

**LATIN AMERICA AND THE CARIBBEAN
IN THE TRANSITION TO A
KNOWLEDGE-BASED SOCIETY**

An agenda for public policy



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I. Introduction

1. Over the past few years the information revolution has ceased to be an issue of concern only to a few groups of specialists and has become a part of millions of people's daily lives. Information and communications technologies (ICTs) have been gaining in visibility, primarily as a result of the growing use of the Internet and the proliferation of "dotcom" enterprises. These technologies are playing a leading role in the globalization of the world economy and in the rapid growth (particularly in the United States) of what has come to be known as the "new economy". It took several decades for the various economic, institutional and technological changes to take place that were necessary in order for the use of these technologies to spread to vast sectors of society in the industrialized economies and to somewhat smaller segments in developing economies. ICTs are having a strong impact on the growth and composition of economic activity, employment, the ways in which production processes are organized and, within an even wider context, on forms of cultural expression and patterns of social interaction.

2. There is a broad consensus as to the potential contribution to social development that could be made by such ICT applications as telemedicine, distance learning, telework, digital libraries, etc. ICTs (and, in particular, the Internet) can help—and indeed are already doing so in many countries—to improve the population's health, education and training and to enhance the transparency of the decisions and actions taken by public and private agents. These outcomes are achieved through the use of ICTs to foster communication among civil society, State institutions and the market, although it is nonetheless true that the penetration, use and impact of the Internet are, in turn, determined by economic and social variables. The challenge facing all developing countries, and specifically the Latin American and Caribbean nations, is to bring about a rapid, efficient and equitable diffusion of ICTs in their economies.

3. It is important to realize that it took many years—and countless technological and institutional changes—for these technologies to mature. The latecomers to this process may take advantage of the knowledge that has already been accumulated and do not necessarily have to go through each of the stages of learning that their predecessors had to complete; however, their relative degree of underdevelopment and the financial constraints they face as they begin to make the transition to information and knowledge-based societies make it necessary for them to undertake a determined investment effort in order to build up their physical infrastructure and to develop the necessary human resources. They will also need to construct the "institutional infrastructure" that the State requires in order to perform effective oversight and supervisory functions that will redefine the

links among the public sector, business enterprises, consumers and citizens. The road that the region must follow in order to achieve these objectives is long and full of twists and turns.

4. In the eyes of many, ICTs are associated with optimistic scenarios in which increased access to information will give rise to more open, more democratic societies and social relationships. Viewed from this perspective, ICTs would appear to have an internal potential for helping to create less exclusionary societies and enabling countries that lagged behind to “leapfrog” stages in the development process and thus move more swiftly towards inclusion in the information and knowledge-based world. Others, however, feel that a new form of exclusion underlies the trend towards the computerization of economic and institutional life; this exclusionary pattern is seen as a force that bolsters society’s existing inequity and exclusionary mechanisms. In point of fact, the “digital gap” separating the industrialized countries from developing nations is even wider than the gap defined by other indicators of productivity and of economic and social well-being; this is also true of the gaps between high-income and low-income sectors within individual countries.

5. The approach that each country takes to the issues of equity and solidarity will also be reflected in the particular form taken by its transition to an information and knowledge-based society. The Nordic countries provide a clear illustration of this point. The leadership position they occupy in the realm of ICTs is largely attributable to the fact that, early on, they implemented public policies designed to ensure that the entire population of these countries would achieve computer literacy. These countries maintained a greater degree of equity and solidarity even before the information revolution, however, which indicates that this revolution tends to be based on long-term, structural behaviour patterns in each country.¹

6. The transition to an information and knowledge-based society raises a number of important questions for the Latin American and Caribbean countries. How can they see to it that this transition moves forward efficiently and equitably in countries whose structural characteristics include inequity and low levels of efficiency? How can they make sure that large firms and high-income consumers will not be the only ones to benefit from it? How can the region finance the investment that must be made in order to narrow the technological gap separating it from the industrialized countries? What kind of legal, regulatory and institutional framework is needed to lower entry barriers and ensure genuine competition among network service providers in order to maximize the transition’s social benefits? What are the main areas or spheres in which regional cooperation can help diminish the heterogeneity that is so characteristic of the region as it relates to ICT diffusion? How can the cultural and linguistic diversity of the peoples of Latin America and the Caribbean be preserved as the region makes the transition to its place in the information-based world? How can gender equity in information access be guaranteed? How can the region share more fully in the content of the information and knowledge being transmitted through digital networks? What steps can be taken to counteract the marked concentration of power in industrialized countries and large transnational corporation resulting from the rapid spread of information technologies?

7. Many of the changes that have recently taken place in Latin America and the Caribbean in terms of the learning process as it relates to macroeconomic policy management, particularly with regard to trade liberalization and the modernization of telecommunications, places the region in a good position to embark upon its transition to an information-technology and knowledge-based society. Serious concerns are also being raised, however, about the types of production and trade

¹ In Sweden, the Government offers tax exemptions for the purchase of personal computers via employers. See *Financial Times Survey* (2000).

specialization that have been taking shape following the region's implementation of structural reforms in view of the high level of structural unemployment in many countries of the region (a situation that may be exacerbated by the new labour-saving information technologies), the region's commercial and financial vulnerability to external forces, and its traditional difficulties in gaining access to long-term external financing and technology. The region's marked social segmentation and high levels of poverty and social exclusion are also causes of concern, as is its very limited institutional capacity for defining and regulating proprietary rights and the social obligations of the agents who hold such rights.

