ICT-RELATED TRANSFORMATIONS IN LATIN AMERICAN METROPOLISES

Faculty of Architecture
Delft University of Technology

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Ana Maria Fernández-Maldonado

Colophon

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Foreword

During the twentieth century the urbanisation process has changed the face of world, which is now eminently an urban world. In no other region of the world has the urbanisation process developed at such a fast pace as in Latin America. Whereas in 1925, 75% of Latin Americans lived in rural areas, this proportion has been reversed and in 2001, 75.8% lived in urban areas. Latin America is currently the second most urbanised world region, after North America. At the same time, it is where the highest percentage of people is concentrated in large cities. The main actors behind this huge spatial mobilisation have been millions of young people, whose desire for economic progress and social advancement have overcome immense spatial, social, economic and cultural obstacles.

A process of similar significance for social, economic and cultural change has appeared in the urban scene during the end of the twentieth century: digital connectivity at the global level. While the developed world has rapidly adopted the new technologies, for the developing world the process develops at a slower tempo because the demand for digital connectivity by most people is not lucrative enough for the global corporations which control the telecommunications markets. But, if the obstacles toward digital connectivity are still too high for most of the urban population, the lessons from the urbanisation process lead us to think that people will eventually find a way to overcome economic barriers in order to catch up digitally. After all, the main actors, the main motives behind the move toward cities and the move toward digital connectivity are the precisely the same: millions of young people with a strong desire for progress and citizenship.

Signs of this process can already be seen in the large cities of Latin America, which is the best connected region of the developing world. For several reasons, however, no studies have, so far, been addressed to exploring the transformations that ICTs and digital connectivity are bringing to the Latin American cities. This has been the main motivation in embarking on this research: to explore, document and assess what is happening now in the Latin American metropolises regarding digital connectivity.

This research originated within the Design Studio '*The Network City'*, which began to function in August 1997 in the Faculty of Architecture of Delft University of Technology (TU-Delft), on the initiative of the Chair of Spatial Planning and the Dutch Ministry of Housing, Spatial Planning, and Environment (VROM). Its implementation was the result of the recommendations of an exploratory study commissioned in 1996 by Johan van Wamelen, head of the *Directie Informatiemanagement en Organisatie* (DIO), to Prof. Paul Drewe, Chair of Spatial Planning, to investigate the relationship between ICTs and cities. After my appointment as coordinator of the Design Studio the first steps of this research were taken.

The development of this PhD research has been a very pleasant job for several reasons. The very first reason is the magic of the topic, its revolutionary character. Digital connectivity has opened a whole new world for us recently, which continuously challenges my intellectual curiosity. My personal fascination is not less important than the intellectual challenge: as a Latin American living in Europe, with family and friends scattered around different continents, the advent of the Internet changed my life greatly, by allowing me to be in daily and instant contact with my loved ones. I feel, therefore, a high personal affinity with the world of the new technologies. Further, ICTs not only constitute the topic of this PhD research; they are also deeply involved in the methods I used to collect information and conduct the research work. This work would not have been possible without the Internet as a research tool.

Additionally, during the course of this work I have had the privilege to meet, interact and discuss with interesting and inspiring people - from well-known authors to peers and students involved in the field of urban ICT studies - who have received my work with great interest, which has led to invitations to publish in different academic contexts. Further, this piece of work has also been the occasion of a renewed encounter with my roots and as such it has been a source of emotional gratification. By contributing to the academic debate on Latin American cities I feel I am contributing to the development of my homeland.

For the completion of this book I am deeply indebted to many people that have supported me along these years. First of all I have to express my gratitude to my research promoters, Paul Drewe and Edward Hulsbergen, for their continuous support, stimulus and inspiration. For me, it has always been a pleasure and a privilege to work with them. My special gratitude is due to Edward, for being there in times of existential, cultural or methodological confusion. I thank my colleagues from the Chair Spatial Planning for the always friendly and pleasant work environment, as well as Linda de Vos and Margret van Swieten for their rapid and enthusiastic help in many administrative tasks. I also want to thank my English language editor, David Baynton, for his fine work, his encouragement and his English humor.

For their support to the Design Studio, whose coordination led me to this research, I would like to thank the Ministry of VROM and Johan van Wamelen. I am also grateful to the members of the dissertation commission for dedicating their time to evaluate my thesis. Further, I want to thank Sam Paltridge, Peri Paredes, Andrés Solari, Francisco Proenza, Francisco Colombo, Carmen Gil and José Luis Rénique for reading parts of the manuscript version of the thesis and kindly sending me comments, ideas and suggestions.

I need to express my gratitude to my Peruvian friends, who have supported me during my field work with contacts, ideas, comments, suggestions, information and have invited me to present my work in different occasions. A special gratitude goes to Germán Pérez and Jorge Melo Vega, for their constant interest and support, and to Nelson Manrique, who first saw the significance of the ICT transformations in Lima, and who generously guided me in the world of 'ICT informality' during several consecutive years. I also have to thank my friends in Argentina, especially to María Esther Rodríguez and Beatriz Cuenya, for their support, contacts and suggestions during my visits to Buenos Aires.

I also want to acknowledge the intellectual contribution of my online network: friends and peers from around the world, with whom I have had virtual discussions on different issues of this research, in many occasions. With some of these online friends I still await a physical encounter, which I am sure will come. Additionally, I want to thank all the persons that helped me gathering data, who provided me with their (unpublished) research reports, to those who provided me with contact with their with peers working in similar topics, as well as the persons I interviewed, and all those who let me take photos or kindly answered my questions. I especially

acknowledge the warm welcome of the people from the City of Buenos Aires Planning Office, who gave me their time and attention during December 2001, in times of high social unrest.

I also would like to acknowledge the contribution of my friends. Dino, John, Sasha, Karina, Luisa and Paul have given me many valuable suggestions and tips from their own experience in the long way to the PhD dissertation at the TUDelft. The young 'Latin American' researchers at the 8th floor of the faculty - Roberto, Andrea, Sari, Natacha, Marcela, Jason, Javier, Francisco, Alejandro - have also collaborated in different ways: they have been an immediately available source of comparative data and, more important, of laughter and *joie de vivre*.

My family has a very important place in my life; I would like to thank them for their love and constant support not only during the research but in every moment of my life. This goes especially to my mother, Estela, for being a second mother of my children. Chicos, thanks for being what you are. Rudie, my partner in life, has been another important factor of my emotional well-being; I thank him for the daily happiness. I would have loved to have given this book to my father, Jorge Fernández-Maldonado, whose life and thought have greatly influenced my own. Since that is not possible any more, I want to thank life for making me his daughter, which I consider a great privilege.

Ana María Fernández-Maldonado

Delft, October 2004

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General introduction

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General introduction

1.1. Introduction

Two relatively recent technological processes, the convergence of information and communication technologies into one only technology, labelled as ICT, and its diffusion from high-technology and work environments to home and mobile locations are gradually and visibly transforming society, changing it into what is known as 'the information society'[1]. ICTs have, indeed, considerable transformative powers and many agree that most of the changes are still to come and that they will be profound, unprecedented and unforeseen. An important reason for this is because ICT connectivity re-shapes the essence of human society, which is communication between people.

Transforming the ways people communicate, inform themselves and develop work and daily life activities, ICTs in many ways transform urban settings, opening up new urban possibilities and opportunities. ICTs support and promote new ways of social interaction and the transformation of traditional urban functions. This, in turn, has effects upon the urban functioning and urban form of cities. In the perspective of such transformations the present thesis is an exploratory study of the relationship between information and communications technologies (ICTs)[2] and the urban development of the Latin American metropolises. Its final objective is the identification of the new opportunities and main challenges that Latin American metropolises face with the development of ICTs in their territory and is crucial in providing the basis for the elaboration of strategic plans and urban ICT policies.

The study of the relationship between ICTs and cities is a new field that has been a subject of analytical and critical research over the last ten to twelve years. Its classic literature includes Manuel Castells' *The Rise of the Network Society* (1996) and *The Internet Galaxy* (2001), William Mitchell's *City of Bits* (1995) and *E-topia* (1999), and Graham and Marvin's *Telecommunications and the City* (1996). Besides these basic texts, a large number of specialised studies has been produced covering a wide scope of sub-themes and perspectives. Stephen Graham has provided a comprehensive view of the main research areas and findings in his *Cybercities Reader* (2004), labelling this recent and dynamic sub-discipline as 'urban ICT studies' (Graham, 2004:3).

As in other fields of urban studies, urban ICT studies are defined by the topic (and the fundamental questions about it) rather than by a traditional set of methods. They draw on theories, issues and experiences from the multiple disciplines and perspectives that they integrate. There is therefore no single or factual method for evaluating the outcomes of the relationship between the new technologies and cities. Considering the situation of ICT-related transformations in the

metropolises of Latin America, some fundamental questions that urban professionals should pose include:

- How are the ICT-related transformations affecting these large and already troubled metropolises?
- What are the likely urban and social outcomes of the introduction and generalisation of ICTs use?
- Are they adding more troubles to their current urban development?
- Or, are they contributing to improving the social and economic prospects of the city and the lives of their residents?

While abundant literature about this topic has been published concerning cities of the global North, in the Latin American region these questions have remained practically unanswered - until now. To provide a first answer to these, and to promote discussion around this important topic are the general goals of this research.

1.2. Context of the research

The general context of the research refers to the context of its two main themes: ICTs in urban settings and the urban development of the Latin American metropolises.

a) ICTs in urban settings

Because of the fast technological advances that led to the convergence of informatics and telecommunications, the current world is different to what it was ten years ago, when the World Wide Web was still not invented. The diffusion of ICT networks and devices that followed the commercial introduction of the Internet into our homes and businesses has transformed urban life forever (Mitchell, 1999). ICT connectivity is now considered as a strategic asset for the economic and social progress of nations and cities, with effects upon almost all types of urban activities. Telecommunications have become just one sector of rapid development, strategic importance and large profits. They have also become a vital enabler of all other industrial sectors (World Bank, 2000). Increasingly major economic activities are linked to information processing and transmission, or depend critically upon ICTs. For that reason ICTs are considered to be the core and the infrastructure of the current type of economic organisation, and, as such, cannot be considered apart from the global re-structuring of economy. Regions, countries, and cities that are not connected with high-technology infrastructures cannot become active participants in the information society and economy. In short, in the last ten years ICTs have become powerful agents of social and economic change, deeply ingrained with the functioning of the new type of political-economic organisation.

However ICTs are much more than agents of globalisation[3]. At city level, and if properly used, ICTs can serve as tools for urban development, as they can be used to provide basic services as education and health, as well as a new impulse for business and commerce in a relatively cheap and flexible way. New ICT applications can be used to the advantage of those places or groups with low or limited access to services by, promoting a more sustainable and balanced growth. But, in addition to ICTs' capabilities for providing services and connecting people, the diffusion of ICTs involve a great potential for social empowerment and bottom-up developments. As no other technologies before, ICTs can be adapted by users for their own purposes, thanks to their (programmable) software component. This implies empowering individuals and groups from the bottom-up, allowing ordinary people to become active participants rather than passive recipients of information.

Despite ICTs' social and economic significance and their great potentials as tools for urban development, the topic of ICTs in cities did not become relevant in urban studies until relatively recently. In their seminal study, Graham and Marvin (1996) denounced the neglect of telecommunications in urban studies. They linked it to the challenges related by the invisibility, technical and private character of ICT infrastructures. But, they also point out the conceptual difficulties linked to the emergence of cyberspace as a new urban domain. ICTs challenge the familiar concepts of topologic space and objective time, unable to contain the new time-space categories that arise with the use of cyberspace for developing urban activities at a distance while, at the same time, ICTs challenge the urban planning paradigms based on the functioning of the industrial city.

From the different opportunities for presentation, discussion and confrontation of the research topic[4] during the process of elaboration of this thesis it became clear that, despite an increasing awareness and acceptance of the relevant role of ICTs in the professional practice, the new technologies still constitute a difficult, and even confusing, issue to be tackled by the professionals engaged in urban development. The confusion comes partly from the different expectations, perceptions and goals that academics, policy-makers and practitioners each have regarding ICTs. While not spelling out these differences, they may greatly interfere with the necessary understanding and synergy between them.

In order to predict the probable future, urban professionals concerned with urban theory need to understand how the new technologies act in the urban space. Urban policy makers have to be aware of the probable and possible consequences of the use of ICTs to envision a future that is desirable for all. For practitioners in urban planning and design the main goal is to understand ICTs' potential in solving the current urban problems.

b) Urban development of the Latin American metropolises

Latin American metropolises grew visibly during the (post-war) period of industrialisation by import substitution. Since the 1980s, they have been affected by far-reaching structural transformations. The political-economic scene has radically changed under the principles of free trade and market forces, which have driven the state away from strategic economic sectors and from its directing role in the nation and society. The privatisation and deregulation processes that followed have radically transformed employment markets, raising the traditional levels of unemployment. These macro changes have had great consequences for city governance. Since key sectors of the city life have been taken out of public hands, the power of local governments has decreased. At the same time the influence of large foreign and local corporations in the urban scene has visibly increased; they have become powerful agents of urban change. These political changes have been occurring under high economic instability and the recurring economic crises, which have increased the levels of economic inequality, making the rich groups even richer than before. Latin America is now the world region with the highest inequality in income.

The demographic setting of the metropolises is also different from the previous period: the explosive growth of the metropolises linked to the rural-urban migration of the period of industrialisation has passed. Their demographic composition has changed. There are now great numbers of young and educated urban residents who cannot find a job in the market easily, and who increasingly emigrate looking for a better future.

The corresponding socio-spatial scene is highly worrying. Today, more than ever, the Latin American metropolises are developing at different tempos and with different urban dynamics. Traditionally, these cities have been characterised by a type of urban development 'at dual speeds', where privileged groups enjoy very high living standards, while the average resident

has difficulties with access to housing and services. Social and spatial polarisation and urban inequality have acquired deeper levels in the new political-economic context. On the one hand, powerful private companies and real estate developers are producing the privileged spaces for the cosmopolitan elites, the so-called 'islands of wealth'. These include residential islands in the form of gated neighbourhoods, productive islands in the form of new business and industrial nodes, and consumption islands in the form of shopping malls, luxury hotels, entertainment centres, etc. Meanwhile, the poor continue building the 'informal city' by their own means. The informal city keeps growing at steady pace while urgent urban problems accumulate in the metropolises regarding housing, infrastructure and the provision of basic services.

The introduction of Internet and the development of ICTs in the Latin American metropolises have occurred within this difficult urban context. Surprisingly few local urban researchers are paying attention to this topic, and even fewer with an empirical approach. On the one hand, this seems linked to the newness of the topic and the conservatism and defensive attitudes of academic circles regarding such non-traditional subjects as the new technologies, as observed in the Latin American academic context by Holmes (2001) and Finquelievich (2002). On the other hand, most local academics generally address specific urban problems that require urgent action. This 'development bias' or preference for topics linked to (solving) urban 'problems' (community participation, housing, land tenure, service provision, local governments' capacities and informal sector) is also to be found in the international literature on 'Third World' cities (Robinson, 2002). Although this strict separation between developed and developing cities is not evident in the literature belonging to urban ICT studies[5], the Latin American cities have not, so far, been the focus of systematic research in this field.

1.3. Problem statement

ICTs are broadly mentioned in the Latin American urban literature as one of the main drivers of the current urban transformations at metropolitan level. The introduction and development of ICTs in the Latin American region are producing significant urban transformations, which are more visible in the large metropolises, which undergo large socio-spatial transformations (De Mattos, 2001, 2002; Cicolella, 1999; Chion, 2002; Schiffer, 2002; Parnreiter, 2002). While, at the same time, there already exists a body of research that gives us an idea of the ICT-related transformations in the cities and metropolises of advanced industrialised countries (Graham, 2004).

However, the particular features of the introduction and development of ICTs in the large cities of Latin America, characterised by their profound social divisions, have remained without examination so far. The general acknowledgement of the relevance of the topic has not led to local research attention to its urban implications as a simple review of the literature will show. No empirical explorations have been carried out into the extent, nature and/or mechanisms of the ICT-related changes in the metropolises of the region, or about ICTs urban and social significance for their future.

In this context, the exploration and analyses of the ICT-related urban transformations becomes an important task to be undertaken for the identification of the main urban challenges and opportunities ahead and for constructing and verifying urban theory on ICTs and cities. The result of these explorations and analyses can be a useful to start a discussion on ICT- urban related issues at Latin American level, which, in turn, will contribute to the increased awareness of what it is at stake for the future of the cities.

The introduction and generalisation since the early 1990s of ICTs are producing urban transformations in the large cities of Latin America. The transformations include the modernisation, deployment and overlapping of ICT technical infrastructures at the city locations and their inter-

connection in global networks in ways that are reinforcing the traditional hierarchies of the urban system; the rise of specialised 'high-level' internationally connected business activities and the increased presence of ICT devices for the purposes of everyday life which are not evenly diffused through the different socio-economic groups. These processes are producing changes in urban functions and in the types of social interactions between urban actors, which, in turn, are producing changes in the urban structure and the built environment and in the ways of urban functioning. However, the final outcome of these changes varies substantially from city to city according to each city's 'personality', its historical development, national political and economic circumstances and by its level of integration into the global economy.

1.4. Research aims and main questions

According to the stated problems, the main aims of the research are:

1. To explore and analyse the nature, scope and the significance of current development of ICT networks in the Latin American metropolises, in its infrastructural, functional and social aspects.
2. To explore how these ICT networks interact and combine themselves locally to produce urban transformations at city level.
3. To identify the new opportunities and challenges that the diffusion of ICTs generate in the Latin American metropolises.

Additionally, the present research intends to promote local and international discussion of the urban outcomes of development of ICTs in the Latin American metropolises and their significance for their future urban development.

According to these aims, the main questions of the research are:

1. What is the situation and the main features of the ICT infrastructures in the Latin American metropolises at both global and local level?
2. What is the situation and which are the main trends of the networks of production and consumption of ICTs in the Latin American metropolises?
3. What is the situation and which are the main trends of the diffusion of ICTs in the metropolises of the region?
4. Which are the main outcomes of the interaction of such trends at local level for the functioning of the city?
5. What are the main outcomes of the interaction of these trends at local level for the built environment and urban form?
6. What are the new problems that the developments of ICTs bring to the urban development of the Latin American metropolises?
7. What are the new opportunities that the developments of ICTs bring to the urban development of the Latin American metropolises?

1.5. Methodological aspects

The following sub-sections explain the thesis' main points of departure, its analytical framework and the selection of case studies.

a) Research approach

To approach the topic, the main points of departure have been:

- Multidisciplinarity and empirical basis

The exploration of the urban development of the Latin American metropolises in the light of their ICT-related transformations is approached with the point of view of the urban ICT studies and the spatial disciplines. This implies a multi-disciplinary approach, integrating theoretical knowledge coming from the fields of telecommunications, urban planning, social and urban theory, networks urbanism, and on recent advances on ICTs as agents of urban change. The research also deals with historical and current aspects of the Latin American urban development.

An important point of departure has been the empirical character of the inquiry, considered essential to answer the research questions and to fulfil the aims of the research. The lack of empirical studies addressed to urban ICT matters in Latin America is precisely one of the main motivations of this enquiry. Empirical studies are indispensable in fighting technological determinisms, which have been common in the field of urban ICT studies.

- Urban complexity

The city is understood as the spatial expression of political, economic, socio-cultural and technological processes, constantly shaped by these and constantly evolving. Urban settings are the product and the reflection of the local society and cannot be separated from it; they are complex and dynamic entities that lend themselves very little to being reduced to models.

As Jane Jacobs lucidly explained in 1962, cities have so many and constantly changing elements and actors inter-acting with each other that the processes arising cannot be described only in terms of linear causality or in terms of probabilities. They are not simple systems - with two or three variables - nor systems of disorganised complexity – with thousands or millions of unrelated variables - which can only be approached by statistical and probabilistic methods. Cities are systems of organised complexity, in which millions of inter-related variables are producing the city dynamics. The inter-relation of variables demands a more sophisticated approach than statistics alone, which are useful for the macro view, but disregard what is happening at the street level.

Since cities are self-organising systems[6], examining their dynamics requires approaching the city with a plural view. On the one hand, a view ‘from above’, to understand macro-scale structural trends in their urban development. This also allows comparing to what is happening in other places. On the other hand, a view ‘from below’ is required to understand what is happening at street level and from the bottom-up, recognising the role of local, idiosyncratic, cultural and contingent processes. This is indispensable in identifying patterns developing over time, because these patterns, built out of millions of individual decisions, are what make up a city’s ‘personality’, which give a special movement to a city’s dynamics.

- Network approach

Modern urban settings have been traditionally designed according to fixed zoning planning principles, where each area has a specific and exclusive function in the whole urban organisation. These spatial principles are, however, unable to grasp all transformations affecting urban organisation and activities. Advances in ICT bring about elements of further complexity in this oversimplified urban conception. Working, education, recreation, shopping, health care and many other activities can be now performed in almost any place, only depending on the choices of the users and the availability of connections and equipment.

Considering that to grasp the contemporary urban issues the city must be conceptualised in terms of networks, the research uses Gabriel Dupuy's (1991) concept of the '*urbanisme de reseaux*' (network urbanism), considered valuable because of the incorporation of the aspects mobility and choice. Dupuy's model considers the city as the non-hierarchical convergence of three levels of operators as illustrated in Figure 1.1. At the first level the operators are concerned with the physical dimension of networks. The second level deals with the operators of functional networks. The operators at the third level are individuals and households in their daily time-space budget. Each level uses the level immediately below to offer services to the level above. The first two levels represent an 'objective' element in the city, while the third level has a 'subjective' character. It is at this level that individuals interpret the possibilities built in the first two levels and operate choices forming in this way their own city.

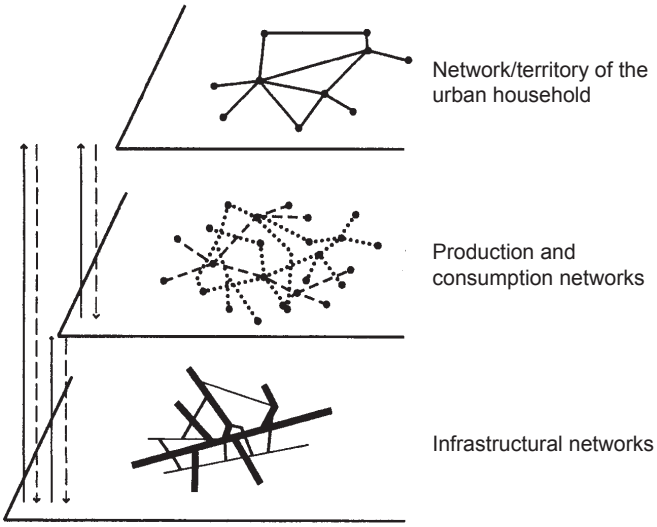


Figure 1.1. The three main levels of networks of 'the urbanism of networks' (Source: Dupuy, 1991).

- Mediation of social transformations

The study of ICTs and the city is seen as the study of the recursive relationship between space, society and technology, in which the three elements are subject to interrelated global and local trends. ICTs do not generate direct urban impacts, but are producing fundamental social and functional transformations, which in turn are gradually producing urban and spatial transformations. This mediation of the social and the functional has been considered as the basis of the framework for the analytical approach.

