where the levels of education and computers literacy among groups of citizens are more unequal.

V. Regulating the internet?

The Internet has been characterized as both the most anarchic organization as well as the most democratic means ever



invented by mankind. Between these two extremes are more moderate opinions viewing Internet as an alternative means for making a more efficient use of society's limited resources.

To be sure, the Internet is the most democratic forum where people with divergent opinions on trivial as well as on more controversial issues can express themselves knowing that someone, somewhere is listening to them. Furthermore, because of the anonymity in the exchange of ideas, people can ex-

3. Incomplete or asymmetric information is said to be present when buyers and sellers have not the same information about the quality of goods and services involved in transactions. For example, when a consumer buys a used car it may be very difficult for him to determine whether or not it is a good quality car or a bad quality car. By contrast, the seller of the car presumably has a better information of the quality of his car.
4. Moral hazard is said to exist when the sellers of a product or service cannot observe the actions of the buyers. For example, when a buyer of, say, a car, buys a car-theft-insurance then he has no incentive to take an appropriate amount of care to protect his car from theft. When the insurance companies set rates they have to take into account the incentives consumers have to take appropriate care of their goods from theft.
5. Adverse selection refers to situations where the sellers cannot observe the type or quality of the buyers. In the car-theft-insurance example, the less-care-taking customers will be seeking for getting insured. The high prime rates resulting from this situation will push off high-quality customers and the insurance company ends up with low-quality customers only. Because of the high costs of acquiring information the low-quality customers crowd out the high-quality ones. This adverse selection problem may be at times so severe that it can completely destroy the market.
6. One way to reduce the adverse selection problem is through signaling. One signal is for the owner of the used car for example to offer a warranty. This strategy aims at convincing potential customers that the good or service sold is a high quality one. Building a good reputation or standardizing may be some other strategies reaching the same goal of reducing the adverse selection problem.

press themselves as freely as possible without fearing possible negative consequences of what they are saying. But this is precisely a major problem with the Internet. Discriminating, racist or other opinions implying hate propaganda can be transmitted instantly throughout the world with major consequences, especially for young people and/or the most emotionally feeble ones. The Internet offers a manual for people with suicidal tendencies, and other information promoting and/or facilitating or even inciting people to do acts beyond the imagination of most ordinary people.

Fears of bandwagon effects from the proliferation of services offered through Internet are many. Some believe that the use of this means as a forum of promoting immoral actions should be regulated. After all, there are similar regulations everywhere in our society. For example, banning sales of cigarettes or pornographic material to young people is quite common in many societies. Given that information through the Internet is free and available instantaneously to everybody, the effects of not banning the promotion of these services such as hate propaganda and the like is believed to be worse than freeing the sale of alcohol to teenagers.

Opponents of regulation argue that restricting or completely prohibiting access to Internet restricts the most basic right of every free and democratic society, the freedom of speech. Governments are not better than individuals in choosing what is good for them. Regulating the Internet would create, anyway, other illicit activities and piracy would increase. The illegality of drugs is a case in point. The commerce of drugs is flourishing worldwide despite the fact that its use is illegal. Therefore, no regulation, whatsoever, can eradicate the proliferation of this type of services through the Internet.

From an *economic point of view*, regulation is imposed when a certain number of conditions are satisfied. It is

well known, in the world of economists, that regulation is judged appropriate whenever competitive markets fail. The latter may occur whenever some of the seller firms have undue *market power*, or when there is *incomplete or asymmetric information*,³ or when there are *externalities or public goods*. In any of these cases, too much or too little is produced from a social point of view. Regulation or other forms of government intervention may correct these market failures. Such intervention is believed to result in markets that provide the appropriate quantity of goods or services at correct prices.

With respect to Internet services none of the above rationales for regulation is valid. Indeed, despite the oligopolistic structure of the industry, it is not yet a mature one. Internet suppliers compete fiercely with each other and prices are quite competitive. At the moment, there are no signs of market power neither from the sellers side nor from the side of the providers of various services. Therefore, the market power argument can be dismissed. When incomplete information among buyers and sellers on either market prices or quality exists, then the market system does not function efficiently. The existence of *incomplete or asymmetric information* may have various perverse effects on a number of business situations, such as *moral hazard*⁴ and *adverse selection*⁵ and a number of remedies have been suggested in eradicating these deficiencies, such as signaling,⁶ reputations, standardization, etc.