8. As is also the case with regard to other aspects of the transition to modernity, the sweeping changes in connection with ICTs that are occurring in the region as it makes the transition to an information and knowledge-based society are marked by striking distributional inequities, both across and within countries. The cost and coverage of telecommunications and of training human resources and preparing business enterprises to function in the digital economy vary widely from country to country within Latin America and the Caribbean. Moreover, in each country only a small segment of society has access to these new technologies, and countless forms of exclusion and adverse selection are at work. Although the telecommunications sector has experienced a thorough-going modernization, in many of the Latin American and Caribbean countries the advances made in this direction over the past decades have been very uneven, especially in terms of the need to make the benefits of such services available to the final consumer. The same is true of the computer industry, which is another vital element in ICT diffusion, and the cost of computer hardware thus differs sharply across countries. It is therefore not surprising that the individual countries are also at widely differing points in their transition to an information and knowledge-based society.

9. This document is divided into five sections. In the next section, a brief description will be given of the main traits of the new information and knowledge-based economy. The third section summarizes some of the built-in characteristics of the social model for the organization of production that has been emerging in most of the Latin American and Caribbean countries in the wake of the structural reforms of the 1990s, since the increasing heterogeneity and social exclusion to which they have given rise form the backdrop for the transition now being made to a knowledge-based society. Section four discusses the characteristics of ICTs in the region. In view of the crucial role that the telecommunications industry plays in the transition to a knowledge-based society, this section examines how various privatization policies and how the different methods used to establish regulatory systems have influenced telecommunications costs and the diffusion of these technologies. Section five explores possible courses of action for the public and/or private sector and for regional cooperation with a view to helping to ensure that Latin America and the Caribbean will become full-fledged participants in the information and knowledge-based economy and that ICTs are used to promote an equitable form of development that makes provision for the participation of the citizenry.

II. The transition to the “new” digital economy and a knowledge-based society

10. The development of ICTs took quite a long time, although the pace of change has obviously been accelerating during the past decade. The scope of recent changes has been the result of the interaction of a number of independent but simultaneous processes that have significantly reduced the cost of transmitting information and the cost of computer hardware (e.g., the substitution of digital technologies for analogue technologies in telecommunications). All this has permitted the formation of a “virtuous circle” of technological innovations in different areas² and the convergence of telecommunications, informatics, radio and telecasting industries into an integrated (information, communication and entertainment) capability to process images, sound, text and data and to transmit them instantaneously to any location on the planet.³

11. Because of the ubiquitous nature and global scope of ICTs, these technologies are changing the way in which economic and industrial activity is organized and are altering the types of factors that determine where a country’s competitive advantages will lie. They are also influencing the type of interaction that takes places between buyers and sellers as well as consumption patterns, the characteristics of employment, the way people use their free time and their access to education or health services. ICTs may even change the forms of cultural expression of society. The accelerating pace of change and the connectivity of both individuals and institutions are generating new products, new markets and new types of businesses, but they are also creating a greater degree of uncertainty and are raising the level of risk associated with economic and personal decision-making, as well as posing new challenges and creating new causes of concern for society.

² Over the last 20 years, the cost of a voice circuit has dropped by a ratio of nearly 1:10,000. The replacement of copper cables with fibre optics, which began in the mid-1980s, has made it possible to bring about a significant increase in information density. The declining cost of microprocessor-based computing devices has permitted the development of cellular telephony and PCS systems. See Bond (1997).

³ The convergence of the telecommunications, information technologies, radio and telecasting industries has far-reaching implications for these industries. On the one hand, communications and information services can be delinked from their infrastructure, since telephone services can be supplied via coaxial cables, data services and Internet access can be furnished over telephone lines, and cable television can be replaced by satellite broadcasts. On the other hand, there is an increasing degree of overlap between the two main components of the communications industry, which used to be separate: systems and networks formed to transmit contentless signals (telephony) and content-based information technologies and sources (Bond, 1997, p. 3).

12. Countless specialized studies have been done on the subject of technological change in the past few decades. During most of that time, however, information technologies did not yet have the economic visibility that the authors of those studies were discussing.⁴ Until very recently, the use of these technologies was not widespread enough to influence the economy as a whole. In addition, some of the other elements that were needed in order for the use of these technologies to spread to large segments of society were still missing. Thus, despite their rapid growth and the fact that they account for an ever larger percentage of the industrialized countries' output, it is still difficult to measure how much ICTs contribute to economic growth.

13. The growth of the Internet has played a key role in the dissemination and convergence of ICTs. The Internet began as an advanced communications systems that had been created by the Advanced Research Projects Agency (ARPA) of the United States Department of Defense in the 1960s.⁵ Later on, digital telephone grids made it possible to use compact protocols, including TCP/IP, for data transmission.