This also implies that for analysing technological change no two places are alike; each place is unique with regard to the use and application of ICTs. Locality then becomes of crucial importance in understanding the ICT-related transformations. For this reason it was considered fundamental to view the transformation from 'inside out', by developing at least two case studies. Buenos Aires and Lima are the cities selected to serve as these.

- Metropolis as unit of analysis

Metropolises acquire a special importance in the information age as they constitute the main nodes of the digital networks. As such, Latin American metropolises are obviously the best

connected locations in the region. It is there where the introduction of ICTs is more extended and deepest, where people are more familiar with ICTs and their applications, and where the main (and especially, bottom-up) developments could be clearly observed and documented.

A visitor to the metropolises and cities of the Latin American region may remark their heterogeneity in terms of image, scale, geography, urban landscape and socio-economic features. They also have a distinct 'urban personality' or *genus loci*. But, despite the visible heterogeneity between them, the whole Latin American region exhibits a degree of coherence that comes from their similar historic and developmental paths, which, added to the language and cultural traits, allow a certain level of generalisation. In this work, the main emphasis has been placed on Mexico City, Caracas, Bogotá, Lima, São Paulo Buenos Aires and Santiago, although sometimes reference is also made to other important metropolises such as Rio de Janeiro, Montevideo and Quito.

b) Analytical approach

The topic of the research is very recent, and there are no 'traditional' ways of assessing the role of ICTs in urban development. The methodology used to answer the research questions

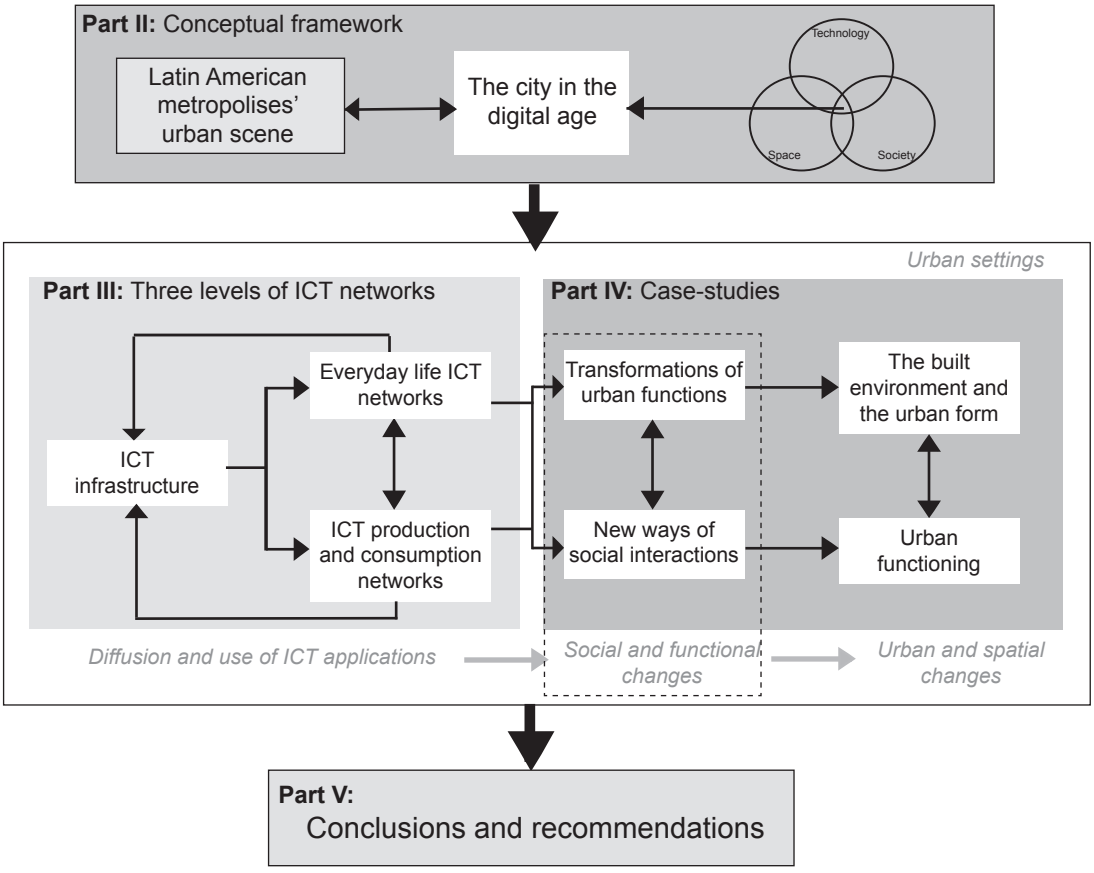


Figure 1.2. Analytical framework of the research.

derives from the points of departure previously mentioned. The exploration has been conducted in five parts, which correspond to the phases of the methodology used. The first part is the general introduction to the research problem. Part II sets the conceptual framework developing theoretical propositions to guide the following parts. Part III is the empirical exploration of the situation and trends of the development of ICTs in three different levels correspond to Dupuy's scheme of the network urbanism. Part IV goes deeper with the exploration in the case-studies. Part V of the thesis includes the conclusions and recommendations. Figure 1.2 shows the analytical framework of the thesis, with its different parts, illustrating the mediation of social and functional changes (inside the dashed lines).

The research, conducted since January 2000, relies upon a large variety of methods and types of data, as demanded by the nature of the topic. In addition to the literature review and desk research, I have carried out field work in Lima and Buenos Aires during several consecutive visits. A very important means to carry out the exploration has been the Internet, both as a communication medium with peers and people involved in the topic, and as a medium to get both quantitative as qualitative data. Part of it is also based on earlier publications.

Part II.

I have used the growing body of literature in the field of urban ICT studies, which I have been following and gathering in my job as the co-ordinator of the Design Studio *The Network City* since 1997. These are books, reports, articles in specialised journals and contributions to international conferences, some of which are the product of research conducted by colleagues from the Spatial Planning Group.

Part III.

(a) The examination of the ICT infrastructure is the 'technical' part of the research. Since there were no previous urban studies of the ICT infrastructure in Latin America, I have put together data coming from studies in the telecommunications field. The exploration required data of the main components of the ICT infrastructure. Part of this information has been taken from reports from the International Telecommunications Unions (ITU), the Organisation for Economic Cooperation and Development (OECD), and other international organisations, and from private firms specialised in this topic, from which the most important is Telegeography. National organisations, as the regulatory bodies, had very little information on this topic. Some of the reports are available on the Internet, but others have been taken from the libraries of international organisations and Delft University of Technology.

To find information not contained in these reports, I have also conducted interviews with people from international organisations working in the telecommunications field. To go deeper into the particularities at local level, I have interviewed people from Telefonica in Lima and Buenos Aires. To detect changes in the traffic routes I have made route analysis with Visual Route software between Delft, the Netherlands, and financial and governments sites in Lima and Buenos Aires before and after 2001, the year in which the large submarine backbone rings were connected. E-mail communication with people working in the telecommunications field has also been useful in getting specific information and useful reports. This has been complemented with information from the official sites from telecommunication firms that operate the networks, NAPs and data centres. To get information about the trends in telecommunications sector I have consulted scientific journals and sites dedicated to this topic, and received information from (online) contacts and interviews.

(b) The exploration of the second level of networks required data regarding the local ICT industries, the content producer industries, the local e-commerce and the local urban economies. As in the first level of networks, most of this information has been taken from reports published in the Internet by international organisations as the Economic Commission for Latin America and the Caribbean (ECLAC), the United Nations for Development Program (UNDP), the Inter-American Development Bank (IADB), and national institutions, complemented by studies and articles in specialised journals. However, few of these have been done from the point of view of spatial development. Most of the information is addressed to what is happening to the most advanced sectors: CBDs and technology parks or clusters. To get a fuller picture of the levels of penetration of e-commerce in Lima I have also interviewed people linked to this field, and identified the many links between them and telecommunications firms. I also used online newspapers as a source of information of ICT-related trends in the urban economy, both in Lima and Buenos Aires.

(c) The exploration of the diffusion of ICTs in everyday life required information about the levels of penetration of ICTs in the total population, and its different sectors. The broad picture is easily available in the UNDP reports as well as in the sites of the regulatory bodies of telecommunications, but for more detailed information on the penetration in different sectors I have relied on surveys made by specialised firms. Most of these I have found on the Internet, within the sites of the same firms, in online newspapers, or in national institutions, while some others, such as Lima's Internet surveys are not available online. These I found in the libraries of national institutions or they were kindly given to me by the firms that made them.

Part IV.

The exploration and analyses of Part III were useful in providing information about the main trends regarding the diffusion and use of ICTs in the metropolises, but to get a good understanding about the urban dynamics generated by ICTs, a closer viewpoint was indispensable. This was done in Part IV, focused on the situation of Buenos Aires and Lima. For this I have used local studies and recent articles in local and international journals. I have also interviewed local researchers and local government officials. I also draw upon my own experiences as an urban planner and urban researcher in Lima, and my familiarity with these two cities as a resident during different periods of my life, which have made me aware of their urban and social transformations.

To get a better understanding about how people were using ICTs and how they were experiencing the ICT-related changes I also conducted open-ended interviews and engaged in conversation with different people from different sectors and neighbourhoods. I combined this with numerous visits to cybercafés and public access centres to observe the clients, their activities and their uses of these facilities; and to make short interviews to the managers. These interviews and visits have been done over five visits to Lima and two to Buenos Aires since January 2000, to get a better notion of the changes over time. There are also a few academic studies that provide more information about uses and perceptions of Internet among the youth, which, in combination with articles in magazines and (online) newspapers have been extremely useful to get a feeling of what is happening on the streets.

c) Selection of case-studies

I considered it essential to have more than one case-study, not only to answer part of the research questions, but also because urban complexity demands to go deeper into the transformations with an approach 'from below' that can only be done in a specific locality. Case-studies are heuristic tools well suited to deal with contextual situations. They are used when

there is no sufficient theoretical support for a problem or when there is no clear, single set of results. Buenos Aires, the capital of Argentina - and Lima, the capital of Peru, were selected as case studies because interesting ICT-related processes were occurring in these two cities. The relevance of these cases is, therefore, not based on a comparison between these two cities, but on their high value in answering the research questions. The main intention has been to understand and not to generalise from the cases.

Buenos Aires and Lima share, however, several characteristics related to their Spanish foundation, a common history, language and cultural traits. They also have a high urban primacy, concentrating approximately 30% of the population and great part of the economic activity of their countries. They have, however, very different and even opposite development paths. While Lima used to be the seat of Spanish colonial power in South America for centuries, its importance gradually decreased after its commercial monopoly with Spain ended in the 1770s. Lima's decay represented Buenos Aires' progress, which had a better location for the trade with Europe. At the end of the nineteenth century, the extraordinarily favourable conditions for agricultural products in the world market made Buenos Aires a highly prosperous city, which attracted a vast European migration wave. During the early twentieth century Buenos Aires flourished to become the Paris of the South. After the 1930s its growth decelerated, but, unlike most other Latin American cities, it managed to cultivate a broad and cultured middle-class, and the highest income per-capita of the region.

Lima is fifth in size of the Latin American metropolises, representing a typical Third World metropolis. Historically a socially divided city, Lima has been deeply affected by a process of massive rural-urban migration beginning in 1950s. While the city has been increasingly unable to provide employment, housing, and urban services to the majority of its citizens, newcomers to the city have sought to obtain them through their own individual or collective efforts. Doing so, they have gradually changed both the physical face and the social and cultural life of the city. The lack of initiative at political level greatly contrasts with the organisational capacities of residents to face their daily life problems, which have been acknowledged in the academic literature. Bottom-up processes and urban initiatives in Lima's *barriadas*[7] have inspired academics in the field of housing (Turner, 1968), and the informal economy (de Soto, 1986) for unorthodox approaches in their fields.

During the 1990s both cities have experienced structural transformations in their economy and politics, triggering processes of deregulation, reduction and withdrawal of the state from strategic and social sectors and the privatisation of public firms. The new rules have attracted foreign capital, and large foreign firms have become important urban actors. These structural transformations have produced enormous social and cultural changes at local level.

Buenos Aires is currently considered, with São Paulo and Mexico City, as a node of the network of global cities of the South. The long-standing economic crisis and the deep economic troubles of the latter years have caused social polarisation, the impoverishment of large sectors of the population, a visible increase of crime and insecurity feelings, the expansion of *villas*[8], the growth of gated neighbourhoods and the physical decay of the city. People talk about the process of Latin-americanisation of Buenos Aires. Buenos Aires' residents, however, still enjoy a high per-capita income in comparison to other cities of the region.

While Argentina is the country with the highest Human Development Index (HDI) and the highest GDP per capita of the whole region, Peru's development position is much lower. In 2002, Argentina was in the 34th position of the HDI world ranking, while Peru was 85th. The same year, Argentina's GDP per capita was US$ 10880, while Peru's was US$ 5010 (UNDP, 2004). The composition of their national population is also very different: while Peru's share of indigenous population is 47%, only 1% Argentineans has indigenous origin (UNDP, 2004).

From the scope of Latin American cities, Buenos Aires and Lima represent two very different situations: they may be considered as the richest and the poorest metropolis in the region, respectively. Both cities have then a different history regarding their relationship to ICTs, which clearly correspond to their social circumstances and their different economic position. The exploration of the urban situation in these two cities can illustrate what ICTs represent for urban development in two large Latin American metropolises which have very different urban personalities and development paths. Buenos Aires and Lima are highly useful as case-studies because they both show signs of highly interesting ICT-related developments, which illustrate the multiple ways in which ICTs are used, appropriated and experienced by different urban actors under dissimilar circumstances. A closer examination of these singular outcomes provides a better idea of the complex interactions in these urban issues.

An additional reason to select these two cities as case-studies is practical. It refers to the researcher's familiarity with both cities, what ensures a valuable knowledge of the urban context and of the local culture, considered important to provide an 'insider' perspective.

d) Methodological limitations

Carrying out empirical research in developing countries is definitely different from doing it in the North. There are some advantages regarding qualitative data - social networks are denser, which facilitates contacts [9] - but several limitations regarding quantitative data. The first refers to its availability, a frequent limitation in developing countries, but even more acute in ICT related issues because of the newness of the topic. Specific information on the ICT networks at local level was difficult to find because of their private character and the considerations of its confidentiality by the telecommunications firms that operate the networks.

Metropolitan or city level statistics are often lacking, and when they are available they have been gathered using different methods or they were very fragmented. Until now, there is no benchmarking process going on regarding the diffusion of Internet in Latin America by the international agencies in charge (IADB, ECLAC) or other institutions addressing the topic at regional level. Even if most national institutions regulating the telecommunications sector publish statistics on their websites, these are mostly at country level. Finally, there is a wide variation of data availability from country to country. While some websites are transparent and well documented, others are not always updated or offer data only after payment.

The reliability of the data is another issue that has to be mentioned. Working with quantitative data in Latin American requires great care to interpret the data provided by public planning agencies, national statistics offices, multilateral organisations, and private firms, which may be manipulated for political purposes and/or, in many cases, distorted due to the existence of 'invisible' processes linked to informal or illegal activities that are not counted in the official figures. Special care is also necessary with data coming from marketing firms, which in many cases use doubtful methods to collect their information and advance exaggerated prognoses easily.

Use of quantitative methods in developing countries settings has also many caveats. The traditional indicators and averages do not give an appropriate picture of what is really happening in countries with high inequality and with high levels of informal economic activities, as it is the case with most countries of the region. Finally, the rapid pace of changes makes the data obsolete in a short time, which constitutes an additional limitation.

In view of these limitations, and the explorative character of the research, the approach to data collection and elaboration has been flexible and open to information from all possible sources. The limitations mentioned, however, are mainly applicable to quantitative data. Because of

these limitations, the results of the quantitative analyses have been considered as an indication of the tendencies and not as a definitive picture of a situation at a certain moment. In those cases when it was indispensable to overcome the data limitations (as in contraditory data) or to verify 'suspicious' or unusual data I used other techniques of data collection, as face-to face interviews, online contacts, Internet research or observation. The conclusions of the research, however, do not rest exclusively on quantitative analyses, but on trends which have been generally confirmed by qualitative data.

1.6. Organisation of the book

Although the book has been written with the objective of providing a linear argument according to the analytical framework illustrated in figure 1.2, each chapter is also a study of a certain sub-theme which can be read as an independent text.

The book has nine chapters, organised in five parts. The first part is the introduction, and consist of this chapter, which gives a first overview of the topic, its context and the research problem, stating the main aims and question that have guided the whole research process.

The second part has two chapters that set the theoretical scene to guide the following exploratory parts. To identify the main issues that pertain to the city in the digital age, Chapter 2 examines the main views regarding the three overlapping spaces of the intersection of space, technology and society: technology and society, space and society and technology and space. Chapter 3 reviews the historic path of the Latin American cities and metropolises, focusing on urbanisation processes and their consequences, and on the latest urban transformations in the light of political, economic, social and demographic changes.

Part III has three chapters that explore the three main levels of networks operating in the contemporary city. Chapter 4 is addressed to the architecture and capabilities of the ICT networks infrastructures, which form the basis for the diffusion and use of ICTs in the other two levels of networks. Chapter 5 deals with the networks of production and consumption of ICTs at local level, emphasising the role of the government and the globally oriented side of the local economy. Chapter 6 documents the main bottom-up developments acting at city level, its consequences in the social functioning of the city and the possible consequences for its future.

Part IV's function is to use the two case-studies as heuristic tools for the purposes of the research. The developments examined form a distance in Part III are are to be seen from a closer view. Chapter 7 presents the case of Lima, the capital of Peru, and Chapter 8 is focused on Buenos Aires, the capital of Argentina. They have both been approached in the same manner, with the purpose of drawing conclusions on the ways that ICT trends in the different levels combine to produce changes in the functioning and built environment of the city.

The last part, Part V, is the chapter dedicated to making a synthesis of the main findings and the conclusions of the whole research, providing recommendations for urban planning in Latin America and pointing out the main directions for future research.

Notes

[1] The concept of Information Society is greatly contested and debated in social sciences. At the same time, it is also the most widely used to refer to the future society that is the product of technological innovations and the restructuring of the economy (Webster, 1995).

[2] In the present work ICTs are referred to as the set of technologies that travel through (land and wireless) digital networks, in which Internet and mobile telephones have an important role.

[3] Globalisation is a multidimnesional process, which refers to the increased global mobility of goods, capital, and persons, but equally important is the global circulation of information, knowledge and ideas. In this thesis I am referring to the technological, economic and cultural aspects.

[4] I am referring to publications, participation in congresses, seminars, round tables, lectures and interviews.

[5] See, for example, the works of Castells (1996, 2001), Sassen (2002, etc.) and Graham and Marvin (1996, 2001).

[6] Self-organisation is a fundamental property of open and complex systems, which can also apply to cities. It *is a mathematical theory increasingly used in 'hard' regional science, but there are also recent efforts to use it to help understanding (and modelling) the city and its processes, linking 'hard' and 'soft' sciences* (Portugali, 1997).

[7] *Barriadas* is the local term for the informal neighbourhoods that the poor build in the periphery to get access to land and housing.

[8] *Villas miseria* or *villas de emergencia* are the local terms for the spontaneous (ilegal) settlements of the poor. These are not necessarily in the periphery.

[9] Since I have lived most part of my life in Lima, I had no problem to identify and approach those people involved with the research topic mobilising my own social networks. I was, however, amazed how similar the situation was in Buenos Aires, which is much larger than Lima.

Part II

Setting the scene

Chapter 2.
The city in the digital age

"When our genes could not store all the information necessary for survival, we slowly invented brains. But, then the time came, perhaps ten thousand years ago, when we needed to know more that could conveniently be contained in brains. So we learned to stockpile enormous amounts of information outside our bodies."

Carl Sagan

"Technology is the mind wanting more body."

William Burroughs

This chapter is an introductory chapter which serves as a theoretical introduction to the study of the city in the digital age, as well as the conceptual framework of the whole research. The first three sections constitute the background, in which the main assumptions of this thesis regarding the relationship between ICTs and the city are made explicit. The city in the digital age is understood as a notion which integrates three fields of study: the relationship between technology and society (the subject of the first section), the relationship between space and society (the topic of the second section) and the relationship between the city and technology (the focus of the third section) (see Figure 2.1).

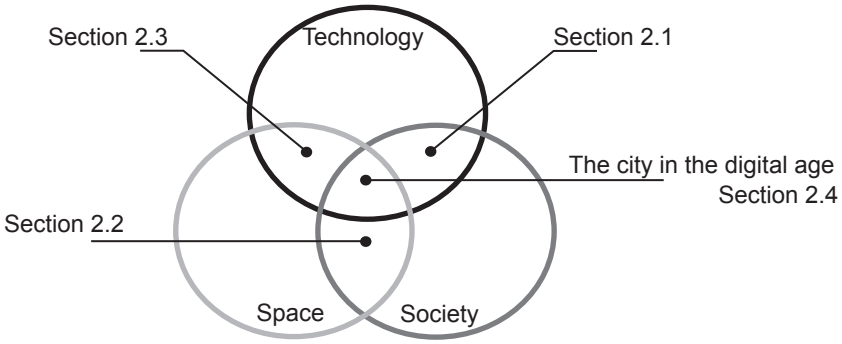


Figure 2.1. Scheme of the theoretical framework of this research.

The fourth section goes deeper into the topic of the research: the city in the digital age. Firstly, it puts forward the most influential perspectives, from which the network approach is considered the most relevant for the purposes of research. The main proposals of network-oriented authors for analysing the city in the digital age are then presented. The chosen analytical framework stems from a re-elaboration of these. The last section summarises the four sections, pointing up the main propositions of the research, as well as the analytical framework that guides the whole research process.

2.1. Technology and society

a) Main views on technology and society

Graham (1998) has identified three broad types of theoretical approaches to technology and society, which he calls (a) substitution and transcendence, (b) co-evolution, and (c) re-combination (see Figure 2.2).

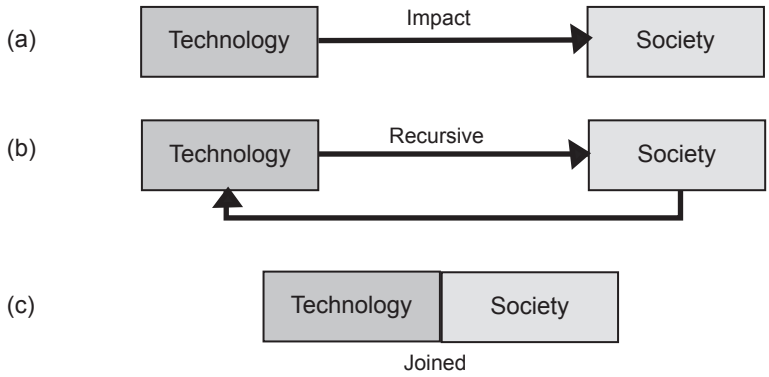


Figure 2.2. Main views on technology and society, according to Graham (1998).