In a way there is no incomplete information in the Internet market. Buyers or sellers are not exposed to different business environments from the ones usually used to realize other business transactions. Nevertheless, if there is incomplete information, the latter may be the result from the lack of uniformity in various regulations in different countries. If, for example, insurance services are offered through the Internet market in various countries, the clients in these countries would expect that the insurance contracts will resemble the ones

offered by their local (national) companies. If they are indeed different customers will not receive the coverage they were expecting to receive. Therefore, in the absence of worldwide uniformity of rules and regulations, risk-averse customers will not use this service in the Internet market. They will prefer to do transactions in the customary way. The development of the Internet market for this type of services would be retarded unless uniformization of various national regulations is achieved.

However, it is reasonable to hypothesize that the provision of these services will not be done at the international level but at a national one. Therefore, national regulations will apply both to the Internet market and the traditional market. No further need exists for elaborating new regulations because these operations are realized through the Internet market. If on the other hand, foreign firms do sell such services or products in domestic markets where regulations are more stringent than foreign ones, they should know beforehand that local regulations have precedence over foreign ones. It is the responsibility of the companies to verify a country's rules and regulations before deciding to sell such a services in these countries. In case of conflict, the establishment of international mechanisms similar to the ones created by the signatories trading nations (NAFTA, European Union, etc.) to deal with commercial and business conflicts is absolutely necessary. At present there is a vacuum in this area. As the Internet's commercial activities are getting more and more important the establishment of such mechanisms may be essential.

With regard to the externalities or public goods arguments a certain number of services offered through Internet are of public good nature.⁷

7. When the availability of a good is not reduced through consumption, the good is referred to as a public good (television broadcast, etc.). In this sense the services offered through the Internet are of a public good nature.

As such important positive externalities emanate from the provision of scientific and educational information. Furthermore, negative externalities arise from the provision of immoral or hate information on racism or sex discrimination, pornography, etc. Thus, there are arguments in favour of regulation. However, these externalities are not of an economic nature and the issue of their regulation mostly reflects the prevailing social values of the country. These issues are still debated in many societies and an economist has little to say on this.

Conclusions and policy recommendations

The Internet industry, a by-product of a broader industry, the ITs, has emerged and managed to establish itself rapidly in the marketplace. Many transactions used to be realized in a segmented way in various physical places in the world. It is now possible and much easier for financiers to serve a big hinterland from a single centralized place. The ever-increasing supply of services through Internet and the insatiable demand for them will make it the busiest market in the world. Busiest does not necessarily mean anarchist as some analysts believe the Internet market to be. Although there are possibilities of committing financial crime from unscrupulous companies or individuals, this does not necessarily call for economic regulation. Some social regulation, in the same spirit as the one applied to labour markets, or to financial transactions may be applied without changing significantly the rules of the game, if not for helping out the participants to carry out their financial transactions with less risk possible. Such regulations may even help the Internet market to develop commercially much faster. ITs have an adverse effect on the wages of low-skilled workers in industrialized countries and a positive

effect on the wages of high-skilled workers. This is so because competition from low-wage countries combined with wage rigidities in the labour markets in the industrialized countries create more unemployment in low-skilled jobs in industrialized countries. Inequalities therefore become even worse with the introduction and the widespread application of ITs. The pattern of inequality becomes even worse in developing countries where the levels of education among groups of citizens are more unequal. ♦

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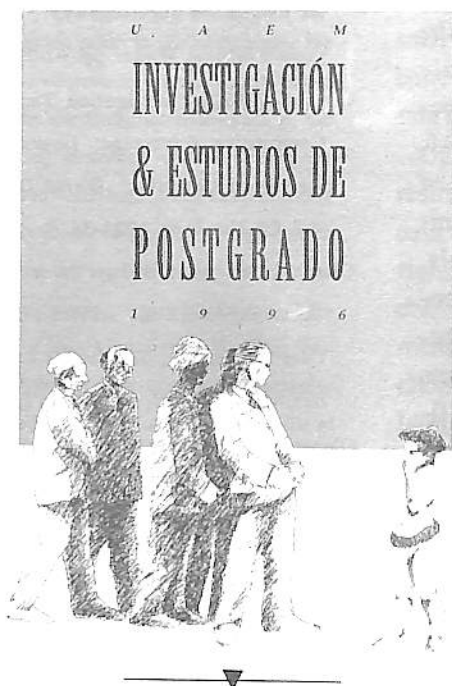
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