14. The rate of diffusion of the Internet in comparison to the dissemination of previous information and electronic innovations is simply astounding: in the United States, it took 38 years for 50 million people to acquire radios and use them as an information transmission system, 13 years for the same number of people to acquire television sets, 16 years for 50 million consumers to purchase a personal computer, but only 4 years for that same number of people to hook up to the Internet, starting from the time when it was opened up for use by the general public (Meeker and Pearson, 1998).

15. In March 2000, the total number of Internet users was estimated at 304 million, with 45% of this number being located in the United States and Canada, 27% in Europe and 23% in the Asian-Pacific (95% in total). Only 3.5% of Internet users were located in Latin America, although the number was climbing rapidly, while the remaining 1.5% was accounted for by African and Middle Eastern countries. If the present growth rate holds steady, Internet users will number over 350 million by the end of the year 2000.⁶

16. The Internet is bringing about sweeping changes in people's behaviour by opening up the possibilities of e-commerce.⁷ A simple typology allows us to identify at least four types of trade flows in which e-commerce plays a significant role: (i) business-to-business (or B2B) flows; (ii) business-to-consumer (B2C) flows; (iii) consumer-to-business (C2B) flows, which are those in which consumers take the initiative, such as when an individual purchases airline tickets or chooses

⁴ Nobel Prize winner Robert Solow's comment that "We see the computer age everywhere except in the productivity statistics" has become quite well known. The productivity paradox —i.e., how the productivity gains of ICT users can be measured— is still a matter of debate. Some experts argue that the length of time required for ICT diffusion and the inherent problems involved in measuring productivity in services are the reason why it is so difficult to measure the contribution made by ICTs to the economy.

⁵ In the 1980s, the National Science Foundation of the United States was assigned the job of developing a highly decentralized data exchange network based on open TCP/IPs (Transmission Control Protocol/Internet Protocol). The TCP standardizes data exchange, while the IP enables the various systems to "talk" to each other. In 1989, the Internet was opened up for commercial use in the United States and, later, in all other countries as well. In the mid-1990s, commercial Internet service providers were developed in all the industrialized countries, and Internet use began to grow in all the countries that had an adequate telecommunications infrastructure (Mansell and When, 1998).

⁶ See <http://www.nue.ie>. The Organisation for Economic Co-operation and Development (OECD) warns, however, that these figures are not comparable. Some countries only count adults, while others include children in the statistics as well. The figures refer to persons who have accessed the Internet at least once in the past three months (OECD, 2000, p. 82).

⁷ However, it should be noted that although the e-commerce market is growing by leaps and bounds, it is still quite small. As observed in *The Economist*, "...for all the feverish excitement about the tripling of electronic shopping last holiday season, the total spent by American consumers online still amounted to only about 1% of all retail sales" (*The Economist*, 2000). Goldman and Sachs estimate that by 2010 retail Internet sales in the United States will represent 15% of the total. By comparison, the statistics indicate that catalogue sales in the United States never amounted to more than 10% of total retail sales.

a tour package; and (iv) consumer-to-consumer (C2C) flows, such as those that take place on e-auction sites, for example (*The Economist*, 2000, p. 7). Each of these typologies is associated with a different market morphology, different economies of scale and scope, different types of externalities and incentives, and differing degrees of connectivity and of Internet access.

17. Another factor, in addition to these types of business-consumer relationships, is the relationship that individuals and businesses maintain with the government in connection with such matters as tax returns, the dissemination of legislative information, the management of social security contributions, etc.

18. The use of telemedicine—one of the many important applications for ICTs in the health and education sectors— would reduce the level of investment required for the construction of comprehensive health care systems by permitting remote “doctor’s visits” and diagnosis and treatment by doctors working out of national, regional or international centres. ICTs would also allow quality health care to be provided to individuals in remote locations through mobile telecentres or local community centres serving a number of different population clusters. These technologies also open up the possibility of providing new types of distance learning and training services to rural health care staff, since they can be used to give such personnel access to specialists and to medical databases maintained by top-quality hospitals. In addition, telemedicine can also cut developing countries’ health care costs sharply, since it would allow doctors to make house calls that may preclude the need for hospitalization, and would make it possible to optimize the use of resources (specialists, laboratories, other equipment and facilities) and reduce the costs involved in providing training and refresher courses, etc. (ITU, 1997).

19. ICTs constitute the infrastructure and hardware for the knowledge-based economy, but they are not the only element needed to convert information into knowledge and incorporate it into the production process.⁸ In a knowledge-based economy, investments need to be made in human resources and high-technology industries so that the knowledge that is coded and transmitted via computer and communications networks can then be adapted to fit the production needs of the businesses operating in any given country. This tacit type of knowledge, instilled in individuals, is the main element that drives the knowledge economy. In other words, making the transition to the “new” economy calls for a determined effort to provide individual training to workers, businessmen and consumers and to create a science and technology-based production sector (OECD, 1996).⁹

20. The management of knowledge is an issue of growing importance in enabling business firms to make productivity gains and in increasing the effectiveness of public-sector measures. ICTs make it easier to handle data, but this is not enough to define and maintain the competitive advantages of business enterprises whose objective is to add value by converting data into information and information into knowledge (Israel, 2000, p. 15). The management of knowledge involves all the processes that govern the creation, dissemination and use of knowledge as applied to decision-making and the adoption of specific measures.