(a) **Substitution and transcendence** allocates magical powers to technology. This view considers technology as neutral, an independent factor which simply 'impacts' on society. It is presented in the media as 'theory free', but it actually leans on deterministic notions. The two main views are held by (Webster, 1996):

- **Utopian thinkers,** in which social change is usually presented as inevitable and beneficial. They propose universal solutions with technical fixes.
- **Dystopian thinkers** focus on the tightening of control over citizenry; the widening gaps between haves and have-nots and the surveillance possibilities of ICTs.

Utopian and dystopian approaches are generally simplistic and misleading. Utopian thinkers are biased towards technological determinism, while dystopian thinkers are geared towards social determinism (Graham and Marvin, 1996). Determinisms were common in most early popular and academic debates, fuelled by excessive optimism/scepticism and a lack of knowledge of the direction of change. McLuhan (1964) and Melvin Webber (1964), for example, predicted the dissolution of cities due to the technological advances (Graham, 1998).

(b) **Co-evolution** is a more sophisticated approach which considers the relevance of social factors in the construction of technology. The two main views are: (a) the SCOT (social construction of technology) approach and (b) the political economy approach, as advanced by Castells (1996) and David Harvey (1990) (see Figure 2.3).

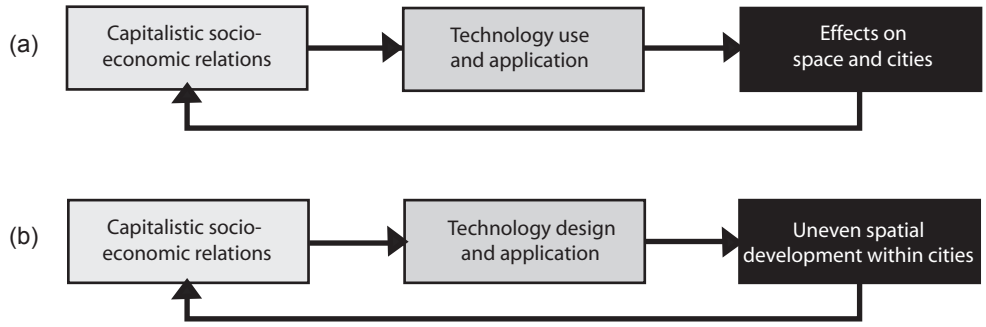


Figure 2.3. Main co-evolution views on society and technology (Adapted from Graham and Marvin, 1996).

Although these two approaches have the same point of departure, they have important differences. While the first is focused upon the use and appropriation of technology by users at local level, the second gives preference to the macro level and to political economy issues. This latter position tends to social determinism in maintaining that technology simply mirrors the interests of powerful social actors and tends to neglect the degree to which social processes can produce local changes. The first leans more upon culture and the second on the economy.

(c) **Recombination** approaches consider that technology and the social aspects cannot be separated meaningfully. They are joined and meshed together in complex ways. Space is continually being constructed; places are in a state of evolution. This implies a relational view of power and action, linked to Lefebvre (2000) relational conception of space, in which technical objects have agency. Space has an individual performance according to a contingent, local actor-network. *"… the hundreds of other actor-networks are always contingent, always constructed, never spatially universal, and always embedded in the micro social worlds of individuals, groups and institutions*." (Graham 1998:179).

A combination of the co-evolution and recombination views has been considered more appropriate to approach the research topic in a comprehensive and integrated way. According to this, the relationship between technology and society is linked to socio-cultural and political-economic processes functioning at both macro and local levels. At the same time, this relationship is continuously being shaped and recombined according the evolution of technological and societal processes.

b) ICTs and societal changes

After stating the approach to technology and society, this sub-section focuses upon ICTs and societal changes, for which the special features of ICTs' special qualities to transform society have to be spelled out. As their name indicates, information and communication technologies consist of two different technologies that have converged into one. While telecommunications have existed since the invention of the telegraph, the origin of computer technologies is attributed to the invention of the transistor in 1947. Since then, the continuous innovations in micro-electronics, and hardware and software computing technologies have immensely improved the power and speed of computers, and the way to process information, making them more efficient and versatile. Table 2.1 shows the evolution in computing in terms of type of computer, dominant technology, ways of processing and purpose since the 1960s. It is useful to illustrate how computers have become smaller, powerful, mobile, and useful for multiple purposes.

Convergence informatics and communications

	1960s	1970s	1980s	1990s	2000s*
Type of computer	mainframes	-mainframes -minis	mainframes -minis -PCs	- mainframes - minis - PCs - laptops & palmtops	- mainframes - minis - PCs - laptops & palmtops - mobile phones
Dominant technology	hardware	program technology	database technology	telematics & multimedia	wireless telematics & multimedia
Way of processing	batch	time-sharing	desktop	network	wireless & high-speed network
Purpose	calculations	-calculations -analysis	-calculations -analysis -archiving & presenting	- calculations - analysis - archiving & presenting - information & communication	- calculations - analysis - archiving & presenting - information & communication - mobile & high-speed information & communication

* Column added by the author

Table 2.1. Developments in computing technologies (Adapted from Matthijssen, R., J. Truijens en H. Doorenspleet, 1997) .

Parallel to these advances, the telecommunications technology was also experiencing ground-breaking progress thanks to innovations coming from the computing field in (a) opto-electronics and micro-processors, that led to a new generation of switches and routers; (b) in semi-conductors and fibre optics, that led to improvements in the transmission between switches; and (c) in the terminal equipment which are the sources and destination of the digital flows (Graham and Marvin, 1996). Great changes in the political economy, especially the deregulation and privatisation of the telecommunications sector and the trend towards globalisation, have been important drivers of these advancements. [1]

Digitisation, the convergence between information and telecommunications eventually produced the emergence of the Internet and the birth of hypertext and the World Wide Web. With Internet and the WWW, a landmark step was achieved because, if before the 1990s computers and communications technologies were basically confined to the high-technology and research worlds, their rapidly decreasing costs, their enhanced powers[2], user-friendliness, multi-functionality and refined communication capacities, have extended their usefulness and placed them in the homes of the users.

The introduction of ICTs represents three main societal breakthroughs. The first is related to the open character of the Internet, since its technology is based on an open protocol. The enormous transformative qualities of ICTs rest in their software component, which is programmable by users. As Internet is a medium that is mainly produced by software, anyone who has access to it, can program it for his own convenience (Dodge and Kitchin, 2001). The fact that the users can control and shape the technology is what makes Internet a revolutionary technology. Due to this openness, the diffusion of Internet to the masses has great implications for empowering them and transforming society from the bottom-up.[3] During the initial period of introduction of the Internet to the masses in the mid-1990s people became aware intuitively of its transformative capacities, which rapidly produced media hype.

Additionally, ICT applications enable the separation of social interaction from physical co-presence. This was partly possible after the invention of the telegraph, which marked the birth of telecommunications. Its convergence with computer technology, however, has made telecommunications surpass a historical threshold, allowing the development of activities at a distance. Social theorists agree that the fact that social relations are transgressing the local boundaries is essential to the understanding of contemporary societies. If in the past most human activities were confined locally, a long process of technological progress has made it possible for us to become more and more independent of geography, extending our exchanges, initiatives and activities to the whole world. This process of globalisation would be unthinkable without the astonishing advancements in the capability and purposes of information and communication technologies. The societal changes related to the capabilities of ICTs to extend geography may be comparable to those produced by the introduction of steam power or electric power.

The last, and maybe most significant breakthrough, refers to changes in our ways of communicating. The increasing supremacy of digitalised texts, images and sounds represents the beginning of a new communication culture, based on the hypertext as opposed to the traditional linear text. This so-called 'electronic' culture is super-imposing itself upon the traditional typographic culture, hegemonic in Western societies since the invention of the printing press. This process has enormous implications in human cognition. The societal changes related to the communicational capabilities of ICTs may be comparable to those related to the introduction of the printing press, as Castells (2001) suggests in *The Internet Galaxy.* [4]

In the history of technology it is impossible to find a technology with such potential to transform society and that has spread at such a rapid pace. For this reason, in the present research it is considered that the introduction and development of ICTs are producing large-scale societal changes, from which we are only witnessing the initial transformations. Awareness of these large-scale transformations has led to the generalised notion that we are entering a new era, the Information Society.[5]

c) Heading towards the Network Society

"Today's technological transformations are promoting another significant transformation in the economic sphere - globalisation - and together they are generating a networked society."

United Nations Development Report, 2001

Social theorists are increasingly arguing that our contemporary social condition is increasingly developing a networking nature and that networks are indispensable for the explanations of the present society. The notion of the emergence of a network society has become popular after the advent of the Internet, and more specifically after Manuel Castells published his trilogy *The Rise of the Network Society* (1996), which has become a basic reference in urban studies. Stressing the centrality of Internet and ICTs in our society[6], he concludes that dominant functions and processes are increasingly organised in networks. He argues that this is directly supporting the emergence of the 'network society' that is spreading unevenly throughout the world. He relates the network society to the structural transformations in the political economy. In the network society, the space of flows is strategically important because it is where the dynamics of political and economic power flows.

Castells' work is a significant contribution to the study of ICT and urban change[7], but he is mainly concerned with macro economic processes. The enhancement of our personal and collective capabilities in both information and communication aspects that ICTs bring has,

however, pronounced consequences in many aspects of our daily life that cannot be examined with exclusively macro economic approaches. To understand these effects, connectivity and networks are also becoming key-concepts.

Based on the results of his research on computer-mediated communication, Barry Wellman states that a computer network is essentially a social network (Wellman, 1996). He argues that the proliferation of networks of personal relations has developed well before the Internet, but that they have become a dominant form of social organisation with the recent ICT developments (Wellman, 2001).

ICTs capacity to transcend geographical barriers becomes, indeed, critical to expand our personal networks to further locations. Thanks to their diffusion, there has been an explosive expansion of the 'contact set' size of individuals, the number of persons one can be in contact with (Couclelis, 1999), which translates itself into a denser and more extensive network of social relations. Ordinary people's circles of social relations now include persons living in other cities, countries and continents. This explosive expansion is not only a quantitative affair, since it also has consequences in the quality of urban life.

In 1967, Stanley Milgram explored the fact that we are all linked by short chains of acquaintances (Barabási, 2002), showing empirically that two arbitrary persons in the US may be connected with a maximum of six person's chain. This implies that social networks are denser than what people realise. This phenomenon makes the network of our social relations a very small world, so this was called the 'small world phenomenon'. [8]

Recently, Wiseman[9] (2003) has revisited the topic and proposed that the six degrees of separation would be at present only four. However, not everybody is equally social, so the degrees of separation between two random individuals vary greatly depending on the number of social links of the individuals involved. Barabási (2002) calls those individuals with a large social network the connectors; in the technical jargon, those nodes with an anomalous number of links. Wiseman (2003) suggests that those individuals who can make the shortest connections are the 'luckiest' persons; those who tend to be in the right place at the right time. This implies that those individuals (and groups) with highly developed networking skills are at an advantage in the world of today, as they can find the shortest links for their purposes. This has implications in the political arena, suggesting that power would be moving toward groups and individuals with (social and technical) networking skills.

Besides the political implications of connectivity, the increased social connectivity at global scale is producing an unprecedented increase in the exchange of ideas, values and perceptions, a fact which is rapidly expanding cultural choice, and with it, diversity at global level (UNDP, 2004). The increased communication flows have also resulted in the augmentation of the flows of people. People are travelling more frequently than before and further. At the same time, international immigration flows are increasing enormously, producing significant changes in both the receiving and sending countries. Additionally, flows of cultural goods have received an extra impulse with the diffusion of the Internet. Economic flows, communication flows, flows of people, flows of cultural goods, flows of ideas and values, are making today's society a really connected society, a network society.

2.2 Space and society

a) Main views on space and society

In the study of the relationship between space and society it has been usual to use spatial or social determinisms. Sociology has tended to see the city as a container of processes,

and separated from them, while planners and designers have tended to attribute to space great transformative qualities. Structuralist approaches[10] have rejected the notions of 'spatial fetishism', in which causal power in determining human agency is attributed to space. But, to consider that cities are simple containers of processes is also reductionistic, because space is a fundament of social activities (Lefevre, 2000).

Spatial determinism and the neglect of social processes was earlier common in urban studies, which used to deal with space as an objective and external dimension. This had its origins in Cartesian points of view, which mapped space by means of three coordinates. This type of 'objective' space was the by-product of the development of modern science, which opened up an empirical space of infinite extension. Scientific knowledge became a matter of comparison of identity and difference, as well as of mathematical measurement. Academics wanted to know everything globally and scientifically, and it seemed then possible to compare and measure with certainty all phenomena (Lowe, 1982).

Cartesian space, combined with objective time, developed into Cartesian thought, which has dominated urban studies since then. For example, central place theory was focused on the (economic) analysis of cities, considered as points in space forming a pattern of settlements within an urban system. The Chicago human ecology school applied spatial analyses to the internal structure of cities, leading to different models of the structure of cities. Louis Wirth associated lifestyles with settlement sizes in *Urbanism as a Way of Life*. These positivist approaches, based on the assumption of the economic rationality of human behaviour, a mechanistic view of society, and a topological conception of space, were supported with quantitative analytical techniques.

The belief that analytic reasoning can develop simple connections within objective time and space has been challenged. Henri Lefebvre has been one of the most influential thinkers to change the old dogmas related to space. Current urban theory acknowledges the complexity of the conceptualisation of space and the relevance of political economy and socio-cultural processes. The city is not seen any more as a mere artefact or space as its absolute framework. Time and space are not any more the absolute frame of the (urban) reality; they have become simple functions within a system. In contrast with the objective reality of Cartesian thought, defined from a unique perspective, the new (urban) reality is multi-perspective and environmental (Lowe, 1984).

Harvey (2003) argues that three space conceptions currently coexist. In the first space is conceived as the **absolute** framework of reality, as in Cartesian thought and Euclidean geometry. A second conception is more dynamic and sees it as **relative** to time and distance, to the medium of travel. The third notion, best theorised by Lefebvre, sees it as **relational**, dependent of the social processes that produce it. Lefebvre (2000) described three main ways of connecting to space, (a) representational space or the **lived space**, (b) the spatial practice or the **perceived space** and (c) the representation of space or the **conceived space** (Figure 2.4). These concepts become highly useful in understanding and pinpointing the challenges imposed by ICTs to urban professionals:

(a) *Lived Space* has complex codified and direct symbols, linked with life. It is the space as it is 'lived' by its users, but also as it is described by artists and philosophers. It contains nature and fertility, action and time. It is subjective; each person has a different lived space.

(b) *Perceived Space* is empirically observable. It contains the visible/legible: north, south, east and west, high, low, before, behind. Being able to hear and to see play a very important role. It is supposed to be continuous, but it is not always the case. The spatial practice of a society

differentiates its space. Spatial practice defines places, the relationship from local to global, and the image of that relationship, their actions and signals.

(c) *Conceived Space* is the abstract and geometric space that plays a role in social and political life. It is the medium for representing objects as buildings, infrastructure systems, and symbols. It is the space that academics, urban planners and designers deal with to develop their work.

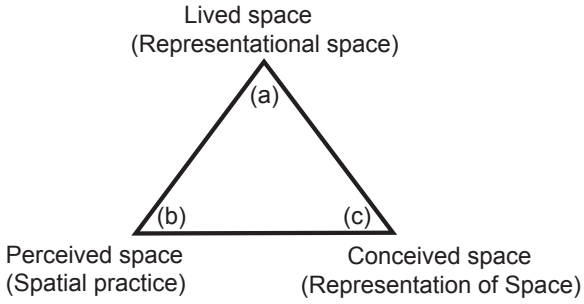


Figure 2.4. Lefebvre's (2000) three main categories of space.

Making a matrix of the conceptions and types of space one gets an array of spaces that expand the traditional dominant conception of space used in urban planning and design (Table 2.2). The dominant conceptualisation of space in traditional urban planning and practice is a combination of absolute and conceived spaces (Harvey, 2003). To overcome simplistic conceptualisations of the city and the urban phenomena, however, all of them have to be taken into account.

	Absolute space	Relative space	Relational space
Lived space			
Perceived space			
Conceived space	Dominant view in traditional urban planning & practice		

Table 2.2. The place of the dominant view of space in traditional urban planning and practice.

This reductionist view of space in planning theory and practice is the product of 'modernistic' urban approaches based on the organisation of the industrial city, which currently only partially apply. These approaches, as well as absolute views of space and time as containers of the urban reality, are being critically revised in urban studies. Graham and Healy (1998) assert: "*Both (planning practice and theory) have remained largely unable to reflect the new, relational, non-linear and non-contiguous meanings of time, space and place in ways which allow us to understand the complexity of the contemporary world.*" (1998: 641). They recommend practising planning in a 'relational way' by considering relations and processes rather than objects and forms, by stressing the multiple meanings of space and time, by representing places as multiple layers of relational assets and resources, and by recognising the power of agency through communication and interpretation.

Two ICT-related processes, the emergence of cyberspace as a new urban domain and the extension of the extension of the spatial reach of urban activities, have made clear the need to transcend tangible, fixed and absolute concepts of space and time in order to understand the current city's circumstances. ICTs are playing an important role in changing urban paradigms.

b) Space and time considerations in the digital era

The introduction of ICTs in work and everyday life and the subsequent widening our spatial horizon has renewed academic interest in space and time issues. Harvey (1990), Castells (1996), among others, have paid attention to this perceived 'compression (or convergence) of space and time' or, more precisely, the compression of space and the acceleration of time in our society. Urban planning and urban studies are evidently highly dependent on both space and time dimensions, but the treatment of space and time relationships in social theory has been mainly theoretical and tends to ignore the role of the specific and the local. Structuralist interpretations, as the those of Castells, Harvey and Giddens, elaborated from the point of view of the political economy, and in terms of the reorganisation of the economy of Western societies, have provided abstract statements regarding time 'compression', 'annihilation' or similar concepts, without reference to empirically observed social practices (Green, 2002).

Feeling ourselves masters over space and time gives us a feeling of power, because it increases our possibilities to choose how to live. It is precisely the very process of conquest of space (and time) which has pushed the human species to migrate and to concentrate on bigger and bigger cities, where everything is within close reach (social circles, political power, specialised work, better education, entertainment, trade, culture, etc.), and where people have the opportunity to choose. The city becomes the space that facilitates the freedom of the individual's election.

This human craving for dominating space through time has been and is, according to David Harvey (1990), crucial for the development of capitalism and omnipresent in the modern society. This force of agglomeration seems to be increasingly strong since the period of the industrial revolution. Urban planning developed as a response to the chaotic results of these agglomeration forces. As such, it can be understood as the collective effort for the 'domestication' of space and time in urban settings, with the help of technological innovations. In this context, the adoption of ICTs represents an important milestone in the process of conquest of space and time by the common individual. Our common sense perceives that ICTs have the potential to transform and extend our (perceived) 'everyday' space and time (Green, 2002).

In his visionary work, Marshall McLuhan conceptualised this process extension of our space and time ("*There are no remote places. Under instant circuitry nothing is remote in time or in space*") and coined the well-known metaphor of the 'global village'. Brian Berry (1970) also could note this decades before the invention of Internet, when he wrote: "*The essence of the transformations is that we are moving toward an era of telemobility, from a mechanical to an electronic kind of environment... but the revolutionary aspect of this electronic environment is not that it reduces the friction of moving goods and people, but rather that it is able to move the very experience of reality*." It was not until relatively recently that his statement became clear for most of us. Internet makes us able to break the spatial and cognitive barriers that tie us to a certain place, and the mobile telephone provides us with the attribute of being always accessible. Together they enlarge our geographical and cognitive universe to limits unforeseen.

Digital technologies provide individuals and firms with the means to organise space and time in more flexible ways, and in multiple combinations and arrangements. These recently acquired capabilities then have direct consequences on the organisation of urban life.

c) Evolution of urban life: from propinquity to global connectivity

A historical account of how the organisation principles of space and time changed with cities is illustrative to understand better where we stand now with ICTs. In pre-industrial times, space used to be the most fundamental dimension, as it was more easily perceived because the experience of reality was bounded to the own location, since people hardly travelled outside

their village. Physical restrictions and low mobility determined the scope of each person's personal experience and vision of the world. Time and space were tied to each other (Harvey, 1990). Time was considered cyclical as it was marked by the nature: days and seasons, but most of people did not worry about time, at most for the recent past and for the immediate future. Distant times and places did not count in the experience of the reality (Lowe, 1982).

In the historic city, public space (plazas, markets, agora, arena) and the important buildings (palaces, temples, etc.), were the places where information and knowledge was exchanged. The city was organised to produce and to control, to exchange and to distribute goods, services and information at local scale, and it was built at a human scale. In this pedestrian city, the relationship with space was determined by the principle of **contiguity or propinquity** (Webber, 1964). People were related almost exclusively with their geographical neighbours. There was not a strict separation between the place of life and the work place, or of the hours dedicated to work and to leisure.

Technological advances triggered by the industrial revolution brought enormous changes in a short period (urbanisation, industrialisation, mechanisation of work, improvements in transport and communications), which reinforced each other mutually and produced formidable effects in cities (Lowe, 1984). The railroad, the electric tram and other new forms of transportation improved **accessibility** within and between cities and produced a great impact in the society by extending the experience of space and time.

With the growing domestication of space promoted by technological advances, time began to be experienced like a new dimension, qualitatively different to space. Gradually, what could not be grasped in terms of a spatial expansion could be understood in terms of time. Thanks to time, an order in space could be connected with another order in another space. This connection was called development in time, a new concept that showed the new perception of time like a linear process. Slowly, reasoning changed from a spatial order to the order of development in time (Lowe, 1982).

With the introduction of capitalism, cities began to organise themselves according to different spatial principles, in which the production of commodities became crucial. Since time became money, production sites would locate close to raw material markets (to minimise costs) and sites of consumption (to maximise sales). In short, the industrial spatial logic[11] minimised the friction of distance for goods and persons, in order to lower the transaction costs.

The rise of digital **connectivity** calls into question the spatial principles that were valid during the industrial era. The new spatial principles overcome the restrictions of locality, be it the physical vicinity or the geographic accessibility through transportation. The city is not any more a defined topological entity with a centre, periphery and hinterland as it has been traditionally conceptualised, but a more complex type of urban phenomenon that comprises processes and activities developed in the real space and in digital space or cyberspace. This new possibility for performing urban activities triggers a different system of spatial principles in a city, in which the traditional motives, conditions and patterns of mobility are not the same any more. The radius of distribution of work, commercial, residential and recreational activities expands and diffuses in space and time.

Referring to these fundamental transformations, Boelens (1997) and the urban planners linked to TAN (Temporary Autonomous Network) have proposed three categories of cities, according to space and time considerations: (a) the *Arche-citta,* the historic city of Architecture; (b) the *Cine-citta* or the centre-periphery model linked to movement; and (c) the *Tele-citta,* where activities can be developed at a distance. They provide a metaphor of the city as an egg[12] to better illustrate the spatial features of the three types of cities: 'the boiled-egg city' represents the

walled historic city, 'the fried-egg city' is the centre-periphery model of city, while 'the scrambled-egg city' represents today's urban complexity. Table 2.3 gives a scheme of these changes, with attention to the different organisational principles of the economy, space and time, as well as the predominant communication culture in the historic, modernist and contemporary city.