21. In addition to the benefits it brings, the “new” economy is also associated with risks that the Latin America and Caribbean countries will need to address by means of public and private initiatives and regional coordination measures in order to ensure that those benefits are distributed efficiently and equitably. As is usually the case with any innovation, the agents that are first to

⁸ In fact, introducing new equipment without first improving human resource and physical systems may actually increase electricity consumption without generating any additional economic growth (Mansell and When, 1998, p. 21).

⁹ See also Department of Trade and Industry of the United Kingdom (1999).

move into the market quickly attain a dominant market position which enables them to capture a large part of the potential proceeds. In addition, in the case of ICTs it may be possible for the firms that have already staked out their claim to block the entry of new producers. By patenting business methods and processes, the first firms to position themselves in the market can also reinforce their dominant position. There is clearly a risk that both of these things will occur in the sphere of e-commerce and the digital economy, and it is therefore important for the relevant regulatory authorities to take appropriate steps to supervise firms holding dominant positions.

22. The digital economy also tends to reinforce the bargaining power of the international economic agents that buy the commodities in which most of the Latin America and Caribbean countries' production and export sectors specialize. This could further reduce the already narrow profit margins that the region's firms have on world markets (Persaud, 2000, p. 15).

23. New types of regulatory methods will be necessary in order to safeguard competition on markets related to the transition to a knowledge-based society and the diffusion of these technologies within that society. It is significant that since the early 1990s all the industrialized countries have established public policy programmes aimed at providing the whole of their populations with greater access to ICT products and services, expanding their use, promoting the growth of digital network infrastructure (especially wide band facilities) and encouraging firms to engage in technological research, innovation and development.

24. The Scandinavian countries took the lead in the ICT market in Europe with the help of government initiatives that facilitated the purchase of computers and their integration into high-speed networks, made ICTs a part of all educational programmes and promoted the development of new products and services in partnership with the private sector (after first having specified which areas would be the responsibility of the entrepreneurs involved and which would be the responsibility of the public sector).

25. In summary, as has been proposed by the working group of the United Nations Commission on Science and Technology for Development, although the cost of making the transition to an information and knowledge-based society is high, Latin America and the Caribbean must take up this challenge because the costs of not doing so are even greater.

26. Finally, above and beyond considerations of market regulation and the necessary role of the public sector in developing the physical infrastructure and "social capital" needed in order to make this transition, it is important to understand that digital networks and ICTs will surely play a part in helping to forge a new overall concept of citizenship, as noted by ECLAC in its latest report, which it presented to the Governments of the region in March of this year in Mexico City (ECLAC, 2000). The need for the State to participate in this process is therefore inescapable.

III. The legacy of recent structural reforms¹⁰

27. The programmes undertaken during much of the 1990s in order to liberalize external trade, deregulate various markets and privatize production activities brought about sweeping changes in the overall scheme of incentives that influence the economic activity and institutional affairs of the Latin America and Caribbean countries. In both political and academic circles within the region, the consensus view is that these structural reforms have resulted in substantial improvements in the management of macroeconomic policy but that they have not led to similar successes in terms of growth rates, productivity gains or technological change. This failing is even more glaring in relation to the achievement of equity in the distribution of the benefits to be derived from the transition to a modern society; in fact, those benefits have tended to become concentrated in fairly small groups within the region's societies. The disappointing outcomes of the structural reforms in terms of equity and efficiency are at the core of the current debate concerning the path to be taken in making the transition to a knowledge-based society.

28. The reforms have nonetheless had thorough-going effects, however, and these effects can be seen at the macroeconomic level, in the structure and behaviour of product and factor markets, and even in the performance of individual economic agents. Moreover, the changes brought about by these reforms have not been confined to economic affairs in the strict sense of the term, as they have also had a notable impact on institutional and regulatory aspects of the prevailing model of social organization (e.g., forms of natural-resource ownership, labour laws, etc.).

29. Clearly, then, the region is undergoing a complex transition as it moves away from an electro-mechanical stage of development in which production is undertaken as a step-by-step process or is divided up into batches and towards a world in which production is a computerized, real-time, continuous activity conducted on a just-in-time basis. As happened earlier in industrialized countries, a profound change has been made in the principles governing the way firms operate; this has major implications in terms of these same firms' degree of vertical integration and, ultimately, the behavioural patterns of the local and international enterprises that supply them with intermediate inputs. This, in turn, gives rise to an intricate process whereby some employment opportunities in the economy are created while others are "destroyed". Thus,

¹⁰ See ECLAC (2000) and Katz (1999).

technological change is strongly biased towards labour-saving mechanisms, but it also creates a need for retraining so that the labour force can adapt to the new demands of computer technology.

30. Far from proceeding in an efficient manner and being fairly evenly distributed throughout society, changes in the production and organizational model appear to be adding to the already high degree of structural heterogeneity that prevails in the countries of the region. Studies conducted by ECLAC have shown that these reforms have been associated with large-scale structural unemployment, the destruction of domestic technological capabilities, and the decline of domestic research and development (R&D) efforts and engineering activities, which appear to be redundant in the new model for the social organization of production. Thus, the process has created “winners” and “losers” and has led to the “death” and “birth” of economic agents as part of a Schumpeterian phase of “destructive creation” in which entire industries, regions and types of businesses (e.g., small and medium-sized enterprises, family-owned and family-run businesses) have had serious difficulties in adapting to the new scheme of incentives and the new model of macroeconomic regulation.

31. The pattern of productive specialization and of linkage with international markets for manufactures has been changing radically owing both to the impact of reforms and to inertial factors that have carried over from the stage of import substitution. Activities that are gaining ground, in relative terms, include non-tradables (or products having a low level of tradability) such as personal services, telecommunications, energy, etc.; industries that process local raw materials; producers of commodities such as paper and pulp, iron and steel, vegetable oils, minerals, etc.; the *maquila* sector, which makes intensive use of low-skill labour; producers of wearing apparel and of video and computer equipment; and, finally, the automotive industry, which enjoys preferential treatment in Mexico, Argentina, Brazil, Colombia, Venezuela and Chile.

32. There are two main —and very different— models of productive specialization emerging in the region. The first, which is associated with the rapid growth of exports —chiefly to the North American market— of manufactures that make intensive use of imported inputs (including assembly activities or *maquila* industries), is found in Mexico and a number of Central American and Caribbean countries. The second, which is the predominant model in South America, corresponds to the rapid development of production and export activities by capital-intensive processors of natural resources. In these countries (and in Mexico), the automotive industry was revitalized and underwent a considerable expansion during the 1990s. This is the only branch of industry that has not had to comply with the generally applicable rules developed as part of the trade liberalization process and has instead received preferential treatment by the various Governments concerned.

33. The process of restructuring the production apparatus has taken place within a fragile institutional framework in which the very limited nature of the public sector’s regulatory capacity is quite conspicuous. In many of the instances where production activities have been privatized (telecommunications, energy, drinking water or sewerage services, etc.), State monopolies have simply been replaced by private monopolies or oligopolies. Although large-scale increases in physical investments and a fast-paced technological modernization of service infrastructure have been observed in almost all these cases, the resulting productivity gains have not always been passed on to consumers via the pricing system. Furthermore, on a number of occasions, local consumers have ended up being the ones that have financed the improvements made in the service delivery infrastructure.

34. Many of the “new” structural features of the region’s economic model can be clearly identified in the ICT sector. However, these characteristics will need to be examined in detail against the backdrop of each set of national conditions before proceeding with the discussion of public policy tools and measures that could be adopted in order to increase the efficiency and equity achieved by each country as it makes the transition to a knowledge-based society.

IV. Information technology in Latin America and the Caribbean

35. How each country chooses to make the transition to a knowledge-based society will depend on two factors. The first is the capacity to supply low-cost and widely available telecommunications services. Although significant progress has been made in this area in the last few years, the region still has to overcome major challenges in order to make telephone services universally available at a reasonable cost. The second factor is the cost and accessibility of the computer infrastructure. It is estimated that in the Latin American and Caribbean countries, there is one computer for every 30 inhabitants; this is in sharp contrast with the situation in the United States, where there is one computer for every four inhabitants. The price of equipment in relation to the average income of the population is the main factor accounting for this difference.

36. The pace at which a country achieves network connectivity and moves toward becoming an information and knowledge-based society will depend on its own particular situation and special characteristics.

A. Recent developments in the telecommunications industry

37. The telecommunications sector in Latin America went through major changes during the 1990s. In more than two-thirds of the countries of the region, telecommunications services have already been privatized, either fully or partially.¹¹ In many cases, privatization of State-owned telecommunications companies has gone hand-in-hand with modernization of the sector, since some State enterprises had become very bureaucratic and were not open to innovation. The association between privatization and modernization is not an automatic one, however, and some countries, such as Uruguay and Costa Rica, have embarked on technological modernization without privatization. Despite the changes that are taking place in the sector, however, the International Telecommunication Union reports that only a little over one-third of all households in the region have telephone service (ITU, 2000, p. 2).

¹¹ One-fourth of the 89 major public telephone operators that had been privatized throughout the world by the end of 1999 were in Latin America and the Caribbean (ITU, 2000, p. 2).

38. The results of privatization in the region have been varied, depending on how far deregulation has been taken and how much deepening of competition there has been. The price of services and the extent to which universal coverage has been attained —both of which must be considered in assessing a country's progress towards becoming a knowledge-based society— depend on how the regulatory framework is designed and what role is assigned to the regulatory authorities.

39. In those countries where the telecommunications sector has been privatized —which do not include Costa Rica and Uruguay— the impact of privatization on the well-being of final consumers has been determined by a number of factors. In Chile, privatization included deregulation and the deepening of competition; in Argentina, Mexico and Peru, privatization meant maintaining a monopoly and reserving the market for a certain period, no less than ten years in any case. Albeit with some differences from country to country, the regulatory framework and the regulatory authorities have played an important role in the new regulated-competition scenarios. Eighteen of the 22 independent regulatory agencies that existed in early 2000 were during the 1990s.¹² Although the regulatory agencies are empowered to oversee the telecommunications market, they are not all equally strong. In some countries, key regulatory functions are shared with or are completely under the control of the minister of the sector, thus limiting the independence and negotiating power of the regulatory agency. Moreover, because privatization was carried out in response to a fiscal emergency, the regulatory agency was not created until later, when contracts had already been signed and commitments made, all of which further limited the agency's ability to act (ITU, 2000, p. 11).