Type of city	Organisation of space	Organisation of time	Organisation of the economy	Predominant communication culture
(a) **Historic** (pedestrian)	Place (proximity)	Biologic	Pre-industrial	Oral (face-to-face)
(b) **Modern** (car-oriented)	+ Zones and networks (accessibility)	+ Mechanic	+ Industrial	+ Typographic
(c) **Contemporary** (electronic flows)	+ Digital flows (connectivity)	+ Instantaneous (real-time)	+ Post-industrial	+ Electronic

Table 2.3. Organisation of space, time, the economy and communication culture in the historic, modern and contemporary city.

In the contemporary city different organisations of space and time, different communication cultures, modes of economic organisation and ways of life coexist, and all of them matter, not only the hegemonic one. In the same way that oral, typographic and now electronic communication cultures superimpose upon each other in our society, the spatial principles of contiguity, accessibility and connectivity superimpose upon each other and do not invalidate the previous situation. Each city has a different mixture and measure of the different components, in which the cities of advanced economies probably have a larger portion of the recently emerged layer. Referring to the Latin American context, García Canclini (1999) states that the coexistence of these three cities, which he calls the historic territorial city, the industrial city and the informational or communicational city, implies a tension between popular traditions, modern ways of life and post-modern attitudes. He adds that the result is a 'video clip' city, in which "…*an accelerated rhythm of cultures of different times coexists in an effervescent montage*" (1997:88).

Attempts to analyse the city with a mono-perspective and 'objective' view and giving pre-eminence to the industrial layer have become too limited. It is critical to recognise the multiplicity of existing organisation modes, which may not lead one to think that only these categories are valid. In the same way that they do not invalidate the previous layer, the transition between one and the other is a fluid process. Recognising the fluidity and the complexity implies the impossibility of completely grasping the present urban reality.

d) Cyberspace as a new urban domain

After explaining the complex effects that the digital flows have in the organisation of urban life, this sub-section deals with the new urban domain. Cities have extended their domain of activities into the abstract space that has emerged as a consequence of the computer mediated communication: cyberspace. The fact that people can live, work and develop activities in two different urban domains, their living space and the cyberspace, constitutes an event with historic significance, as both spaces have a strong impact in our society and, in turn, in our cities. In fact, what exists in cyberspace is very much related to what exists outside of it.

However, there are some crucial differences between real and electronic space. The first refers to the abstract and invisible nature of cyberspace, which constitutes a challenge for urban professionals (Graham an Marvin, 1996), as urban studies and policies mostly deal with

the visible and tangible features of urban life (the conceived space). The second difference refers to their dissimilar reach. While real space is concrete and defined within certain limits, cyberspace has no limits and is in constant construction by millions of users, a feature which might bring about increasingly new and diverse electronic environments in the future. However, real life grounded in real places is always richer than life in cyberspace, as there are types of sensorial information (tacit knowledge) people send when they are face-to-face that cannot be transmitted even with the best digital techniques. Empirical evidence suggests that ICT exchanges are rather complementary to, and/or a weak substitute for face-to-face interactions (Wheeler, et al., 2000; Gaspar and Glaeser, 1998).

William Mitchell (1995) was among the first scholars to proclaim the emergence of cyberspace as a new urban domain in his pioneering book *City of Bits,* which described how people can choose between visiting actual buildings or their virtual versions (see Table 2.4). In his evident enthusiasm ahead of the changes, however, he did not pay enough attention to the multiple contradictions and complexities involved in the transition. Nine years after its publication this account seems more centred on the technology than on people. More recently Mitchell (2003) has argued that the separation of bits (the elementary unit of information) and atoms (the elementary unit of matter) is over. According to him, the cities of the twenty first century will be sophisticated systems of interlinked and interacting places, where networked intelligence will be embedded in every kind of physical system – both natural and artificial.

In real space →	**In cyberspace:**
Bookstores →	Bit-stores
stacks (in libraries) →	servers
galleries →	virtual museums
theatres →	entertainment infrastructure
schoolhouses →	virtual campuses
hospitals →	telemedicine
prisons →	electronic supervision
banking chambers →	ATMs (automated teller machines)
trading floors (stock exchange) →	electronic trading systems
department stores →	electronic shopping malls
work (in offices) →	Tele-work
at home →	@ home

Table 2.4. Some emergent urban activities according to Mitchell (1995).

The relevance of cyberspace in developing urban activities is not only related to the possibility to choose between real activities and tele-activities, but also to the possibility to extend their spatial reach from one location to a global scale. To analyse cyberspace as a new spatial domain is not an easy task because it is a complex, heterogeneous and multi-faceted environment, which is not necessarily spatial. Dodge and Kitchin's (2001) *Mapping Cyberspace* is so far the most serious attempt to understand and map it. They distinguish four kinds of cyberspace according to their spatial qualities and geographic reference:

(a) Those with a clearly spatial and a direct geographic reference (as digital cities that represent plazas, buildings and institutions);

(b) Others with spatial qualities, but without a geographic reference (as chat-rooms);

(c) some others that have a reference to the real world, but are not spatial (as webpages); and

(d) those that are completely abstract and have no spatial qualities or geographic references (as bulletin boards).

Nevertheless, the urban significance of these new spaces does not reside in their spatial qualities, but in their capacity to complement and supplement real spaces in different aspects of urban life. This depends upon the (information) accessibility within the Internet. A specialist in this topic, Martin Dodge (1998), has pointed out that the development of activities in cyberspace is not simply a matter of Internet connectivity, but includes other relevant dimensions. He proposes considering (a) network performance, (b) size, diversity and dynamics of the information spaces, (c) 'findability' of information and (d) information structure, design and user behaviour, as important issues for the development of activities in cyberspace.

Cyberspace, the abstract space that emerges when people digitally interact, and other ICT applications are promoting the emergence of a network society and allowing new ways of organisation of space, of time, of the economy and the emergence of a new communication culture. Their superimposition to those organisation modes that characterised the industrial city and the historic city explain the reasons of the increasing urban complexity and the difficulties experienced by urban planners and practitioners. It has become evident that approaches to urban issues from one 'objective' view and paying exclusive attention to issues concerning the industrial city are too reductionistic.

2.3 Technology and space

a) Technology as agent of urban and spatial change

Technological changes are essential part of social and economic change, which in turn have effects upon urban transformations. The effects of macro-scale technological change have been summarised in the (Kondratieff) concept of long waves or cycles of expansion and contraction in economic development (the K-waves). This theory holds that capitalistic economies grow in a cyclic fashion with a periodicity of 50-60 years. Four (complete) waves of technology related boom-recession-depression-recovery have been identified: the Industrial Revolution, based on the development of textile, iron and steam-powered industries; the Bourgeois Kondratieff as a result of the railroad hegemony and the expansion of coal and iron industries; the Neo-Mercantilist Kondratieff, linked to the expansion of electric power and the automobile industry; and the fourth Kondratieff, related to space technology and computing. The recently emerged fifth Kondratieff would have begun in 2000, linked to developments in ICTs, robotics and bio-technology.

Each of these technology eras developed a certain type of distribution channel, which, in turn, produced important effects on urban space. Figure 2.5 illustrates the Kondratiev waves and their corresponding dominant distribution networks: canals, railroads, paved roads and airways. The fifth Kondratieff will most probably have (broadband and wireless) telecommunications networks as its main distribution channel. It is important to note that the last wave superimposes upon, but does not dismiss, the previous layers, contributing to increasing complexity in urban and spatial analyses. The most visible transformations have occurred during the upwaves of each cycle, as the one we would be currently experiencing.

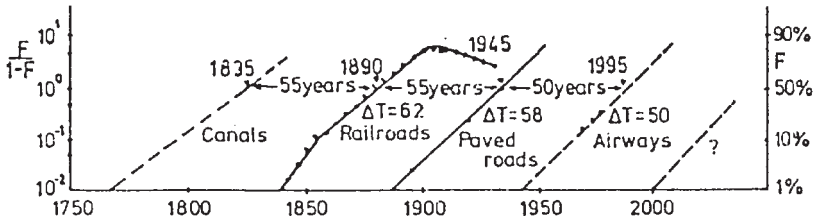


Figure 2.5. The Kondratieff waves and their corresponding changes in distribution channels. (Source: Drewe, 1996).

Technology has always been linked to the development of the city, originally to concentration processes and since the last century to dispersion processes. Densely populated cities were the combined result of agricultural technologies that pushed large numbers of workers off the fields and of production technologies that pulled them into factories. Later on, specialisation trends and the consequent inter-dependence among firms further stimulated the growth of centralised cities, which at that time had few transportation facilities. Geographic proximity was strategically important for conducting businesses.

Technological advances in transportation and communications that emerged in response to the agglomeration trends served to accelerate them further. Public transportation, first in the form of horse cars and trolleys, later subways and buses, facilitated intra-city transportation between residential, working, and shopping areas. The possibility of reaching a working population within a greater radius of the factories and businesses allowed further urban growth and the centralisation of industrial and commercial activities.

Before 1920 the suburbs grew up spread along a railroad line with station stops from three to five miles apart, which meant that there was a natural limit to the spread of the new neighbourhoods. Houses were located within easy walking distance of the railway station, and the closest to it were the most expensive ones. The introduction of the automobile radically changed this mobility pattern. With a car, it became possible to live at a distance from the noisy and polluted workplaces.

The telephone also contributed greatly to the development of centralised cities, with specialised functions in the city centre and residential functions outside of it. Historic accounts have shown the role of the telephone and the elevator in the original centralisation of business functions. The combination of high-rise buildings and telephone connection allowed businesses to opt for ‘moving up’ instead of ‘moving out’ (Graham and Marvin, 1996), but after its initial tendency towards concentration, slowly and then later massively, the telephone contributed to the dispersion into the suburbs.

In the late 1920s and early 1930s, changes in manufacturing technology also began to serve as a force for dispersion. Newer technologies and growing plant size began to give a competitive advantage to plant distribution with horizontal material flows and wide aisles. Space for this kind of plant could be found only outside the central city. Improvements in transportation technologies further facilitated dispersion of factory sites.

Technological innovation has had profound effects on cities, slowly, but surely, changing the patterns of urban growth and with it the shape and the perception of the city. The spatial transformations have not been confined to the cities themselves, but are also valid for the system of cities. The effect of trucking on industrial locations was as dramatic as the one that the automobile had upon housing location (Fischer, 1992).

The historical advantages of central location, economic agglomeration and urban concentration have been steadily weakened with the introduction and eventual generalisation of newer and powerful technologies. The complex and changing character of the technology related transformations cannot be ignored. Even if the trends to dispersal seem hegemonic at first sight, deeper analyses show that technological advances produce contradictory and complex spatial patterns in cities.

b) From the pedestrian to the networked city

Transportation was the crucial innovation in the gradual transformation of the pedestrian city into a large city with a centre and suburbs, but the remarkable impact it had in the city was only possible in the context of other new decentralising technical networks (in energy, communication, water and sanitation, etc.) that were deployed in the cities since the mid-1850s (see figure 2.6). Their continuing deployment had a less spectacular impact in the city's structure, but nevertheless contributed to the dispersal trends and completely changed the functioning of the city and the habits of urban residents. Even if pedestrian cities or neighbourhoods may exist, no settlement can be considered urban without these basic networks. They have become an indispensable element of our way of living. The deployment of urban technical networks constitutes the first step in making new settlements and neighbourhoods viable for urban living.[13] In those places where economically poor groups take possession of peripheral land for housing purposes, one of the first demands of their residents is the connection to the urban networks.

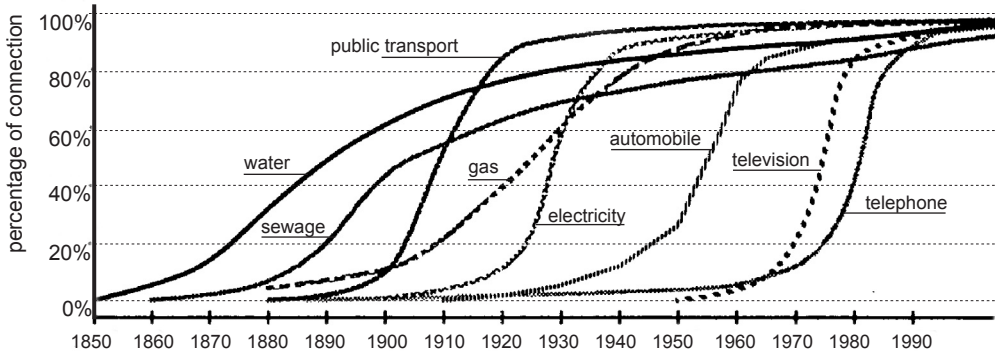


Figure 2.6. Development of technical networks in the Western city (Source: Dupuy, 1991).

Urban technical networks now provide transference and communication services on a permanent basis, distributed over a great number of points of the urban space. Dupuy (1991) points out important features of the development of technical networks in the city: the rapidity in which the process has been realised, the role of technological innovation in the emergence of technical networks, the role of private initiative in their origin and evolution, their development according to the logic of the affluent demand rather than to the logic of needs, and their close relationship with the built environment. On the other hand, the urban networks have been developed within a sectoral logic, conditioned by a definition of services provided by economic and financial criteria. This sectoral logic is very technical and far from the worries and issues of urban planners.

Urban professionals could not ignore the massive phenomenon of urban technical networks, which profoundly modified the ways of life and the uses of urban space. The study of urban

technical networks was, however, systematically neglected (Graham and Marvin, 1996; 2001). This was related to their technical nature and the heterogeneity of urban networks in the city, which hindered a common vision of technical networks in urban studies. Historians have been more interested than urban scholars in the transformations linked to the development of urban technical networks. The histories of the telegraph, electricity lines and the especially of the telephone inspired many studies which addressed different social, political, economic and sometimes spatial considerations. These studies have been more appreciated since the diffusion of ICTs, and very useful as a means to understand the present transformations.

c) Networks and the city: From Cerdà to Dupuy

The debates about the city and technology are increasingly considering the importance of networks as essential component of cities, but this is relatively recent, as previously they were neglected in urban studies. Network thinking was generally limited to sectoral approaches as transportation, infrastructures, etc. The few urban thinkers who adopted a network approach for urban space provided some principles in clear opposition to the principles of the mainstream zoning approach. Network thinking is associated with a geometry that stretches itself horizontally across the territory, overcoming centre/periphery dichotomies.

Before proposing his own vision, Dupuy (1991; 2000) documented the views of the main network thinkers and their different emphasis in the time-spatial dimensions of topology, kinetics and adaptation. From them, two (opposite) positions have provided the most convincing views about the city in terms of networks. The need to think of the city in terms of networks appeared at the end of the XIX century, related to the expansion of the city.

Ildefonso Cerdà introduced the concept of networks in urbanism. Researching the living conditions of workers for his study for the expansion of Barcelona, he concluded that the closeness imposed by the city walls and lack of proper transportation systems hindered the good functioning of the city. Cerdà defined the city as "*a gap of habitability in the great system of the universal vialidad*". His concept of *vialidad* expressed the infinite possibility of movement and circulation in a rapid, non-bonded and direct way. The essential use of the street is for Cerdà to supply all residents the service of 'communicativity' (from the Spanish *comunicatividad*), by means of the universal *vialidad*, to facilitate generalised accessibility. Because for Cerdà, "*all is movement, all is expansion, all is communicativity*".

The second grand proposal to grant the network a deciding role in the city was Frank Lloyd Wright's *Broadacre City,* from 1935. If Cerdà's proposal came from a positive idea of the city, Broadacre was anti-urban. It was rather born from a utopian vision that advocated a radical transformation of the U.S. American society to restore Emerson and Jefferson's rural virtues of individual freedom and self-reliance (LeGates and Stout, 1996). Wright viewed the dense and crowded cities as degrading and no longer modern, and predicted the decay of Chicago and New York. Without centre or periphery, Broadacre was a 'city' of independent farmhouses in which households would receive one acre to be autonomous from one another. On the other hand, many forms of efficient transportation and transmission were designed to make Broadacre a city of rapid and easy communication, where each unit was the centre of the system (Dupuy, 2000). Broadacre was the spatialisation of the high levels of individualism that sustains the 'American way of life'.[14]

In the post-war period, the spread of the automobile made cities grow substantially by the development of suburbs. Home ownership and low-density living, central aspects of the suburban dream, consumed huge surfaces of land in the US cities and elsewhere. This attracted

most of the interest (and worries) of urban professionals and triggered many debates about their (allegedly negative) effects. During the 1960s, several authors (as Jane Jacobs, Lewis Mumford, etc.) rejected suburbia basically because of their anti-urban character. However, most households embraced suburbs as the best way of urban living.

The first attempt to use communications theory for explaining urban organisations came from Richard Meier (1962) in his *A Communications Theory of Urban Growth*. He was the first urban scholar to express that cities evolved primarily for the facilitation of human communication.[15] In *Explorations into Urban Structure* Melvin Webber (1964) developed the concept of 'non-place urban realm'. Supporting Meier's view on the city as the search for human interaction, Webber added that it is not the propinquity, but the accessibility aspect of place that is important. He saw the city like the nodes of a massive communication system, as the switches of a complex system of exchange of information. "*The place-community represents only a limited and special case of a larger genus of communities, deriving its basis from the common interests that attach to propinquity alone*" (Webber, 1964:111). Webber proposed analysing the metropolis at three levels: (a) the spatial flows of information, money, people, and goods; (b) the location of the physical infrastructures; and (c) the location of activity places.

Robert Fishman, a historian specialised in the American suburbs, sees them as the marriage between the city and the nature ideal, as the perfect combination of urban sophistication and rural virtue. In *Metropolis Unbound: The New City of the 21st century* (1990) he explains how, since the suburbs have become independent of the central city for its economic base and essential services, the periphery has replaced urban centres and has become a new type of city in itself. This new urban reality, known as exurbs, urban sprawl, edge cities, etc., does not have a centre or defined borders, the very concept of centre and periphery has faded, as in a network. The new city is the decentralised world of highways and detached houses, malls, and business centres built in the US after the war, and reproduced outside of it. Its symbol is not any longer the skyscraper, but the road network, as it is seen from above, connecting extended areas in an extensive super city. In this way, part of Broadacre City's basic spatial concepts became reality. [16]

Fishman (1990) suggested conceiving the new city as composed of three overlapping networks, each one with a different spatial logic and defined by the three categories of destinations that define each person's city: The network of the household (supporting personal life), the network of consumption (Mallopolis) and the network of production (the place(s) of employment). "*Instead of the logical division of functions of the old metropolis, one finds a post-modern, post-urban collage…. The new city allows and requires each citizen to make the necessary connections among the three network on his own, to draw that complex pattern of multidirectional journeys that constitute each person's city*" (Fishman, 1990:51)

Fishman's proposal is mainly functional and based on mobility and time aspects of an individual or household. Three overlapping networks represent the three basic categories of destinations that define each person/household's city. These are defined by the time it takes to travel, rather than by the distance from origin to destination. Elaborating on Fishman's ideas, Dupuy (1991) has advanced a more comprehensive way to study the city, placing more emphasis in technical and spatial aspects than Fishman, but without leaving mobility and time aspects out. Additionally, he also identifies other urban operators, beyond the household or individual, and places each one operating at the different levels. Figure 2.7 makes a comparison between Fishman's and Dupuy's views, to show their similarities and differences.

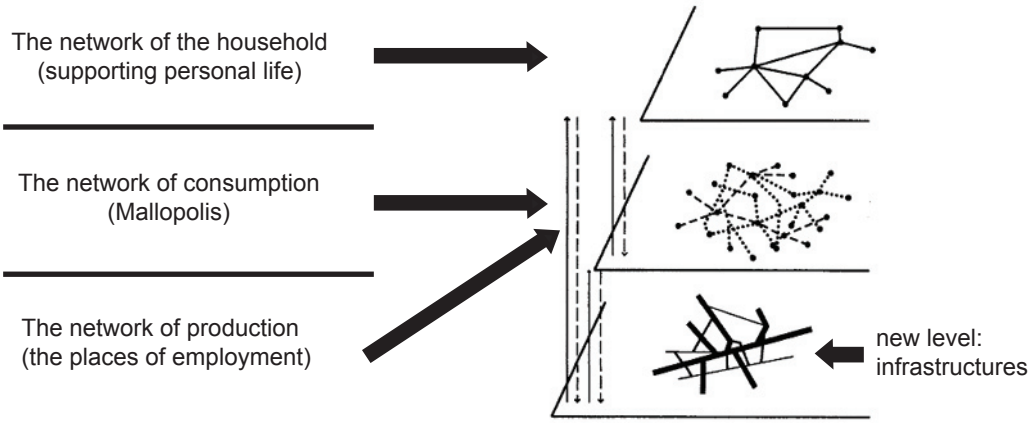


Figure 2.7. Three levels of networks in Fishman (1990) (at the left) and in Dupuy's (1991) network urbanism

Dupuy's proposal includes a (new) first level concerned with the physical dimension of the infrastructural networks. In the second level he combines both production and consumption networks, while the third level remains the same. Households and individuals operate at the third level according to their daily time-space budget. Each level uses the services of the level immediately below and offers services to the level above. The first two levels represent 'objective' elements in the city, while the third level has a 'subjective' character. At this level individuals interpret the possibilities built in the first two levels and operate choices creating in this way their 'own' city.

Technology has, then, enormous powers to structure and shape space continuously and territory at both macro and urban scales. Hence, the evolution of cities cannot be separated from the evolution of technologies; cities are socio-technical processes. Advances in transportation and telecommunication technologies have played the most relevant role in the expansion of the urban frontiers and the (re)structuring of cities. The deployment of large technical infrastructures has made the city evolve from a pedestrian to a networked city, and more recently expanded their reach from urban scale to global scale. Emphasising time and mobility aspects of urban contexts, 'network thinkers' have proposed conceptualisations of the city that seem more suited to approach the current city's complexity.

2.4. The conceptualisation of the city in the digital age

The previous three sections have presented the fundamental assumptions regarding the relationship between the three broad fields of study that intervene in the research topic: space, society and technology. This section goes further into the circumstances of the city and ICT technology.

By adding a new level of organisation of urban life to the current city, ICTs make the conceptualisation of the city a much more complex issue. The idea that urban professionals do not have enough expertise to know how to tackle the complex problems faced by the current cities is gaining impetus (Batty, 1999). Urban changes are so rapid, dependant on so many factors, and interacting in such intricate ways, that it becomes increasingly complex to diagnose, to make predictions, or to make plans for the future.

For Drewe (2000) the failure to assimilate ICTs as a new urban paradigm is related to the high level of uncertainty of the direction of the changes, the indirect character of urban transformations and the resistance of practitioners. Graham and Marvin (1996) relate this failure to (a) the invisibility and intangibility of ICT infrastructures and spaces, (b) the conceptual challenge regarding the city's increasing space-time complexity, and (c) the conservatism of the urban and regional planning disciplines, still focused on the industrial city concepts and models. Despite the multiple challenges, there is a growing consensus that the concern for the urban environment requires real intellectual attention into how to organise their increasing complexity.