40. As a backdrop to this complex interdependency among the regulatory frameworks, the companies taking over as a result of privatization, and the regulatory bodies, the national telecommunications markets were undergoing significant changes as new technologies were put in place. One factor influencing this situation was the rapid rate of technological change that was taking place in the sector throughout the world as a result, including the growth of cellular telephony and cable television. Another factor was the changing structure and performance of the telecommunications sector in individual countries as a result of the replacement of State monopolies. New operators came on the scene, including providers of services with a higher value added, equipment suppliers and software companies. Thus, the whole scenario became more complex and more sophisticated over time, as a national "culture" evolved in this sphere.

41. It should also be noted that the transformation of the telecommunications sector began under extremely precarious conditions, in terms of coverage and of quality of service. In the early 1980s, coverage in Latin America as a whole averaged 7 lines per 100 inhabitants —12 in Argentina, and 10 in Chile, Mexico, and Costa Rica— compared with an average of nearly 50 lines per 100 inhabitants in the developed countries. In Argentina —an extreme case— fewer than half of all telephone calls were actually completed. It took 5 years to get a line installed, and an average of 15 days to get repairs done. The situation in Chile was not that bad, but was also well below international standards.

42. Conventional indicators of productivity per employed person (number of lines per employee, in the sectoral jargon) and data on coverage (number of installed lines per 100 inhabitants) show that there were definite improvements in the sector throughout the 1990s. Thus, during the last

¹² According to the ITU report, the independence of these regulatory bodies is more apparent than real. In Argentina, the central government has intervened the regulatory agency several times, removing all or most of the directors each time (ITU, 2000, p. 11).

decade, the supply of telephone lines in Argentina rose from 11 to 22 lines per 100 inhabitants, and Chile had a total of 7.5 million lines, or an average of 22 installed lines per 100 inhabitants.

43. There were also significant improvements in other “quality” indicators, including those relating to digitalization of the system, number of users without service, number of public telephones installed and daily average number of repair requests pending (ITU, 2000). The telecommunications sector is already fully digitalized in several countries of the region.

44. Nevertheless, the development of the sector involves more than just installing new phone lines. The entire system needs to go through a maturing process, and improvements need to be made over time throughout the whole network of sectoral agents, regulatory institutions and human resources training programmes. These changes must go hand-in-hand with the development and dissemination throughout society of a world-class telecommunications “culture”. Indeed, the region has already made great strides in all these areas.

45. As noted above, Uruguay and Costa Rica followed a different strategy with regard to ownership of basic telephone services. On the one hand, they maintained the State enterprises, but on the other, they tried to open the market to competition by deregulating cellular telephony and value-added services.

46. The International Telecommunication Union reports that with the exception of some Caribbean countries, Uruguay has one of the best coverage rates in the region, i.e., more than 27 lines per 100 inhabitants. The Uruguayan State-owned telephone company plans to have installed 1 million lines by the end of 2000 —up from 750,000 in September 1997—, which is equivalent to a density of 30 telephones per 100 inhabitants. Antel had fully digitalized the telephone system by July 1997, and there are virtually no pending applications for service. A similarly successful effort at modernization without privatization may be found in the basic telephone service in Costa Rica, which has the same density of telephone lines as Chile and Argentina.

47. The lesson to be learned from these two “unconventional” cases —Uruguay and Costa Rica— would appear to be that privatization of basic telephone services is not a *sine qua non* for modernizing the telecommunications sector, but rather that the key to modernization is the deepening of competition.

48. It is also important to realize that in future, market performance (i.e., rates for access to basic telephone service) will reflect the rapid growth of mobile telephony, which, from the end user’s standpoint, represents the strongest competition. Subscriptions to mobile cell phone services in Latin America and the Caribbean rose to more than 38 million in 1999, up from 100,000 in 1990 and 3.5 million in 1995. According to ITU data, Paraguay and Venezuela were the first countries in the region in which the number of users of mobile telephone services surpassed that of fixed-line telephone users (ITU, 2000, p. 4). It follows that one of the main barriers to the growth of Internet use —the cost of access— is bound to drop eventually.

B. Other factors that determine the pace of transition to an information economy

49. Electronic commerce has grown rapidly in the region. According to the International Data Centre, online demand for goods and services in the region amounts to around US\$ 160 million per year.¹³ Because of its size and industrial development, Brazil has the highest connection rates, i.e., approximately 4 million users in 1999, which is nearly half the online population of the region. Mexico is second, with a connection density of 18%; Argentina is third, with 12%, and Chile accounts for approximately 4% of all users.¹⁴ As regards the structure of spending via the Internet, the available data show that around 80% of total spending goes to only six major fields of activity: supermarkets, books, computers and software, electronic equipment, music and financial services.

50. In addition to the cost of telephone service, the structure and behaviour of the different markets involved in Internet services also influence the dissemination of such services in society. At least five major actors on the data transmission market determine the way the Internet is used. The market relationships between them are crucial to an understanding of the process whereby information technology is spread in a given society. These actors are (i) the carriers, which own the high-speed connections, such as MCI, Sprint and UUNet; (ii) the internet access providers (IAPs), which act as intermediaries between carriers and internet service providers, and handle high-speed inter-urban connections; (iii) the internet service providers (ISPs), which provide connectivity to end users, and operate as retailers, whereas IAPs are wholesale providers of connectivity services; the services of ISPs are provided through telephone or modem connections or permanent point-to-point connections between clients and wholesale providers; (iv) content providers, which are individuals, companies or organizations that publish information on the Internet, in the form of Web “pages”, for end users, and finally, (v) end users, who go online and use the information that is available on the servers. Services at the first two levels are usually supplied by international companies, while the other levels of service are usually provided by national companies operating in different countries of the region.

51. The many different linkages —as regards both cooperation and competition— among these agents or groups of agents, and within the individual categories, give rise to externalities, direct interdependencies, economies of scale and economies of scope. The atmosphere of competition that is created by this situation accounts for the rapid progress towards the supply of free connections in the more competitive markets. It is safe to say that competition on the Internet has been built by the income generated by advertising and the availability of free connections.

52. In addition to the high cost of local telephone services and the lesser or greater degree of competition that may exist among the agents that make up the Internet, other factors influencing connectivity rates are the high prices of computer equipment, the incomplete coverage of the telecommunications network and a number of security-related issues relating to electronic transactions. This explains why Latin America, with 8% of the world population, only accounts for 3.5% of Internet users and less than 1% of electronic commerce worldwide. In 1999, however, the

¹³ The Boston Consulting Group, 1999. Jupiter Communications estimates that annual sales on the Internet retail market amount to nearly US\$ 200 million, with Brazil at the head (US\$ 121 million), followed by Mexico (US\$ 25 million), Argentina (US\$ 15 million) and Chile and Colombia (US\$7 million each) (see *América Economía*, No. 1, p. 11, April 2000, for details on the 50 most active portals of the region).

¹⁴ According to an independent study by Prince & Cooke, the number of users in Argentina was approximately 509,000 in 1999 and 925,000 in 2000, which amounts to 2.43% of the total population of the country. These figures are similar to those published by the Boston Consulting Group.

number of computers with Internet connections grew more rapidly in the region than in anywhere else in the world. The number of Internet users in Latin America grew by 14 times between 1995 and 1999 (ITU, 2000, p. 19).

53. Several countries have promoted Internet access by setting up terminals in public places and community centres.¹⁵ Thus, the number of Internet users can be expected to rise sharply over the next few years, as a result of the implementation of proactive public policies aimed at promoting rapid connection for primary and secondary schools (as in the cases of Chile and Argentina), the reduction of telephone rates as a result of deregulation of the telecommunications market, and the increase in competition.

54. Another issue that must be addressed in order to promote Internet expansion in Latin America is that of the weakness of the legal framework for the system. Because of the differences in the protection offered to consumers in regard to the fraudulent use of credit cards, no safe and reliable payment processing platform has yet been developed to reduce the uncertainty associated with transactions over the Internet. Brazil is the country that has made the most progress in this regard.¹⁶

55. Just as legal insecurity limits the spread of electronic commerce, so does the scant level of development of postal service infrastructure for distributing the goods and services that people buy through electronic means. Mexico has probably made the greatest strides in developing a sophisticated distribution platform, which operates through Estafeta, a company with more than 500 distribution offices throughout the country. The postal services in Brazil, Argentina and Chile are implementing a rapid process of modernization, although their practices are still below international standards.

56. As ITU warns, however, the extension of Internet access in a region where one-fourth of the population lives on less than one dollar a day will not depend only on lowering the cost or improving the quality of services. In several countries of the region, prices for Internet access are lower, in absolute terms, than in the United States; however, because of the low income levels of the middle and lower segments of society, they are still beyond reach. This means that in Latin America and the Caribbean, the State must play a stronger role in subsidizing the dissemination of ICT products and services than in other parts of the world.

57. Different countries are at different stages in their preparations for the transition to an information and knowledge-based society. Therefore, special measures must be taken in each case to close the gap in respect of international patterns.

¹⁵ In Argentina, the Government created the argentina@internet.todos programme, and installed nearly 1,000 telecentres to provide Internet access to remote and low-income communities; in Barbados, all primary and secondary schools will receive ICT equipment over the next few years, as part of the Edu Tech 2000 programme; in Belize, the Internet for Schools programme, which was begun in 1995, will provide free Internet access to all high schools and universities; in Chile, the Fondo para el Desarrollo de las Telecomunicaciones is being used to help develop community telecentres in the context of a project for providing Internet access to all Chilean communities by 2006; in Colombia, Telecom runs a programme for providing free Internet access to all poor municipalities of the country; in Peru, the Red Científica Peruana promotes public Internet centres; in Uruguay, the State-owned telecommunications company, Antel, is installing 25 digital community centres in all state capitals and major cities, as part of the Tercer Milenio project; in Brazil, the banks have begun to offer free Internet access (ITU, 2000, p. 20, 29).

¹⁶ Banco Brasileiro de Desconto (Bradesco) has created an "electronic wallet" that can be downloaded from the bank's Website and used with a long list of authorized companies. Such mechanisms cannot be extended to other countries in the region, however, since they are not transferable between countries and cannot be used in other banks.