The initial literature referring to ICT and the city tended to be simplistic and to use grand metaphors to illustrate the coming urban transformations. Cities were considered to be positioned in a new era in which ICTs had a dominant role in reshaping their evolution (Graham and Marvin, 1996). These urban predictions were linked to the lack of proper empirical support and the challenging nature of ICTs. This first stage of technological determinism has been overcome and several interpretations of the relationship between ICT and the city that have been advanced. These visions approach the new organisation of the city according to three main perspectives: (a) the territorial approach, (b) the political economy approach, and (c) the network approach.[17]

a) Concentration versus deconcentration trends

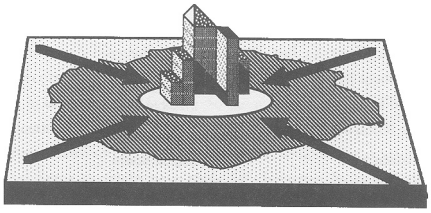
The examination of agglomeration and dispersion forces has been important within urban studies. The spatial/economic perspective, whose major period of development was between the 1930s and the 1960s, addressed issues as the spatial distribution of systems of cities, city ranking and development (Paddison, 2001). Christaller's central place theory of geometric patterning of cities according to their specialization of services was the most influential. Lösch, Isard and later Berry gave a follow-up and empirical assessment to central place theory. In an attempt to capture the spatial characteristics of the ever-expanding city, urban scholars advanced their own visions. Frank Lloyd Wright's *Broadacre city*, Lewis Mumford's 'invisible grid' and Melvin Webber's 'community without propinquity', were among the more discussed metaphors. But these studies were centred in the spatial/economic logic of the industrial city, which currently has become too narrow to explain urban transformations.

Townsend (2003) has made a useful analogy to clarify the role of the main components of the new ICT infrastructure for urban planners, comparing them to important elements of the system that supports the industrial economy. The four main components are then (information) ports, highways, warehouses and factories (see Table 4.1).

Analogy	**Referring to:**
Information *highways*	→ The transcontinental and undersea fibre optics lines which move data at light speed from city to city
Information *ports*	→ Network Access Points (NAPs): the sites where telecommunications carriers interconnect their systems into a single, global network
Information *warehouses*	→ Data centres: the secure structures which house rows of telecommunications equipment, such as Internet servers and switches
Information *factories*	→ The wired businesses and homes that produce (and consume) information products

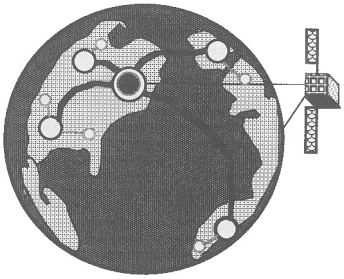
Table 4.1. The four main components of the global telecommunications infrastructure (Townsend, 2003).

It becomes apparent that extending our powers to dominate space-time dimensions ICTs are powerful technologies for decentralising and dispersing activities. Garreau (1992) has, for example, suggested that US' edge cities have developed partly because of ICT advancements. Graham and Marvin (1996) made an illustrative parallel between the opposite forces of urbanisation process and the adoption of the new technologies. The motivation behind both processes departs from the same human yearning of conquering space and time. Both processes allow accelerating time by shrinking space, although they achieve their objective in a totally different way: while urbanisation 'tames' space, telecommunications 'tame' time (see Figure 2.8).



The city

Function: to overcome *time* with space
Developed to make communications easier by minimising space constraints to ovecome time constrainst.



Telecommunications

Function: to overcome *space* with time
Developed to make communications easier by minimising time constraints to ovecome space constrainst.

Figures 2.8. Space-time considerations in the urbanisation process and the telecommunications adoption process (Source: Graham and Marvin, 1996).

These opposite forces imply that concentrating urban activities in a relatively small and dense space, the process of urbanisation allows overcoming the temporary barriers minimising the space barriers. On the other hand, telecommunications have the opposite effect to the concentration in the cities: they allow overcoming the geographical distance minimising the temporary barriers.

Futurists (as Cairncross, Toffler, Negroponte, et al.) thought that the challenges that ICTs pose to the agglomeration forces would eventually lead to the dissolution of cities. It is now widely accepted that there are no direct changes in the urban form as a consequence of ICTs. If, in theory, they provide the potential for decentralising and dispersing activities, it is in the sphere of the society and the economy where the changes have to be realised, which eventually might lead to changes in the physical form of the city. The evidence has been so far contradictory, although it remains clear that cities acquire strategic importance as knowledge and economic centres. Recent studies suggest that there is strong evidence that the agglomeration forces remain strong even when transportation and communication costs tend to become insignificant (Storper and Venables, 2002).

The continuous success of agglomeration forces has been related to the fact that computer mediated communication (CMC) does not render face-to-face contacts superfluous; on the contrary, it revalues them (Ascher, 1995). Face-to-face contacts and their various effects on both people and businesses seem to be very important reasons for urban agglomeration. Psychologists explain this in terms of the multiple human traits that cannot be exchanged through CMC, and which are strategic for the conduction of social and business relationships.

These would be tacit information that is impossible to codify, but essential for coordination, motivation, trust and human bond, as speech, body language, ultra rapid communication, immediate interactivity, etc. (Storper and Venables, 2002). Propinquity and physical interaction remain crucial traits of urban places.

In view of this sustained force of agglomeration the theories of agglomeration have turned away from strict economic views[18] based upon transportation and transaction costs, and are considering innovation as basis of economic progress. Indeed, since its emergence, the city has always been a place of gathering, of encounters, of increased opportunities, of exchange and innovation, and for that reason a place to go. Spatial proximity seems to improve the flows of information and ideas that are considered necessary to the process of innovation. This place-based approach argues that the economic prospects of a place are driven by local place-bounded characteristics.

Two main explanations have been advanced under this argument: technological innovation and cultural innovation. The first stems from Alfred Marshall's 'industrial districts' concept, which argues that industrial agglomerations exist in part because individuals learn from each other when they live and work in close proximity. According to this, individuals acquire skills by interacting with one another, and dense urban areas increase the speed of interactions. Cities would attract young people, who are not so averse to risk and who benefit most from learning. Proximity, a good atmosphere and the unexpected would promote technological innovation.

Since the industrial logic has become too limited in the contemporary city, the focus has shifted from the industrial to the informational logic. Technological clusters become relevant. Since the most specialised information-producing firms tend to cluster in highly wired (financial or artistic) downtown districts, this view suggests that clusters of economic activity are the sites of 'technological spillovers' of knowledge and information. This would raise the rate of innovation and, therefore, increase productivity. In this context, the rise of Silicon Valley and 'Silicon Alley', the New York multimedia industry, have been linked to San Jose's and New York's density of information flows involved in this type of cutting edge industries, respectively.

The cultural innovation perspective is based on Jane Jacobs' (1961) view that the diversity that concentration promotes is at the basis of urban economic advantages. Diversity would facilitate chance contacts, haphazard encounters and serendipity among people, which in turn might lead to a more varied circulation of information that promotes creativity and innovation. These last depend not only on the typical deductive way of thinking, but rely on analogies, metaphors and lateral thinking.

This position is shared by Florida (2002) who, in his best seller *The Rise of the Creative Class*, developed a creativity index for cities.[19] He states that cities are shaped by people who create and produce new ideas (researchers, artists, entrepreneurs, venture capitalists, etc.), who are not evenly spread in urban areas but concentrated in some cities. Diversity and tolerance would be attracting these 'bourgeois bohemians' to the creative cities. "*Creativity is now the **decisive** source of competitive advantage*" (Florida, 2002:5). Florida's emphasis on 'bohemianism' has been rightly criticised but the notion that the advantage that one place has over another is highly driven by its people is accurate. Most studies show that human capital and urban economic growth are highly related in the digital age.

Warning about over-simplifications Graham and Marvin (1996) have stated that the relation between ICTs and space is mediated by four different mechanisms of concentration and de-concentration: synergy, substitution, generation and enhancement. With the purpose of making urban planners aware of the new spatial developments Gepts (2002) has identified the most evident of these four effects in the current urban scene (see table 2.6).

synergy	Telecommunications infrastructures are concentrated in cities Nodes of telecommunications networks have a centralising effect Telecommunications infrastructures follow the existing infrastructures Cities are the command centres of the new economy ICT strengthens existing social polarisation
substitution	ICT leads to a dispersal of (certain) economic activities ICT offers virtual substitutes for (certain) urban activities ICT changes the way we work and use space
generation	ICT generates flows of data ICT generates the need for face-to-face contacts
enhancement	ICT optimises the efficiency of transport system

Table 2.6. Main effects of the relationship between ICT and space (Gepts, 2002) .

As the previous table shows, ICTs have a wide scope of contradictory effects, sometimes concentrating and sometimes dispersing activities in the city. At macro level, this simultaneous dispersal and concentration trends that ICTs promote are important features of the new global way of organisation of the economy and society. At urban level, these opposing tendencies can produce different outcomes according to the local circumstances. The relationship between ICT and urban form is thus complex and it cannot be reduced to simple schemes or to concentration/deconcentration dichotomies, but it has to be studied at multiple levels and in multiple locations. It also has to include considerations of both economic and socio-cultural aspects.

b) Cities as centres of the new economy

The richest and liveliest debates in urban studies deal with the new role of cities in the context of the rise of the knowledge and information economy. This is not a new topic, as research on world cities and, even before, of capital of empires was producing hierarchies and rankings of the richest or most developed cities, but the debate has been refuelled since the emergence of ICTs. Central in this approach is the evolution of cities in their transition from an industrial to a post-industrial, post-Fordist or informational type of economic organisation, characterised by the transformation of the main means and objects of production, in which ICT is a major drive. This has fundamental relevance in urban studies, as it implies transformations of what is produced and how and where it is produced. In general terms, the changes include the globalisation of the economy, the decline of large-scale industries and mass markets and the increased importance of the market place and the decreased power of the state. (Large) Cities become critical to the new economy as they are the location of the command centres of the new top functions, and at the same time the place where global and local processes converge.

The acquired influence of global factors has increased the perception that external scale economies acquire an extra weight over internal scale economies (Sassen, 2001). Researchers from different disciplines and origins have been working in aspects related to global cities, mostly since the mid 1990s, producing a large body of literature.

The two most discussed concepts are Saskia Sassen's global city and Castells' informational city. Both views have very much in common, as they state that cities are part of a (global) network of cities, which function as strategic sites for global economic operations. Sassen addresses the re-territorialisation of global economic processes in different cities. She argues that ICTs are not only functional to global coordination, but also to the production of global control capacities. The role of global cities is then examined according to these new control

capacities. Translating this to spatial terms, it implies the concentration of finance and certain producer services in the central business districts (CBDs) of major international centres. These global cities are coming forward as producers of services for export, accompanied by a trend towards specialisation (Sassen, 2001). Her analyses also include cities of the South as Mexico City, Buenos Aires and São Paulo (Sassen, 2002).

Manuel Castells has been the most influential thinker on the transformations brought about by ICTs. In his earliest work on this topic, *The Informational City* (1989), he has practically laid the foundations of the field of 'urban ICT studies'[20], introducing the idea of the 'space of flows' years before the launching of the commercial Internet. In 1996 he complemented that study with *The Rise of the Network Society*, which is probably the most cited of all books in the field.

In his large *oeuvre*, he argues that the digital revolution has allowed the emergence of a networking logic of global development, concluding that dominant functions and processes are increasingly organised the space of flows that ICT networks make possible. The space of flows is for him basically an economic space embedded in the global network, with its communications infrastructure, its nodes and hubs, and the organisation of the operators who run them. He argues that power resides in the network, not at the nodes, and it cannot be controlled from a node. "*Presence or absence in the network and the dynamics of each network* vis-á-vis *others are critical sources of domination and change in our society*." (Castells, 1996:469). Inclusion and exclusion in the space of flows determine the position of individuals, households, cities and nations.[21] Regions without proper access to the space of flows will be consigned to a role of economic marginality. In this context, the informational city is not a form but a process characterised by the structural domination of the space of flows (Castells, 1996).

Castells' and Sassen's approaches are criticised because of their insistence in macro-scale visions of cities, and their tendency to overestimate the role of economic globalisation and the political factors. Some authors have produced 'softer' versions of global cities, as the studies of 'global city regions' (Simmonds and Hack, 2000) and 'globalising cities' (Marcuse and Van Kempen, 2000), which also include examinations of cities of the South. These approaches are not so strongly focused on financial and producer service flows and the links with the network economy, and include analyses of more traditional local variables as manufacturing and basic infrastructures.

A second argument against the global city approach comes from its exclusive attention to the most advanced cities. Almost all cities of the world show some spaces which are connected to other 'valued' spaces across the city as well as across national, international and even global distances (Graham and Marvin, 2001). Some authors have proposed a broader and more 'cosmopolitan' study of cities as 'ordinary cities' to overcome the economic bias of global and world city studies (Robinson, 2002). Townsend (2001) has even challenged the assumption that the major global cities dominate international information exchange conducted in the Internet backbone networks.

Categorisations of cities according to their connection/disconnection to the new global economy are thus considered reductionist. Cities are much more than exclusively global economic engines, they have also intense local dynamics made up of technological, demographic, socio-economic and cultural processes that add up to their complexity and determine an own path of urban development.

c) Cities as networks and nodes of networks

The third vision of the city in the digital age stems from the conceptualisation of cities as networks or nodes of networks. The network approach[22] is useful to overcome limitations of the

two previous approaches. While considering horizontal spatial relationships, they also include time dimensions. Indeed, stretching the networks around the globe, a new type of spatiality arises (Sheppard, 2002), which includes properties that the Euclidean spatiality did not have. Using networks to grasp the current urban complexity seems useful as they comprise necessary dimensions that traditional urban concepts neglect.

Yet despite the acquired importance of network concepts in many different disciplines, the study of their structure and properties has not been common. Barabási's *Linked. The New Science of Networks* (2002) has given new insights on important features of networks. His work on complex networks has shown that the Internet is not a random network but a 'scale-free' type of network, characterized by an uneven distribution of connectedness. In 1998, his team mapped the connectedness of the Internet and noted that links on web pages follow a 'power law' degree distribution.[23] There are many nodes with few links, while there are few nodes that have a huge number of links. Power law distributions are "*the patent signature of self-organisation of complex systems*." (2002:77). That the more connected nodes get much more links that the less connected, is explained by 'preferential attachment' which in turn induces a 'rich-get-richer' phenomenon.

Drawing from his experience in large technical infrastructures, Gabriel Dupuy (1991, 1993) has elucidated the main properties of urban networks. A network is a set of geographic locations (it has a topologic dimension) interconnected in a system (a kinetic dimension) by a number of routes (an adaptive dimension). The three properties of networks are better suited to understand contemporary urban space:

- The **topologic** nature of networks is open, cohesive, and opposed to strict separations as city/countryside, centre/periphery and zoning.
- The **kinetic** notion of networks establishes a more flexible relationship between space and time, based on circulation, speed, tending to the instantaneous, to 'real-time', which becomes more appropriate to approach the present space-time complexity.
- The **adaptive** properties of networks imply that, as their nodes are linked with each other by multiple options, they are able to react rapidly changing routes and facilitating the necessary relations and choices within the network.

Dupuy's (1991) concept of 'network urbanism', based on mobility and time aspects, approaches the city as an overlapping of three main types of networks: in the first level the technical infrastructural networks, the networks of production and consumption become the second level of networks, and the network of the household or individual is at the third level. This approach is at the base of the present research. Dupuy, however, did not give an explicit attention to the ICT networks.

Adhering to Dupuy's scheme for a network urbanism, Drewe's proposal (2000; 2003) does give consideration to ICTs. For Drewe, the 'Network City' concept is a new way of thinking cities or (re) problematising urban systems in terms of urban technology systems. Departing from the spatial planning discipline, Drewe (2003) expresses the need of an integrated planning of land use and urban technology networks, in particular transport and ICT. Within this new type of planning, the role of ICT can be emphasized by introducing ICT initiatives as pilot or demonstration projects. To test the 'Network City' concept he proposes: (a) analysing the virtual space of the Internet, (b) re-reading the classics, (c) implementing a design studio, and (d) searching for emergent network-based concepts (Drewe, 2003).

To analyse cities' position in terms of ICT networks Drewe (1999) has interpreted Dupuy's three levels as (a) the Internet infrastructure, (b) the Internet industry: ICT industries (equipment, manufacturing and services), content industries, industries making use of ICT products and services, and (c) traffic on the Internet. This interpretation is very close to Castells' (2001) proposal to analyse urban contexts according to their position in the Internet geography. Castells coincides with Dupuy's scheme distinguishing three levels of analyses: (a) the technical geography (for Dupuy the technical infrastructure networks); (b) the geography of the production of the Internet (the networks of production and consumption); and (c) the geography of users (the network of the urban household).

This thinking of networks in terms of levels ranging from the physical to the applications level is not uncommon. Caso (1999) argues that it can be traced back to the understanding of the networks inherent properties: topology, kinetics and adaptation. In his work, Caso sees the network city as the articulation of the physical, functional, social and personal components of urban contexts. Interpreting the (network) city as a technology, these three levels would coincide with its hardware, software and brainware elements, respectively (Caso, 1999). Table 2.7 illustrates the similarities and differences of the proposals advanced by Dupuy, Drewe, Castells and Caso to analyse contemporary urban settings.

	Dupuy:	**Drewe:**	**Castells**:	**Caso:**
	Network urbanism	ICT networks in an urbanism of networks	Networked places	The network city as a technology
3	Network/territory of the urban household	Traffic on the Internet	**The geography of users:** Territorial distribution of Internet users and its implications	The personal component: **the brainware of cities**
2	Networks of production and consumption	**The Internet industry:** - ICT industries (equipment, manufacturing & services) - Content industries - Industries making use of ICT products and services	**The economic geography of the Internet production**: - Internet equipment manufacturing and technology design - Internet content providers - E-businesses (B2C and B2B)	The functional and social component: **the software of cities**
1	**Infrastructure networks**	The Internet infrastructure	**The technical geography:** Telecommunications lines dedicated to data packet traffic	The physical component: **the hardware of cities**

Table 2.7. Levels of analysis of the city in the digital age according to Dupuy, Drewe, Castells and Caso.

The main differences between the four perspectives are linked to the different analytical perspectives of its authors: Dupuy is a 'network' engineer focusing on the technical and spatial aspects; Drewe's and Castells' analytical purpose is to measure the position of cities and urban settings according to their level of development of ICTs, and Caso's view is that of an urban designer.

Following and recombining these interpretations of 'networks urbanism', the present thesis analyses the ICT-related transformations of cities according to three inter-related network

levels, which correspond to the ICT infrastructure networks, ICT networks of production and consumption, and the diffusion of ICTs in everyday life. These constitute the technical, economic and socio-cultural aspects of the development of ICTs in cities. In this context, the three levels are closely interacting. The level of the technical infrastructure is of fundamental significance for the development of the other two, and they all three reinforce one another.

2.5. Conclusions

This chapter has set the scene of the city in the digital age, spelling out the main assumptions of the research and explaining the choices for its analytical framework. The first three sections addressed the interrelation of the three fields that intervene in its study: space, society and technology.

The first section has explained the research approach to technological change, which rejects simple cause and effect interactions. The relationship between technology and society is considered to be shaped by cultural and political-economic processes functioning at both macro and local levels. Technology and society cannot be separated; they are continuously being shaped and recombined by each other. Due to the revolutionary powers of ICTs to transform society thorough the empowerment of individuals and groups, the transcendence of geographic barriers and changes in our ways to communicate, ICT-related transformations are considered large-scale societal changes. Technological changes are driving us into a network society, in which the local and global scales mingle and intertwine to produce complex social and cultural transformations.

The second section has presented the main considerations regarding the relationship between space and society, useful to explain the reasons of the increasing urban complexity. The capabilities of ICTs regarding new ways of organisation of space and time dimensions illustrate the need to move away from social and spatial deterministic views that were present in social theory and urban studies. Space and society cannot be separated from each other. Cyberspace, the abstract space that emerges when people digitally interact, is the concrete prove. ICTs diffusion are then promoting new ways of organisation of space, of time, of the economy and the emergence of a new communication culture, which are superimposing to those that characterised the industrial city and the historic city. The result of this overlapping is what explains the increasing complexity the current city. Attempts to study the city from one 'objective' view' and giving exclusive importance to the issues concerning the industrial layer have become too limited.

Concerning the relationship between technology and space, the third section has depicted the enormous powers of technology to continuously structure and shape space and the territory at both macro and urban scales. The evolution of cities cannot be separated from the evolution of technologies; cities are socio-technical processes. Advances in transportation and (tele)-communication technologies and the deployment of large technical infrastructures has made the city evolve from a pedestrian to a networked city, expanding its reach from urban scale to global scale. Conceptualisations of the city based on networks, which emphasise time and mobility aspects of urban contexts, as well as their 'subjective' character, seem more suited to approach the current city's complexity.

The fourth section has gone deeper into the city in the digital age, presenting three main perspectives: the territorial approach, focused on the trends to concentration or deconcentration; the political economic approach centred on cities' economic role in the global economy, and the 'network urbanism' approach, which sees cities as part of networks of both local and global reach. The latter is considered the most comprehensive as it does not give preference to (local) spatial or (macro) political economic considerations. Instead, this perspective considers different

levels of analysis to study the contemporary city and allows its examination from different scales. Hence, the theoretical framework that has guided the present research is mainly based on Dupuy's 'networks urbanism' approach.

After explaining the main issues related to the city in the digital age and the main assumptions of this research, the next chapter is addressed to the main features and circumstances of the Latin American urban scene that are relevant for the present exploration.

Notes

[1] Internet's origin is the ARPANET, a computer network of the ARPA (Advanced Research Projects Agency) from the Defense Department of the U.S, established in 1969 with the purpose to mobilise research resources from top-universities, but not directly for military applications. Castells (2001) states that the Net was born from an unlikely formula: big science, military research and libertarian culture.

[2] Moore's law predicts the doubling of computing power every 18 – 24 months due to the rapid evolution of microprocessor technology. Gilder's law predicts the doubling of communications power every six months, due to advances in fibre-optic network technologies. Both mean high cost reductions and massive increases in speed.

[3] These qualities also make the Internet very vulnerable, as the attacks of hackers, spam, cybercrime and computer viruses show. School students have been behind some of these cases.

[4] Obviously referring to McLuhan's *The Gutenberg Galaxy: The Making of Typographic Man*, first published in 1962.

[5] Not everyone agrees with this. In *Theories of the Information Society*, Webster (1995) presents the debates between 'transformists', for whom the information society constitutes a rupture from the past, and 'continuists' who think it is just the informatisation of established relationships without a clear break from the past. The first include post-industrialism (Daniel Bell), post-modernism (Baudrillard and Lyotard) and Castells' Network Society position. The latter include Giddens' nation-state, Habermas' public sphere and Harvey's flexible accumulation views.

[6] "*The Internet is the fabric of our lives*" (Castells, 2001:1) is the opening sentence of his last book, *The Internet Galaxy*.

[7] An important criticism to Castells' work is his persistent use of dichotomies. For example, Graham (2003) remarks Castells' mistake in considering the space of flows and the space of places as following an own path of development, when they are obviously deeply ingrained.

[8] Recent work has suggested that the small world phenomenon is not only visible in social networks but also in nature and technological networks. It is also a fundamental ingredient in the evolution of the digital networks which we know as the World Wide Web.

[9] Prof. Richard Wiseman is an English psychologist known by his research on luck. His results have demonstrated the strong relationship between luck and social connectivity.

[10] They maintain that explanations for observed phenomena cannot be found through the empirical study of the phenomena alone but mainly by examination of the prevailing economic and political structures.

[11] Logic is understood here as the formal principles of a branch of knowledge (Merriam-Webster Online Dictionary)

[12] The metaphor of the city as an egg is linked to the spatial features of the three types of cities, from a bird's eye view.

[13] In cases of war or natural disasters, cities become paralysed when their basic services networks do not function.

[14] By this it is understood an average household of two parents and two children living in a single-family house in the suburbs, with two cars, high mobility and high consumption patterns.

[15] Classic sociologists, as Durkheim, also saw the large cities as dense interconnections among people, a quality that made cities important (Fischer, 1992).

[16] The other important part, the rapid and efficient communications system, which would allow the family home to emerge as the 'real centre of American life', would become a reality at the end of the 1990s. For Wright, the only centralisation possible was the individual American home (Fishman, 1990)

[17] These three perspectives are very much related to each other. The distinction I have made here is based on their main emphasis.

[18] As forward and backward business linkages or search/matching labour markets dynamics (Storper and Venables, 2002).

[19] The Creativity Index is a mix of four equally weighted factors: the creative class share of the workforce; high-technology industry Index; innovation, measured as patents *per capita*; and diversity, measured by the Gay Index, a reasonable proxy for an area's openness to different kinds of people and ideas.

[20] Among other things, he argued that the effect of ICTs and the emerging urban form is not direct but mediated by multiple factors related to social, economic and institutional restructuring. He also argued that neither centralisation nor decentralisation trends are dominant in the new complex territorial processes.

[21] Lash (2001) shares this idea, stating that the landscape of inequality has changed from exploitation, in the manufacturing period, to exclusion from the ICT networks in the present era.

[22] Networks concepts have been used in different ways in urban studies. Bertolini and Dijst (2003) have identified three main interpretations: a morphologic, a normative–strategic and an analytic interpretation.

[23] This is a mathematical expression that implies that many small events coexist with few large events (Barabási 2002:67).

Chapter 3.
Latin American metropolises' urban scene

"Latin American cities are enticing to students of cities because they combine great promise and great tragedy… Mexico City, Caracas, Bogotá, Lima, São Paulo, Buenos Aires and Santiago (among others) suffer from congestion, pollution, crime, and vast social inequities, but each one has achieved some measure of greatness and has the potential to be much, much better. The great cities of Latin America, to some extent, combine the social problems of Detroit with the promise of a Paris."
Edward L. Glaeser, 2003

After spelling out the main assumptions and the analytical framework of the thesis, this chapter completes the scene by providing the main elements to understand the changing dynamics of spatial development of the metropolises located in the Latin American territory. This is done with respect to two levels: the level of the system of cities and the metropolitan level. To refer to these two issues requires paying a special attention to the singular process of urbanisation of the region, whose huge scale and rapid pace changed the scene of the Latin American society, from a rural to an predominantly urban society in an amazingly short period.

In spatial terms, the process has developed highly unevenly and concentrated in some locations, specifically the largest cities. At the same time, the continuous exodus from the countryside to the cities has produced an enormous strain in the internal structure and urban functioning of the rapidly-growing cities since the second half of the 20th century. The urbanisation process has not been only a spatial phenomenon, but also a multi-dimensional process with repercussions in all spheres of society. At present the city is the fundamental life style for most Latin Americans.

While rapid urbanisation has brought about increasing and almost unmanageable urban problems, at the same time it has promoted highly auspicious initiatives for an alternative kind of planning and managing the city from the bottom-up. If the perception of cities as complex, chaotic and unpredictable entities is increasingly felt in cities of industrialised countries, this impression has existed long time in Latin America, where traditional spatial planning approaches have hardly succeeded in their objectives.

Table 3.1 synthesises the different ways of spatial organisation of the urban system and of the internal structure of the large Latin American cities during their different periods of development. The first section presents the evolution of the Latin American metropolises, giving an account of the first two periods of their development as shown in table 3.1. The second section addresses the process of urbanisation and urban concentration in Latin America, its main aspects and also the main views about it. The last section presents how recent social and economic processes have shaped the internal structure of the cities in the present times.

Period	Spatial dynamics of the urban system	Spatial development of cities
1500 - approx. 1850 Spanish and Portuguese rule	Growth as administrative and commercial centres, and ports at the Atlantic Coast after the 18th century	The compact and concentric colonial city model
approx. 1850-1920 Immigration and trade with Europe	Growth of port and immigration cities, beginning of urban primacy	First developments outside the centre, preceded by road and railroad networks
approx.1920-1950 Change from European to US capital	Growth of port cities located at the Atlantic coast and urban primacy	Suburbanisation of the elite, followed by middle classes. North American type of modernisation
approx.1950-1980 Industrialisation and urbanisation	Heightened urban primacy and concentration. Growth of industrial centres. High rural-urban migration. Rapid urbanisation.	Gradual proliferation of land take-overs and informal neighbourhoods. Urban development at different speeds and ways: 'formal/informal'.
1980-onwards New economic and political context. Global capital flows.	New hierarchy of cities in terms of their global economic integration. Diversification of national urban systems	New wave of suburbanisation of the elite. Socio-spatial fragmentation, preceded by road and telecommunication networks

Table 3.1. Spatial organisation of the Latin American urban system and cities.

3.1. From pre-Columbian urban centres to the demographic explosion

The successive stages of the Latin American process of urbanisation have been characterised by differing ways of urban development. The foundation and location of the settlements in the colonised territories were determined by Spanish and Portuguese colonial interests. Jorge Hardoy (1975) presents a timeline of Latin American urbanisation until the demographic explosion, illustrated in Figure 3.1.

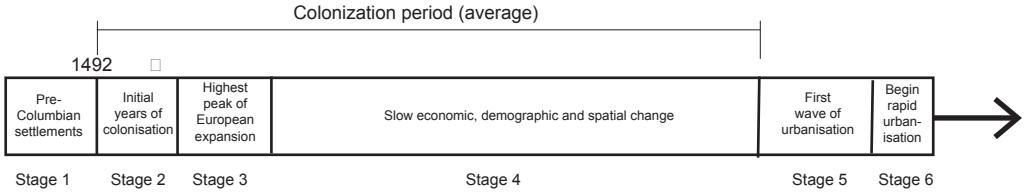


Figure 3.1. Timeline of the Latin American urbanisation according to Hardoy (1975).

a) Spatial dynamics during the colonial period

The rationale for the Spanish foundation and location of the early cities in the New World was related to their colonisation objectives. The choice for the location of new cities was based on the proximity to maritime and land routes, as trade and mine extraction were the most profitable economic activities. The definitive form of the Latin American system of cities was mainly laid out between 1540 and 1600 [1] (Hardoy, 1975).

Around the mid-1520s, the main characteristics of the 'classic model of the Hispano-American city' (Hardoy, 1975) began to be observed. This implied an urban structure based on a

rectangular or square grid of approximately 100 metres, with streets of the same section in both directions. The town's life was centralised around the main plaza, an empty block of the grid that was home to the main buildings: the main church, the palace of the main authority and the municipality. Other important public institutions (customs, justice courts, etc.) were distributed near the plaza. The surrounding blocks housed the most important Spanish residents. A strict spatial separation between Spanish and indigenous population was a characteristic of the model too. The city built for the Spanish residents displayed a great contrast with the quarters for the autochthonous population built outside the regular grid.

From 1600 to approximately 1850 there were no significant changes in the pattern of development of the urban system (see Figure 3.2) or the internal structure of the colonial cities. During this long period, the three capitals (Mexico City, Lima and Bahia, which was replaced after 1762 by Rio de Janeiro) confirmed their importance. As trade increased, a progressive gravitation towards the Atlantic side of the territories was observed since the beginning of the 18th century, towards cities as Havana, Cartagena, Buenos Aires and Recife, which offered more advantages for trade due to the shorter routes to Europe.

Figure 3.2. Latin American system of cities in 1800 (Source: van Lindert and Verkoren, 1994).

b) Emergence of the Latin American metropolises

The 19th century was a period of great political changes, due to the wars for the independence and the political unrest that characterised those first years after independence. Only Brazil,

Cuba and Puerto Rico remained as colonies until the 1880s; most large countries acquired their independence in the early 1820s. Initially, these political processes produced few transformations in the spatial structure of the colonial model, or the hierarchy of urban centres, but when the commercial supremacy of Spain declined and English, French and later US influences became dominant, a new hierarchy of cities became apparent. This consolidated the advantages of the Atlantic regions of Latin America, which provided shorter routes to Europe and the US Atlantic Coast. Between 1850 and 1920, the southern cities of the Atlantic (in Argentina, Uruguay and the South of Brazil)[2] articulated their economies exporting agricultural products to the world market, while they received a massive European immigration.

Meat and cereals, wool, coffee, cacao, fruit, sugar cane, minerals and other raw materials were exported to Europe, and manufactured goods as textiles, tools, iron and steels were imported. British capital had a great presence in the port cities system, and dominated their economies (Hardoy, 1975). The introduction of the railway, by English and French companies, began in the mid-1880s around most of the largest port cities. Between 1880 and 1920, railway networks to connect with cities in the interior of Argentina, Uruguay, Mexico, Chile, Cuba, Brazil and Peru were built, precisely in the seven countries that had the largest port cities at that time. These networks were monocentric and centralised in the ports with facilities for export. Instead of contributing to decentralise, they finally reinforced the primacy and/or concentration of the port cities.

Figure 3.3. Latin American system of cities in 1900 (Source: van Lindert and Verkoren, 1994).

In 1850 the total population of Latin America was around 30 million inhabitants, from which more than 50% lived in Brazil and Mexico. By 1900 the population of the region had doubled, not only due to natural growth, but also because of European immigration. Forced immigration of African workers, and in a minor proportion Asian workers also accounted for population growth. During this period, the growth rates in capital cities, especially those located on the coast, were higher than national rates. Figure 3.3 illustrates the Latin American urban system at the turn of the 20th century.

Table 3.2 shows the population of the ten largest cities of Latin America in 1900. The largest was Buenos Aires, which represents a singular case, as it grew enormously between 1887 and 1914 thanks to its role as a commercial centre and a centre of immigration. In 1914, Buenos Aires had 1.6 million inhabitants and was the largest American city after New York (Ades and Glaeser, 1995). The new ranking of cities confirmed the importance of ports located on the Atlantic coast. Mexico City was the only city that was not located near the coast nor was a port city. Lima, which had enjoyed a continental role as main seat of the Spanish power in South America during centuries, decreased greatly in importance during this period, partly due to its unfavourable location toward the Pacific Ocean.

City	Population (in thousands)
Buenos Aires	867
Rio de Janeiro	691
Mexico City	541
Montevideo	309
Santiago	287
São Paulo	239
Havana	236
Salvador (Bahia)	208
Lima	130
Recife	113

Table 3.2. The ten largest Latin American cities in 1900 (Source: Hardoy, 1975).

Figure 3.4 illustrates the evolution of six largest metropolises in the 1900-1930, showing the huge growth of Buenos Aires, which more than tripled its population during the three decades of the 20th century. Montevideo, Havana and Salvador (not shown in the figure) decreased in the hierarchy during these first thirty years of the last century.

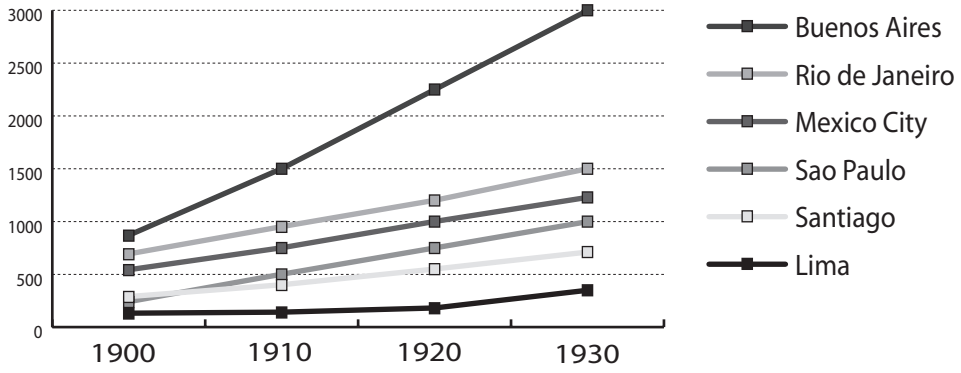


Figure 3.4. Growth of the first metropolises in the early 20th century (Own elaboration with data form Hardoy, 1975).

During the 1930s, Argentina, Uruguay, Chile and Cuba reached their urban majority and belonged to the most urbanised countries of the world. A great proportion of their population was concentrated in the capital. Other countries of the region had to wait two more decades to reach their urban majority (Villa and Rodriguez, 1996). In 1930, Latin America had already six cities with more than half a million residents: Buenos Aires, Rio de Janeiro, Mexico City, São Paulo, Santiago and Havana. There were also 28 cities of more than 100,000 inhabitants scattered around South America and Mexico, but none in Central America, still only slightly urbanised.

The huge economic and demographic transformations, especially those of the countries located in the South had also a profound impact in the spatial structure of the affected countries. New cities began to develop inside their borders, as a consequence of the opening up of new land, the exploitation of minerals, or were created as transportation hubs and service centres in the vast new territories. Very few of the many new urban settlements that were founded in this period reached the size or the importance of the cities belonging to the old network inherited from the colonial period. Belo Horizonte and La Plata are the exception.

During the 1940s, the urbanisation process that has so deeply affected the region became visible in most of the countries, the topic of the next section.

3.2. Urbanisation and urban concentration in Latin America

The processes of urbanisation and the concentration of population in certain spaces are two relevant inter-related factors to explain the evolution of urban systems and the cities within them. In both regards, the dimensions that these spatial processes have acquired in the Latin American context are worth to pay special attention to them. The Latin American region is the most rapidly urbanised region of the globe and at the same time where the highest percentage of people concentrates in large cities. This section deals with the main views about these concepts and their particular course of action in the Latin American territory.

Despite the long history of cities they were isolated phenomena for thousands of years as most of humankind continued living from agricultural activities. The emergence of international trade and the reinforcement of the power of the state between 1500 and 1700 led to the visible growth of ports and capital cities, respectively, but it was the industrial revolution that made cities expand substantially and become more complex, as industrial capitalism required the concentration of labour force and the means of production in the same place. Industrialisation generated a strong process of urbanisation, producing a real urban transition.

In 1900, 95 of the 140 cities with more than 200,000 inhabitants were located in Europe (Alonso-Villar, 2000). In the 20th century urbanisation rapidly extended to other parts of the world. Thanks to this, the 20th century has been identified as the century of the urban transition. While in 1900 only one in eight people lived in urban areas, 47% of the global population was living in urban areas at the end of the century (United Nations, 2002). It is expected that in 2007 the proportion of the world's population living in cities will exceed 50%.

a) The urbanisation process in Latin America

Latin America has currently a rather small, but highly urbanised population if we compare it to other regions of the world. It shows levels of urbanisation that resemble those of the advanced economies, with an average rate of urban population of 75.8 % during 2001. In the same year, in the more developed countries the average proportion of the population living in urban areas was 75.5 %, while in the less developed countries it reached 40.9 % (United Nations, 2002). Latin America is currently the second most urbanised region of the globe, only after North America. Its rate of migration to cities has been astonishing, especially since 1945. Whereas

in 1925, 75% of Latin Americans lived in the countryside, this proportion has reversed and currently 75.8% of its people live in urban places.

A slowdown in the growth rate of urban population has become visible since the 1970s, as the natural growth rate has declined and migration from the countryside has gradually decreased. In 2001, the average annual growth rate of the Latin American urban population was 1.56%. The tendency to decrease will continue during the coming years. By 2025, 85% of the population of Latin America is expected to be urban (United Nations, 2002). The region's rural population has remained almost the same in absolute numbers since the 1970s.

Although most countries transformed during the last 50 years, from rural to predominantly urban societies, there are evident disparities between countries and regions. The Caribbean and Central American countries are those with the lowest urbanisation levels, 63.4% and 68.5% respectively, but still higher than the world average. South America, with an average of 80.1% of urban population is not evenly urbanised, the coastal regions being the ones with the highest rates. Regions as the Argentinean North-East, the Andean plateaus and the Amazon still show lower levels of urbanisation.

The disparities in urbanisation levels are not only spatial, but also temporal, as the Latin American countries find themselves in different stages of the urbanisation process (see Table 3.3). There is a negative correlation between urbanisation level and total annual population growth, as observed in Figure 3.5. The countries of advanced urbanisation (with over 80% of urban population) are the ones with the lowest growth rates, as they have finished their demographic transition. The mid-way urbanisation countries show decreasing growth rates, close to demographic stability. The countries with the largest population find themselves in these two higher stages, which account for 86% of the population of Latin America. The early urbanisation countries belong to the fastest growing group, over 3% during the 1990s, and somewhat less during 1995-2000. The exception in this group is Panama, with lower than average growth rates. Finally, the only country with an incipient urbanisation (less than 50%) is Guatemala.

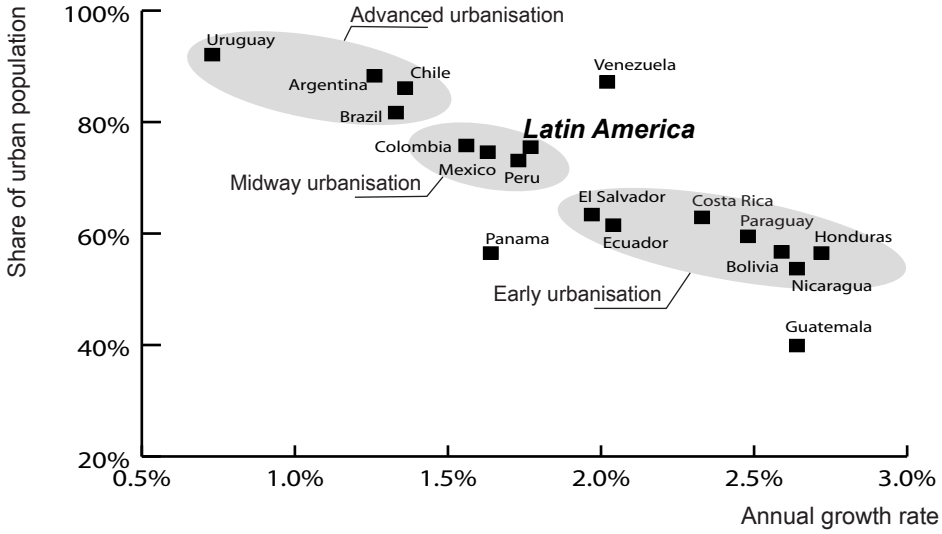


Figure 3.5. Growth rate versus percentage of urban population (Own elaboration with data from United Nations, 2002).

	Total population (in thousands)	Percentage of urban population	Rate of growth 1995-2000
Advanced urbanisation (+80%)			
Uruguay	3 610	92.1 %	0.73 %
Argentina	37 488	88.3 %	1.26 %
Venezuela	24 632	87.2 %	2.02 %
Chile	15 402	86.1 %	1.36 %
Brazil	172 559	81.7 %	1.33 %
Midway urbanisation (80% -70%)			
Colombia	42 803	75.5 %	1.77 %
Mexico	100 368	74.6 %	1.63 %
Peru	26 093	73,1 %	1.73 %
Early urbanisation (50%-70%)			
Ecuador	12 880	63.4 %	1.97 %
Bolivia	8 516	62.9 %	2.33 %
El Salvador	6 400	61.5 %	2.04 %
Costa Rica	4 112	59.5 %	2.48 %
Paraguay	5 636	56.7 %	2.59 %
Nicaragua	5 208	56.5 %	2.72 %
Panama	2 899	56.5 %	1.64 %
Honduras	6 575	53.7 %	2.64 %
Incipient urbanisation (- 50%)			
Guatemala	11 687	39.9 %	2.64 %

Table 3.3. Urbanisation stages in countries of Latin America, in 2001 (Data source: United Nations, 2002).

b) Main views on urbanisation

The urbanisation of Latin America has developed at a very high speed and triggered abundant academic interest in the topic. The dominant debates have evolved around the causes and effects of rapid urbanisation and its relationship with industrialisation. There are, indeed, many links between the urbanisation and industrialisation processes. It is evident that the most urbanised countries tend to be more industrially and economically developed. However, as Gugler (1997) points out, this high correlation does not establish the direction of causality: do countries develop after urbanising or do they urbanise after they develop? The different views on urbanisation give different answers to this question.

During the rise of early industrial capitalism, urbanisation was more a process of attraction of the city (pull factors) for the jobs offered by the new industries. However, until around the 1940s this process was only observed in those industrialised regions or in process to industrialisation. Suddenly, the pace of growth of cities began to increase by unforeseen rates in other regions than the industrialised ones. The main reason for this sudden acceleration of urbanisation was the beginning of a process of demographic transition in developing countries, characterised by explosive growth rates. [3]

Migration processes are now explained in terms of push (expulsion) and pull (attraction) factors. They both encompass a combination of individual decision-making processes, which are framed in the macro structural forces that influence that decision, even if individual migrants cannot grasp these influences in their immediate situation. Since the demographic transition process began to affect the developing world, the push factors seem to be more useful in explaining the causes of rural-urban migration rather than the attraction of the city. Rural groups have been forced to migrate to the cities seeking means of survival, as the countryside has

not been able to provide for the population surplus resulting from the higher growth rates. Migrants have appropriately assessed that life in the city offers them more hope for a better future than staying in the countryside, were opportunities are scarce. Pull factors cannot be considered as irrelevant to explain the growth of cities, but they are more useful in explaining urban concentration in certain cities.

According to the modernisation theory, the transformation from rural to urban societies is equivalent to the natural transition from traditional to modern ways of production and orientation of individuals and institutions. The city becomes the modern ideal, the place of progress. In fashion during the post-war era, this theory alleged that industrial employment attracted people to cities, which in turn expanded modern industry and promoted economic growth. Therefore, urbanisation was good because large-scale migration to urban areas is a pre-requisite for a modern industrial society.

So after some decades of rapid urbanisation, and its visible effects in cities, modernisation arguments lost appeal and the counterarguments to this theory gained acceptance. The 'urban bias' approach argued that poor countries stay poor in terms of favourable resource allocation to cities, and especially capital cities. According to this approach this disparity ultimately results in a reduction of economic growth and growth of inequities (Bradshaw and Noonan, 1997). Urbanisation is, in this view, promoting under-development.

Latin American-born dependency theory is also concerned with urbanisation levels, urban primacy and cities. This historical structural approach asserts that the policies and decisions taken in the powerful countries of the 'First World' have great impact in the development of the dependent countries of the 'Third World'. Denying a functional relationship between urbanisation and development, they propose the concept of 'over-urbanisation' to better explain urbanisation in dependent countries (Gugler, 1997). Over-urbanisation measures whether countries are too urbanised relative to their level of development. At present the concept of over-urbanisation is out of fashion; the new dependency arguments focus on the global debt crisis postulating that foreign debt and IMF pressures increase the negative aspects of urbanisation and retard economic growth (Bradshaw and Noonan, 1997).