V. Towards an agenda of public policy and regional cooperation to ensure greater efficiency and equity in the transition to a knowledge-based society

58. In a number of recent publications, ECLAC has stressed the need to improve the regulatory frameworks and policies governing competition, to resolve market failures through long-term financing, innovation and technological change, and to implement policies for promoting production and improving the efficiency and equity of the region's economies following the liberalization of trade and the deregulation and privatization of production activities. Such steps are also necessary, although not sufficient, to ensure a more adequate transition to the world of information and knowledge. Following is a brief summary of some elements that might be included in a Latin American and Caribbean public policy agenda aimed at ensuring a smoother and more equitable transition to an information and knowledge-based society.

A. Correct the adverse impact of structural reform

59. The fiscal emergency and the lack of experience that were the backdrop against which the issue of privatization was originally addressed diverted attention from the concerns of those who wanted to take ex ante measures to ensure competition, and hence, the prevailing view was that deregulation precluded any new regulatory role for the State. Thus, the authorities underestimated the need for privatization schemes to be associated with strong and independent regulatory agencies designed to encourage new forms of "regulated competition". Regulatory agencies were often created at a late date, after privatization contracts had already been signed, and therefore lacked the independence, resources, institutional powers and operational capacity that were needed to protect the interests of consumers.

60. As a step towards correcting this situation, the experiences of other countries should be studied with a view to drawing conclusions regarding the principles that should govern a regulatory framework so as to reconcile the protection of ownership rights with the protection of consumer rights, thereby guaranteeing the supply of satisfactory and sustainable services. The regulatory principles embodied in mature systems, such as that of the United States, should be borne in mind,

as well as more recent experiences, such as the British one, where a great deal has been learned about the construction of new regulatory mechanisms.

61. In addition to the issue of regulatory frameworks and agencies in the context of privatization, public policy must also take into account the question of competition. This is an especially important consideration in efforts to build a model of social organization of production that protects the well-being of consumers and fosters the efficient allocation of resources by eliminating anti-competition practices and promoting competition through the adoption of principles, legislation and institutions designed to protect it.

62. A proactive agency that ensures competition should prevent anti-competition and price-fixing practices that are designed to exploit market strengths. It should assess the impact of mergers on competition and ensure transparency in public stock offerings so as to protect the interests of small shareholders. It should prevent the use of insider information in business transactions, regulate conflicts of interest, and reduce barriers to market entry. A regulatory agency should operate as a strong counterweight to the growing presence in the region's economies of the large conglomerates of domestic capital and transnational corporations.

B. Correct market failures

63. The public/private policy agenda that is needed to support the transition to an information and knowledge-based society should also include measures for expanding and improving the production apparatus of the region and resolving market failures, e.g., in the sphere of long-term financing, access to technological and management know-how and training of human resources. The construction of social capital should be promoted by encouraging the development of institutions, synergies and strategic complementarities within the production fabric of individual societies.

64. From this standpoint, if information technology is to be used to deepen the growth process, the countries must implement a comprehensive production and technological development policy. On the one hand, such a policy should be designed to improve the operation of markets for the factors of production and, on the other, it should allow for the accelerated diffusion and use, at the local level, of computer-based technologies that will expedite the transition to an information society.

C. Deepen innovation and technological diffusion

65. Policies designed to promote innovation and technological diffusion, as well as those aimed at shoring up the institutions involved in this field, should capitalize on and strengthen the new patterns of productive specialization and insertion in global trade flows that are emerging in the region. Every effort should be made to increase domestic value added and the engineering and technological content of specific products. The synergies among the production apparatus, the universities and technical schools, and the domestic supply of engineering services must be strengthened and encouraged, as they are essential to efficient economic growth based on improved productivity.

66. In order to move in this direction, domestic spending on research and development and on diffusion of technology must be increased, and incentives must be created to encourage private spending along the same lines.

67. Priority must be given to exploring possibilities for using seed capital to encourage the creation of new technology-based companies, of which there are too few in the region, and the development of science and technology-intensive activities, including software development and biotechnology, which are just beginning to take off in the larger countries.

68. The State must play a stronger role in funding research and development and promoting greater interaction among the agents involved in innovation at the national level. The State could also operate as a second-tier bank, through a process of decentralization, so that the commercial banks would be responsible for fund management and risk assessment. The latter would be expected to adopt new criteria for assessing the risks involved in innovation and play a more dynamic role in financing innovative technology projects.

D. Ensure greater efficiency and equity in the transition to a knowledge-based society

69. In the effort to ensure greater efficiency and equity in the transition to an information-based society, a number of measures need to be taken to lower the cost of telecommunications services and increase access to digital networks, as well as reduce the cost of and improve access to the computer infrastructure.

70. The diffusion of ICT products and services must also be improved in the educational and public health systems and in local community centres, so as to provide the low-income sectors with access to the information society. Internet terminals should be set up in public places and community centres, so as to ensure access for more and more citizens of the Latin American and Caribbean countries.

71. In addition, the legal framework must be improved so as to guarantee legal security in electronic transactions, provide better protection for consumers and thus generate a greater volume of electronic commerce.

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