Bradshaw and Noonan (1997) have tested the relative merits of each theory, presenting a theoretical and empirical reassessment analysing a country's urbanisation and economic growth against economic, demographic, education and dependency variables sustaining these three main theories. The data used in the study refers to 57 poor and middle-income countries between 1970 and 1992. Their results show that the debt crisis and IMF pressure have had a strong positive impact on over-urbanisation. Economic growth is best explained by dependency and urban bias arguments and it becomes clear that not only one, but differing theories must be used to provide a complete explanation of the causes and effects of the urbanisation process in developing countries.

The approach held in this research regarding urbanisation combines different elements of these views. Cities are viewed as strategic places of progress and innovation, not only in the economic sense, and therefore, places of attraction. Additionally, as urbanisation is viewed as a multi-dimensional process, a historic approach that takes into account the structural forces political-economic acting in society becomes unavoidable to provide properly the main elements of the evolution of the Latin American cities.

c) Spatial concentration and its main causes

The singular process of urbanisation in Latin America has been accompanied by the concentration of the growth in specific areas, which has produced the rise of large cities and mega-cities. [4]

A simple observation of the Latin American system of cities (see Figure 3.6) helps to visualise the coastal location of the largest cities and the enormous weight of primate and large cities, unseen in other areas of the world. If these trends were already visible in the urban system of 1900 (Figure 3.2), the urbanisation and concentration processes during the 20th century have confirmed and reinforced them.

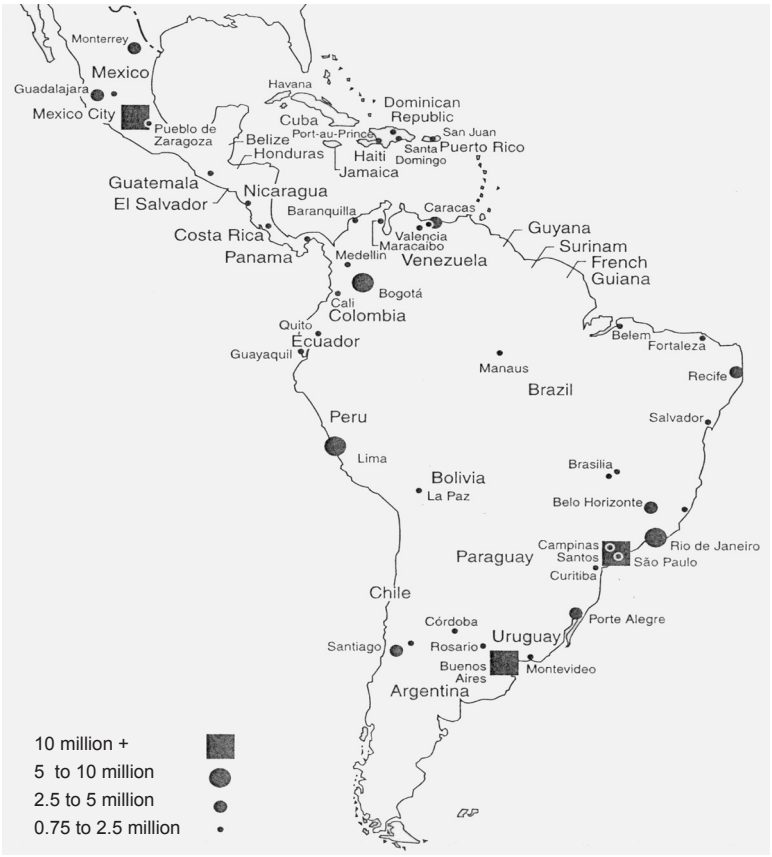


Figure 3.6. The Latin American urban system in 1990 (Source: Gilbert, 1994).

Ades and Glaeser's (1995) study on urban giants showed that countries in the Latin American region have main cities that are 40% larger than those of other world regions. Latin America accounted in 2001 with two cities of more than 18 million inhabitants (São Paulo and Mexico City) and five mega cities of more than eight million. 49 Latin American cities had more than a million inhabitants at the turn of the century, which housed 43% of its urban population (ECLAC, 2000), confirming the preference of Latin Americans to concentrate in large cities.

Concentration is an important topic in the spatial disciplines and, therefore, there is an extended literature that addresses the reasons that explain spatial concentration in large cities. The capitalist system's spatial dynamics favours central locations because far away locations imply higher costs to overcome distance constraints. In developing countries central locations seem to have even more advantages due to the existing infrastructural shortages and higher costs of transportation. Gilbert (1982) divides the causes of concentration into two main categories: those linked to an economic organisation with a strong export orientation, and those associated

with the inward-oriented industrialisation. In other words, trade and industrial activities are accounted for the concentration in cities. However, political matters also influence concentration and for some scholars for a large part.

Throughout history, trade has been the traditional activity promoting urban growth. In the Third World, it was the growth of international trade which promoted the growth of the first large and primate cities, generally port cities. These generally controlled the flow of exports, the revenues from these exports and the import of goods financed by the export flows. The critical factor in the domination of the primate cities over the provincial cities was, however, the control over the revenues of international trade by the state bureaucracy and private interests (Gilbert, 1982). In some countries, this has lead to the development of more than one city, as for example in Brazil. In Colombia, the lack of a dominant port led to the development of four competitive cities.

There are other trade-related variables that have been linked to concentration in cities, which are not export, but inward oriented. When there is protectionism for domestic industries, prices are lower in the central city because firms are located there. Workers come then to the city to pay lower prices for domestic goods. This protectionism-related concentration has been suggested in the growth of Mexico City (Ades and Glaeser, 1995), but may be also be valid for other Latin American capital cities, which had protectionist policies during their period of industrial expansion. [5]

The analysis of Alonso-Villar (2000) suggests that large metropolises in the Third world are not only the result of protective trade policies, but also the consequence of the relative position of a country, in terms of industrialisation, with respect to the rest of the world. Industrialisation has indeed more straightforward consequences for the concentration of people than trade. Industrial development has occurred more rapidly in the largest cities and at the same time encouraged urban primacy and concentration. Because of this, concentration can be viewed as both cause and effect of industrialisation. This self-reinforcing process of agglomeration occurs because, on the one hand, the best location for a firm is the one with easy access to its market. On the other hand, the best location for workers is the one with easy access to goods.

São Paulo and Mexico City are good examples of the presence of this self-reinforcing economic process in the formation of giant cities. Inspired by the case of Mexico, Krugman and Livas (1999) explain the existence of giant cities as a consequence of the strong forward and backward linkages that arise when manufacturing tries to serve a small domestic market. Their model implies that these linkages are much weaker when the economy is open to international trade. This suggests that the giant Third World metropolis is an unintended by-product of import-substitution policies, and will tend to shrink as developing countries liberalise.

Recent research in the field has been useful for understanding how the balance between agglomeration and dispersion forces relates to microeconomic conditions. Both self-agglomeration trends and the hub-effect of transport nodes[6] contribute to concentration in large cities. Therefore, large cities and port cities are more attractive to firms. When industrial growth is limited, as it is the case in Latin America, the location of the government can be considered as a main source of urban concentration too. This is because spatial proximity to power increases political influence, so firms prefer to locate near the government. [7] The cities which concentrate a large market, a port and the seat of the government are then the most attractive for economic activities.

These explanations, however, are exclusively linked to the political economy and underestimate socio-cultural factors. The fact that large cities are the locations which concentrate educational, cultural, health, communication and recreational facilities is also a good reason to migrate to them. Most newcomers do not find a formal job in the city but they get access to services that

were not accessible in their home town. Another common reason to migrate to the large cities in Latin America has been to escape from political violence in the place of origin. Finally, an important drive toward urban concentration comes from the generalised vision of the city as a place of modernity and progress.

According to the periodisation of the Latin American urban system, three successive attraction factors explaining concentration in large cities can be identified:

- An initial concentration in cities that were seat of political power during the colonial rule, as in Lima, Mexico City and Salvador (later replaced by Rio de Janeiro);

- After independence, a phase of city growth linked to international trade. São Paulo grew on the basis of coffee trade, Buenos Aires on mutton, wool and cereals (Gilbert, 1982). Buenos Aires grew during a period of heavy trade expansion, when the city was a world centre for international movements of goods and capital, and immigration;

- Industry-related growth, during the post-war import-substitution period, coinciding with the demographic explosion.

Along these successive stages, the traditional urban primacy[8] of most of the capital cities has acquired new dimensions. However, it is important to note that not all countries have a high primacy rate. The ones that have historically enjoyed a more balanced urban system (Brazil, Mexico, Colombia, Bolivia and Ecuador) share a common feature: the capital cities do not coincide with the port city. The location of the main port(s) and the appropriation of their revenues seem of essential importance to explain urban primacy in Latin America. In Brazil most of the large cities are located on the coastline of its vast territory, which favoured competition among them. Location near the sea seems to have promoted the growth of cities as Barranquilla and Cali[9] in Colombia, and Guayaquil in Ecuador.

d) Evolution of the large metropolises

Even if the statistical figures show a more or less continuous growth in most of the metropolises, a more precise view shows that their development has not been all the same (see Table 3.4). Different economic, political, demographic and sometimes environmental circumstances have accelerated or slowed down their growth during different periods. For this reason the hierarchy of metropolises has completely changed since the 1940s. The initial dominance of Buenos Aires and Rio de Janeiro has been largely surpassed by Mexico City and São Paulo. Lima and Bogotá have both surpassed Santiago. Caracas is now much smaller than other Brazilian and Mexican secondary cities. Giant cities have decreased their growth: between 1970 and 1990, São Paulo growth rates were approximately cut by half, Rio de Janeiro by two thirds and Mexico City by three quarters (Tolosa, 1998). Across the region, migration rates have been very low and even negative in the cities of more than five million inhabitants during the 1990s (ECLAC, 2000).

Figure 3.7 illustrates graphically the spectacular growth of the metropolises since the mid 1950s. The reason for such growth was the massive arrival of millions of people looking for a better future in the city. These were partly expelled from their rural territories and partly attracted by the metropolises, where the import-substitution industrialisation period was in full swing. At the same time the figure shows the slow down of growth since the 1980s, the so-called lost decade for Latin America, characterised by a strong economic crisis. Since that period, the large cities are growing more by their own natural growth than by migration.

Population (in thousands)	1950	1960	1970	1980	1990	2000
Bogotá	647	1.682	2.892	4.122	4.851	6.400
Caracas	683	1.346	2.174	2.641	2.989	2.300
Lima	1.025	1.845	3.302	4.608	6.422	7.500
Santiago	1.509	2.133	2.871	3.937	4.676	6.100
São Paulo	2.333	4.005	7.866	12.183	15.183	18.000
Rio de Janeiro	2.885	4.392	6.685	8.619	9.600	10.700
Mexico City	3.145	5.173	8.900	13.811	15.047	18.100
Buenos Aires	4.622	6.739	8.314	9.723	10.886	12.000

Table 3.4. Latin America's largest cities: evolution 1950-2000 (Own elaboration with data from Villa and Rodriguez, 1996; United Nations, 2002).

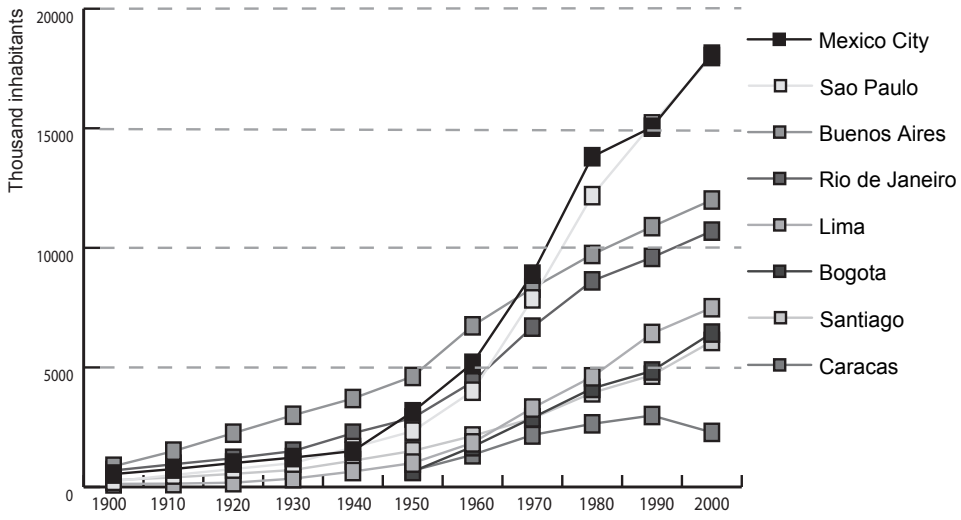


Figure 3.7. The growth of the largest Latin American metropolises during the 20th century. (Own elaboration with data from Villa and Rodriguez, 1996; United Nations, 2002).

With the urbanisation process now at mature stage in the region, most nations have been diversifying their urban systems since the 1980s. These equilibrating trends, more pronounced in the countries of advanced and mid-way urbanisation, mark a sharp contrast with the population concentration in primate cities, which was dominant in the previous stages. Figure 3.8 shows the changes in the distribution of the urban population in Latin America during the last 50 years, per decades. It shows the relative weight acquired by the cities between one and five million inhabitants since the 1980s, and the somewhat lesser weight of those with more than five million since the 1970s. This is expected to decrease even more in the coming years (Arriagada, 2000).

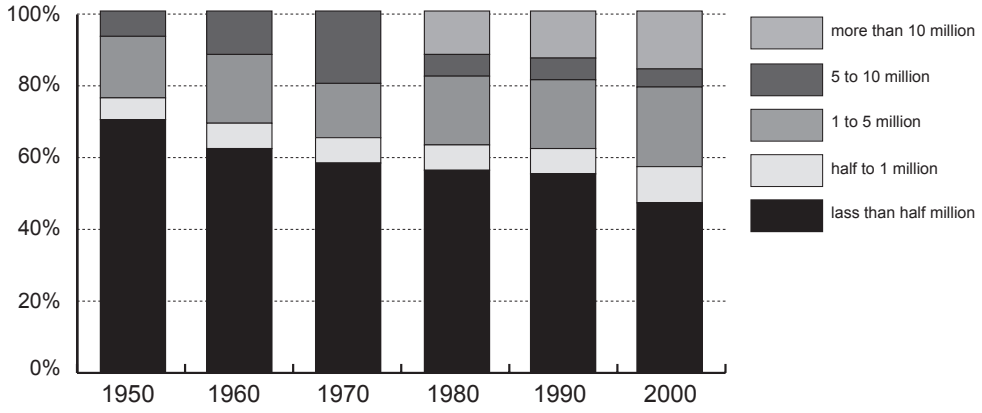


Figure 3.8. Distribution of urban population in Latin America by city size (Source: Arriagada, 2000).

Due to the size of their population and local economies, some observers point out that the Latin American cities of more than five million inhabitants have become global cities (ECLAC, 2000). However, this is a too simplistic vision. It is not the size of the population or the economy but the integration of the local economies into the global economy which counts for a city to become 'global'. According to economic considerations, global cities are the ones that house head offices of multinational corporations and financial services firms, those which are linked to the circulation and production of capital flows. Some refer to them as the sites of 'control functions' of major multinational enterprises.

There are different views about the global character of Latin American metropolises. According to John Friedman, in the Latin American region, only São Paulo can be considered a world city, while Rio de Janeiro, Buenos Aires, Mexico City and Caracas are regarded as secondary world cities, with the same rank as Johannesburg, Hong Kong, Taipei, Manila, Bangkok and Seoul (Tolosa, 1998, citing Friedman, 1986).

3.3. Spatial structure of the Latin American metropolises

After describing the effects of the rapid urbanisation and urban concentration on the size and relative position of the Latin American metropolises, this section addresses the effects of these transformations on the internal spatial structure of the metropolises. Yujnovsky (1992) has remarked that this topic has attracted less attention than urbanisation-related issues in Latin America. There is an abundance of local studies referring to urban 'marginality', informal housing, self-construction and urban social movements in the Latin American cities, but local studies do not generally deal with the urban structure taken as a whole. Most of these studies have considered the city as the background, the container of social and economic processes and not as an object of study. This is partly explained because the point of departure of such studies mainly comes from disciplines as urban sociology and anthropology and in much lesser extent by spatially oriented disciplines as urban geography or urban planning.

Three main models have been formulated to represent the internal structure of the (industrial) city: the concentric model (Park and Burgess in 1929), residential sector model (Hoyt in 1939) and the multiple nuclei model (Harris and Ullman in 1945). Although these models are considered of declining relevance since the general dissatisfaction with the rational comprehensive model of planning, geographers have advanced models that would represent the typical Latin American

city (Van Lindert and Verkoren, 1994; Bosdorff, 2002; Janoschka, 2002). They basically combine the concentric model of the classic colonial city with the sectoral axe-oriented developments of the North American type of cities. However, cities are not easily represented in models. This is particularly true for the Latin American city, due to the great diversity of situations in which they find themselves. Secondly, the Latin American cities have generally maintained a great deal of multifunctionality that has not represented in the proposed models (van Lindert and Verkoren, 1994). Furthermore, the elements of these models do not represent accurately the elements of the rapidly changing Latin American city.

The internal spatial structure of a city is defined by the set of activities that take place in the city, their spatial dimensions and distribution in geographic space, as well as the connections between them. Its development is linked to the allocation of the available land and the allocation of resources among the different activities and groups. This allocation process is determined by the type of economic organisation, the local and national policies and regulations and the thousands of individual and institutional decisions that have an effect on urban space in a certain city, obviously framed within the social and political 'rules of the game' of each society (Yujnovsky, 1975). As these processes are essentially dynamic, their study demands an approach that takes into account the different stages in their evolution, in which the influences of regional, national and global scale developments become relevant too.

Four characteristic phases of the internal spatial structure of the Latin American cities can be distinguished:

- The traditional compact city during the colonial and early republican times;
- complemented by the axe-oriented suburban expansions since the late XIX up to the mid-XX century;
- which extended itself further with the growth of spontaneous settlements since the mid 1950s; and
- the decentralisation and recent emergence of 'islands of wealth' and the fragmentation of urban space since the mid 1980s.

a) Suburbanisation as the new way of production of urban space

The expansion of the capitalist system in Latin America, originally linked to European (mostly British) capital, during the late XIX century introduced new export-oriented features in the economy, which eventually had a tremendous influence in the development of both the largest and port cities. The size and prosperity of the major cities was related to the revenues created by the export related activities. The extraordinary population growth that this brought about in the largest cities, accompanied by the availability of money for public works, finally produced the disintegration of the classic colonial model and the gradual expansion and modernisation of the large cities. The emergence of a central business area (CBD) of offices and small industrial companies became visible, originally in the cities of the Atlantic coast, Buenos Aires, Montevideo, Rosario and Santa Fe. Just before the turn of the century they were also observed in Santiago, Lima and Mexico City. Soon after, this process also affected Bogotá, Caracas, Cordoba, Monterrey and other large cities in process of industrialisation. However, these changes affected mostly the largest cities, so most other Latin American cities maintained their traditional character and compact structure (van Lindert and Verkoren, 1994).

As the congestion in the centre increased the largest cities expanded in new and unseen ways, along the major road and tram lines, although there were still few cars. New residential areas for higher income groups appeared in the periphery of the traditional city for the first time. Haussmann's urban renovation of Paris influenced greatly this first wave of expansion. New

institutional buildings, extended parks with pavilions and statues, and boulevards and diagonals were built linking the centre with the new peripheral areas. The gradual introduction of North American capital and the expansion of the capitalist system in the large cities also played an important role in changing their face. New techniques in building technology were introduced to build with iron and concrete. Some years later the elevator and water pumps made possible the construction and (eventually) the proliferation of high buildings - first for office purposes and then apartment buildings. The new building typology was no longer the house with patios, but 19th century French architecture, which completely altered the traditional urban image.

Some years after the new residential quaters for the elite were located in the periphery. Some of these were country or seaside villages inhabited during the summer months, which became permanent residential areas. This was possible because trams, roads and/or suburban railways networks were deployed to connect these areas. Buenos Aires even deployed an underground network in 1913. In this way Belgrano and Flores in Buenos Aires; Miraflores in Lima; and Copacabana in Rio de Janeiro became the new neighbourhoods for the local bourgeoisie. Figure 3.9 shows Lima with its three railway lines towards the port, Magdalena and Miraflores in 1908 (the dark zones are the built areas).

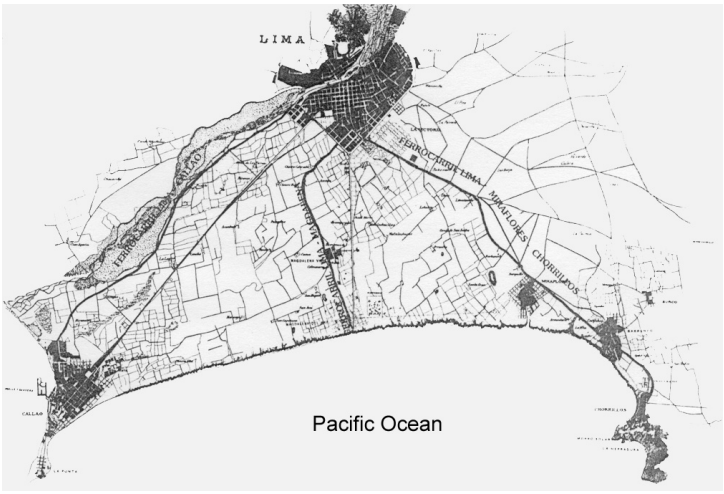


Figure 3.9. Map of Lima extending itself towards the South and the sea in 1908 (Source: Driant, 1991).

The main housing typology in these new residential quarters was the one-family house, the '*chalet*', with green areas around it. As there were no mechanisms for controlling the expansion, the process developed mostly around the land speculation of landowners, land dealers and (generally) foreign railway or tram network companies. As the rich moved gradually to the outskirts, the lower-income groups re-positioned in the city and moved into the generally deteriorated colonial houses with patios that were left behind, which were rapidly transformed into collective dwellings. [10]

Both the depth and timing of this initial process of suburbanisation was not homogeneous in all large cities. The cities of early urbanisation (Buenos Aires, Montevideo and Santiago) experienced a process of suburbanisation earlier than the rest. In them, a more European type of architecture and urban development was observed, characterised by more compact and multi-functional city. In the rest of the cities, which developed later, the North American influence was more marked and produced more radical changes.

b) Rapid and 'spontaneous' urbanisation and as main way of growth

Social and economic background

Apart from the countries of the Southern Cone (Argentina, Uruguay and Chile), whose industrialisation process was established early and a considerable variety of industries had already developed by 1940, Latin America's economy was, at that time, predominantly agricultural, with high numbers of peasant population and weakly developed internal markets. Great changes in the world economy after 1945 would completely alter this situation. Most countries of the region engaged in a process of import-substitution industrialisation, at the hands of the national bourgeoisie and foreign (mainly US) enterprises. This triggered a period of high economic growth that persisted up to 1973, on average. The most favoured spaces during this expansion period where precisely the largest cities, as the newly established industries preferred locations which were close to their largest markets. Capital cities also prospered from the wide expansion of the public bureaucracy that was necessary to operate the new development model (Gilbert, 1996b).

The combined effects of the industrialisation process with the arrival of rural migrants to the large cities gradually transformed the Latin America society. As government, commerce and industrial employment grew, the middle class and the formal sector expanded greatly, representing more than 50% of the population in the South Cone countries. Most countries became urban and consumer-oriented societies, while few of them made real efforts to redistribute income.

But - industrial growth had its limits. Undoubtedly, the newcomers were attracted to the cities by the possibility of getting a job in industry, but the amount of industrial jobs was not high enough to provide employment to the large numbers of job seekers, most of them with limited education and skills. The modern factories provided little employment and the industrial expansion was, in turn, greatly conditioned by the size of the internal market. [11] Mass production was not possible in many sectors as great part of the population could only afford the cheapest industrial products. Only high- and middle-income households could acquire the more durable products.

Changes in the urban structure

In this context of fast economic and demographic growth combined with socio-economic inequality, the built environment was increasingly produced by a mixture of formal and informal processes. This situation occurred because land (and housing) access in Latin American cities differ for the wealthy and the poor (ECLAC, 2000). While the wealthy can afford legal and secure lands with the appropriate infrastructure to build their dwellings and neighbourhoods, the poor have to resort to survival and informal strategies to get a place in the city.

The stages of the process of occupation of urban land by the poor, which have produced the informal side of the Latin American cities, are well documented in the urban literature. From an initial central location in generally dangerous and residual areas in industrial zones or riverbanks, the migration streams to the cities reached momentum and peripheral land take-overs or silent 'pirate' developments began from the mid- 1950s, sometimes in massive dimensions. In some cases, the poor bought cheap land from illegal land developers. Spontaneous neighbourhoods soon emerged in these locations. Since the complete occupation of the closest peripheral areas at the 1970s, the urban poor have resorted to two main strategies: to occupy the deep slopes or land reserved for urban facilities inside the older spontaneous neighbourhoods, or to continue extending the urban boundaries in different informal ways.

Obviously, this process did not have a homogeneous character, due to the different factors involved at local level. The dimension of the migration streams, the availability of land, the capacity of industries to provide jobs for the newcomers, the 'rules of the game' among socio-

economic sectors and the attitude of the states in face of the land take-overs, the national economic circumstances and even local climatic conditions have been the factors to shape the size, location and development of the spontaneous neighbourhoods. In general terms, the cities of advanced urbanisation and industrialisation (Buenos Aires, Montevideo, Santiago), developed fewer informal neighbourhoods than the cities that developed later such as São Paulo, Rio de Janeiro, Mexico City, Lima, Bogotá and Caracas, which have higher percentages. It is precisely in these cities were the informal areas have become important elements of the urban structure of the city. Table 3.5 shows the approximate situation in some large cities in 2000. [12]

City	Percentage of informal neighbourhoods
Bogotá	59%
Buenos Aires	10%
Caracas	50%
Lima	40%
Mexico City	40%
Quito	50%
Rio de Janeiro	20% (only in *favelas*)
São Paulo	22% (only in *favelas*)[13]

Table 3.5. Percentage of population living in informal neighbourhoods in selected cities of Latin America (Source: Clichevsky, 2000).

During the same period, the formal side of the city continued developing along the most important avenues connecting the city centre to the most favoured areas, the ones with the better environmental conditions, consolidating the initial developments of the previous period. Higher-income neighbourhoods in Latin America have traditionally located close to commercial areas, providing their residents with accessibility to high-level urban facilities and centrality, two important requirements for Latin Americans (van Lindert and Verkoren, 1994).

While the rich neighbourhoods were provided with all the standard facilities and urban services, their dwellings gradually mirrored the North American one-family houses, with front and back gardens, garages, several bathrooms and modern home appliances. This trend was not only visible in the more affluent, but also in the middle class neighbourhoods, albeit in a more modest manner. The American way-of-life had become the ideal of high and middle-classes. [14]

The location of these privileged spaces differed from city to city. In Buenos Aires and Bogotá, these were the districts of the north; in Lima and São Paulo the south-west areas; in Santiago the north-east. However, Caracas and Rio de Janeiro developed less segregated residential developments than flat cities. This was because the land considered unsuitable for formal-sector construction because it was too steep, was later occupied by informal settlers, producing a mixture of *barrios* and *favelas* with the formal neighbourhoods (Gilbert, 1996b).

New industries generally located in peripheral zones, near port areas, in discontinued zones, or along the railway or major route networks. The central business districts (CBDs) also expanded themselves greatly, generally along the main avenues connecting to the centre, the so-called commercial axes, although some of them remained in or close to the city centre. In contrast with the North American cities, the Latin American CBDs resisted in more or less extent to the specialisation and maintained their multi-functional character (van Lindert and Verkoren, 1994).

The cities which most flourished during this period were Caracas, Mexico City and São Paulo, due to oil revenues in the first two cities, and the presence of a large industrial sector in the last (Gilbert, 1990). Given the spectacular population growth, all Latin American major cities developed reasonably well during the import-substitution period (approximately 1945-1975), taking into account housing quality indicators (as overcrowding and space per person) and, especially servicing conditions, which clearly improved until 1980 (Gilbert, 1996b). The extension of the cities brought serious common problems too, as transport, which in turn increased traffic congestion and pollution. At the end of this period, the large cities had become more extended and surrounded by vast informal settlements. The informal way had become a major way of production of urban space.

3.4. Metropolitan transformations since the 1980s

Since the 1980s radical transformations have characterised the Latin American urban scene. The most important was the implementation of a new model of organisation of the economy. This process has produced major shifts at the economic, political and social scenes, which in turn produced radical transformations in the cities' structure and functioning. To understand the nature and scope of the socio-spatial changes I describe first the main transformations in the economic, political, social and demographic scenes.

a) Changes in the urban context

In the economic scene: crises, instability and inequality

Signs of the economic crisis that struck the region in the 1980s were gradually evident during the 1970s: failures of the import substitution model; chronic inflation in most countries; and heavy external indebtedness, which was requested to cover the national deficits to continue with the inwards oriented industrialisation model. The deepening of the crisis during the 1980s brought about very low or negative economic growth, soaring external debts[15], a high macro-economic instability and fiscal crisis, accompanied by huge distortions in resource allocations. The IMF and the World Bank forced governments to change the economic model and to adopt the Structural Adjustment Policies (SAPs). The adjustment policies prescribed involved radical public-spending cutbacks, reduction of public sector, privatisation, deregulation and liberalisation of trade and finance. Table 3.6 shows the depth of the changes in the main five sectors of reforms in Latin America's large countries during this period.

Number of major reforms	Country	Fiscal reform	Trade reform	Financial market reform	Labour reform	Privatisation of public utilities
Five	Argentina	Major	Major	Major	Major	Major
	Chile	Major	Major	Major	Major	Major
Four	Mexico	Major	Major	Major	Some	Major
	Peru	None	Major	Major	Major	Major
Three	Colombia	Major	Major	Some	Some	Major
	Bolivia	Major	Major	Some	Some	Major
Two	Brazil	None	Some	Major	Some	Major

Table 3.6. Structural reforms in Latin American countries (Source: Ferrufino, 1999).

As expenses in several key social sectors were cut, the new policies had drastic social effects in both middle and low-income sectors. At the end of the decade, the per capita GDP was lower than in 1980 and poverty had increased visibly. Hyperinflation threatened political stability. Besides, the gap between rich and poor increased enormously, and became more visible in

the large cities. Unemployment rose due to the reduction of the public sector and the loss of industrial employment. Highly unequal cities became even more unequal during the lost decade (Gilbert, 1996b) while others became increasingly polarised.

Along with the economic crisis, the openness of markets had dramatic consequences for the local manufacturers. The metropolises were affected by a process of de-industrialisation and tertiarisation of the economy. Entire sectors have been devastated due to their inability to compete with cheaper imported products. This has been more visible in the large cities, which had a stronger industrial production.

The beginning of the 1990s witnessed a period of economic recovery in most countries, as inflation was reduced and economic stability regained, but in their eagerness to increase their attraction of global capital markets, the large Latin American countries ran up new kinds of debts, which were invested in short-term assets and booming property markets. On the other hand, besides productive capital for serious investments, 'hot money'[16] flowed in, especially in Argentina and Brazil. Spectacular crashes have ensued in Mexico (1994 and 1995), Ecuador (1999), Brazil (1999) and Argentina (2001). Figure 3.10 illustrates the zig-zagging growth of the Latin American (and the Caribbean) economy since the early 1980s, in terms of its Gross Domestic Product (GDP).

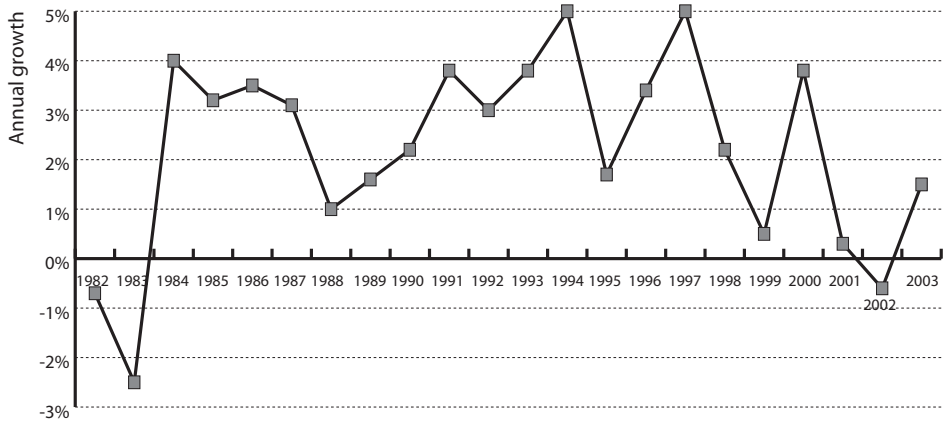


Figure 3.10. Percentage of change (from the previous year) of the GDP of Latin America and the Caribbean since 1982. (2003 is a forecast) (Source: World Bank, IMF).

As national and local governments tried to attract international firms, foreign investment increased and the largest cities began to be more connected to the global economy. Branches of multinationals and financial and information-handling firms as banks, insurance companies, lawyer firms, marketing, accountants, consultants, and ICT firms began their operations in the markets they found profitable. In this process Mexico City, Buenos Aires, São Paulo, Santiago and, to a lesser extent, Caracas, Lima and Bogotá experienced the most visible changes.

Furthermore, the openness of the national economies has made the Latin American economies more dependent than before on foreign capital, and more vulnerable to external crises. This, combined with national circumstances (political instability, natural disasters, oil crisis, etc.) has produced waves of recession in Peru, Colombia, Venezuela, Paraguay, Uruguay and, more dramatically, in Argentina. Even Chile, the 'model' economy of the region, had negative growth in 1999. In average, the 1990s' economic growth and income redistribution indicators were

both disappointing in the region (IADB, 2001). The Latin American cities exhibit the infamous distinction of being the world's region with the highest income inequality, with an average GINI coefficient of 0.47 (IABD, 2001). Figure 3.11 shows the evolution of income inequality in the region during the 1990s until 2001, and illustrates the impressive increase of Argentina's income inequality. Despite the region's heterogeneity, economic deceleration was generalised during 2001 and 2002, with Argentina's crisis as the most dramatic episode.

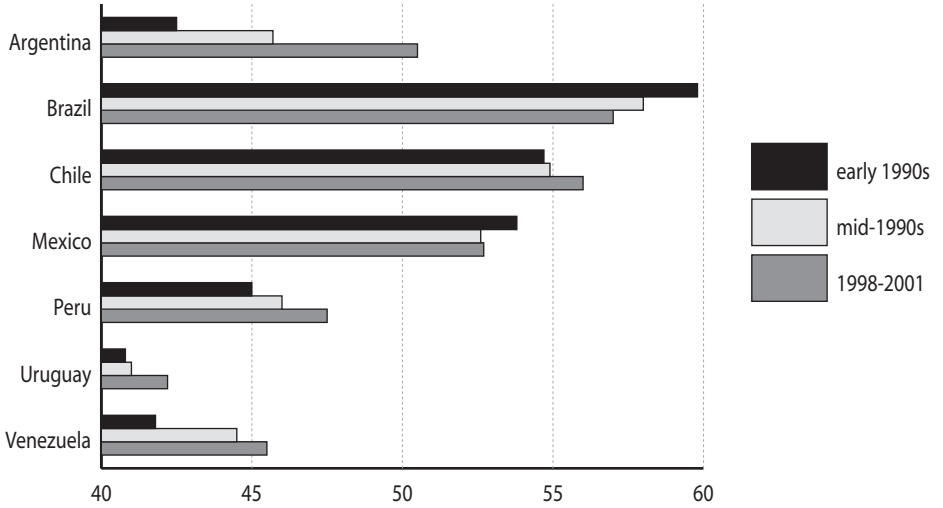


Figure 3.11. Evolution of income inequality in selected countries of Latin America (Source: The Economist, 2003b, with data from the World Bank).

In the political scene: further weakening of urban planning

At city level, these enormous economic changes have had great effects in the local political scene, which have made urban planning even less influential than it was before. The economic crises have meant fewer resources for the local governments, which was translated into lower levels of or no public investment, with the consequent deterioration of public spaces and urban functioning. Not less important, the privatisation of basic services has meant the decrease of public competence in urban management. In some cases the deep economic crisis led to the crisis of the local urban management and virtual abandonment of urban planning. In other cases, planning has focused on the implementation of large prestige projects, more addressed to position the city internationally than to make a city liveable for all its citizens.

On the other hand, the weakening of the local government has run parallel to increased presence of foreign private capital in key sectors of the city which were traditionally in the hands of local public and private enterprises. These mainly concern urban services (roads, telecommunications, water, electricity and gas infrastructures), real estate and construction (present in the 'shopping centres' and gated neighbourhoods businesses), retailing (large department stores, supermarkets and mega supermarkets), and transport (the privatisation of public transportation). In many cases, the telecommunication firms that bought the former public monopolies have become the largest firms of the respective nation.

The substantially modified urban 'rules of the game' have given free hand to enterprises to focus their businesses on the new type of demand of the elite, whose security concerns seem now to prevail over their traditional requirements of centrality and accessibility.

In the social scene: fragmentation and polarisation

In terms of employment the new context has implied the drastic restructuring of the urban employment markets. This includes the deterioration of industrial and public sector employment, and the accelerated growth of the informal sector in almost all countries and large cities. Furthermore, real salaries in the formal sector decreased in average between ten percent for industrial wages, up to thirty percent for public sector and minimal wages in the 1980s (Clichevsky, 2000).

The increase of relative and absolute poverty in the large cities[17] also had consequences in a increase of street prostitution, drug dealing and crime, especially property crime (IADB, 2000), which has had disturbing effects in urban life. Additionally, the feelings of insecurity in large cities have been increased by traffic congestion and public space occupation by street sellers in central areas and along the main commercial arteries.

As living conditions in the central quarters were getting worse, and crime and informality conquered additional urban spaces, the interactions and perceptions among the different urban groups began to alter. Social conflict has also been exacerbated by the emergence of a cosmopolitan elite with ostentatious consumerism and with different tastes and interests to the common citizen (Gilbert, 1997). Fear of crime and violence increased enormously, intensified by what Caldeira (2000) calls 'the talk of crime': the crime-related narratives that propagate fear of 'the other' among high and middle income groups. The general decrease in the quality of life became unacceptable for some groups who decided to escape from the city's increasing troubles.

Anthropologist Teresa Caldeira (2000) has elucidated how violence and fear intertwined with processes of social change and democratisation have developed into new forms of spatial segregation and social discrimination in São Paulo. [18] The circumstances that she describes in São Paulo have great similarities to processes acting in other Latin American metropolises, where contradictory trends towards democratisation and social polarisation collide. The most evident outcome of this process is the 'fortified enclave', exclusive walled areas for residence, work, consumption and leisure for the high and middle income sectors.

The decline of the middle class and growth of poverty as products of the difficult economic climate in the region has been accompanied by the rise of a small but powerful cosmopolitan professional class, linked to transnational corporations. Sassen (2001) has reported how in the global cities this new elite coexists with an army of low-skilled personnel (chauffeurs, nannies, cooks, maids, etc.) that helps the busy new professional class with their household tasks. This picture is, however, absolutely not new in the Latin American context, where elite and middle class groups have traditionally enjoyed cheap domestic help. While in the cities of the North they are generally (illegal) immigrants, in the case of the Latin American cities they are mostly newcomers or poor residents of the same city. It is not unusual that gated neighbourhoods have a *favela*, *barriada*, or *villa* in the immediate vicinity that provides with the low-paid workers.

The higher-income groups develop their life among 'modern' enclosed spaces, which reproduce the spatial features of the cities of the North, while the poor are also confined inside impoverished areas of the city. This social polarisation reaches extremes, as in São Paulo, where personal helicopters are used by the elite to escape from the congested highways and dangerous streets of the city (Graham and Marvin, 2001).

Direct contact between elite and poor groups has diminished, and is now mainly maintained due to the need of the elite for domestic services. The number of persons employed as domestic

or cleaning help, gardeners, and security and administration personnel sometimes outnumbers the number of residents of the private neighbourhoods (Coy and Pohler, 2002).

In the demographic scene: the troubles of the youth

The period of explosive urbanisation has already been passed in the large countries of the region, although the preference for an urban way of life has been confirmed. The prolonged economic crisis has resulted in the lessening of the attractiveness of the largest cities, the most deeply affected by the economic troubles. Migration rates have been very low in the large cities. Furthermore, the natural growth rates have decreased along with fertility rates, which became more equal across metropolitan areas. As a result of the demographic changes, the share of the population in the working age group has increased markedly (Villa and Rodriguez, 1996), but not the jobs.

It is getting increasingly difficult to find a job for young people of all sectors. It is now not enough to finish a university study to find a proper job. Recently graduated professionals are underemployed or exploited due to the large demand for employment. Post graduate and specialisation studies are indispensable to compete in the job market. People with higher resources are increasingly following post-graduate studies in the US and Europe to increase their chances to get well-paid jobs in the formal sector.

For the poor the situation is obviously much harder. The second of third generation of migrants is now urban and educated, but still cannot find an adequate place in the job market so their future opportunities are dim. Their exclusion from work has great effects in all other aspects of their life, increasing the gap between aspirations and real consumption.[19] Hopenhayn (2003:301) illustrates their troubles "*Urban youth from popular sectors suffers this gap with increased strength: they have, in average, three more years of education than their parents and therefore more potential productivity; they have socialised with the media cultural industry since they were children; but they experience three or four times higher unemployment than the older generations, they are stigmatised by the society as possible infractors, they do not achieve economic or housing autonomy and their expectations grow with the same intensity than their frustrations*".

Emigration (to the US and in lesser extent to Europe or other richer countries of the region) has been one of the main ways out to fight unemployment and the lack of economic opportunities, not only in low-income sectors, but also in the middle class. Surveys in different countries generally give worrying high percentages of the will to emigrate among youth. Latin American emigration to the US, especially from Mexico and Central America, continues in large proportions, despite the increased difficulties to get a visa and to cross the Mexican border. Latinos constitute now the largest minority group in the US, out-numbering African Americans. Intra-regional migration streams are also relevant, and tend to change according to the economic circumstances of the receiving countries. [20]

On the other hand, the lack of economic prospects of the youth has also resulted in processes of social or political violence.[21] Youth is more easily associated with violent attitudes and conduct than the rest of population groups, while, at the same time, it is the main victim of acts of violence. Additionally, the troubles of the youth have been also expressed in their retreat into blasé and individualistic attitudes, and a striking indifference toward political participation. Garcia Canclini (1995) has argued that the exercise of citizenship rights has been displaced from political participation to consumption practices, something which is especially valid for young people. The features of youth-related processes have been so perturbing that youth issues have become an important topic in the local social sciences during the 1990s.

b) Corresponding socio-spatial changes

All these economic, political, social and demographic processes, in combination with the introduction of information and communication technologies since the late 1990s, are undoubtedly producing spatial transformations in the city. New types of urban actors and social interactions among actors have emerged, while new centres and new types of locations of urban function have become visible. They have resulted in new ways of production of urban space and functioning of the city. The main changes refer to:

Privatisation of urban space

Recent urban growth in Latin American cities is characterised by fragmented developments, in what some call 'the late suburbanisation of the elite' (Pírez, 2000) or the emergence of 'fortified enclaves' (Caldeira, 2000) or 'islands of wealth' (Janoschka, 2002; Coy and Pohler, 2002). The privatisation of urban space concerns different elements of the structure of the city as:

1. Road and other infrastructural networks. The recent peripheral transformations common to the Latin American metropolises have been preceded by important private investments in road and telecommunications networks in the peripheries of the metropolises. A change in accessibility is the most important condition for a change in the functional structure. Changes in the mode of transport and changes in infrastructure generally precede changes in the functional structure (Jacobs, 2000).
2. Productive and industrial spaces, which have been increasingly localised at the periphery, in a process of industrial and office space deconcentration that is visible in the large metropolises (de Mattos, 2002).
3. Consumption spaces, linked to massive changes in consumption patterns of the elite and middle-income groups. Huge 'shoppings' (malls) have appeared in the periphery, with multiplex movies, discotheques and other recreational spaces. This also concerns exclusive bilingual schools, universities, clinics and even graveyards, which have flourished during the 1990s.
4. The rise of 'private neighbourhoods'. Examples of them can be observed in most of the large cities, although the intensity of the process varies. In Mexico City, São Paulo and Buenos Aires, they are an important way of urban growth. These consist of gated neighbourhoods with large detached houses, or apartment buildings of controlled access surrounded by green areas, swimming pools, gyms, shops, restaurants and other recreational, commercial, sportive (and sometimes educational and work) facilities. In some of the new developments, local municipalities are keeping out of the urban services (security, garbage collection, sewage installation, lighting and landscaping), which are financed by the owners. These can be considered as new 'extra-territorial spaces' of the cities (Coy and Pohler, 2002), developed to escape from the city's current troubles. Each city has coined its own term for these new developments[22] and different names for the different typologies. Their development has been so rampant in the 1990s that it has become a popular issue in recent urban literature[23].

Large urban projects and a new urban landscape

Urban marketing strategies have not been strange to the Latin American cities. In the new and highly competitive economic context, not only the local economic environments are being restructured to meet the needs of transnational corporations, but also cities are being restructured and modernised to meet the cultural and recreational demands of the new cosmopolitan elite. Large public-private projects have been undertaken aimed at increasing the attraction power of the cities at international level. This has produced flagship projects as the regeneration of riverbank areas, as in Puerto Madero in Buenos Aires, and Guayaquil; or the

renewal of downgraded colonial city centres, as in Lima or Mexico City. The recuperation of these central spaces has included changes of land use to uses related to office, entertainment and cultural functions for the global and local elites. In many cases this has triggered processes of gentrification, which have not produced the expected 'trickle down' effect (Clichevsky, 2000).

The urban landscape of the cities has also been transformed to meet the demand of the cosmopolitan elite, which likes to gather in exclusive malls and areas with luxurious residences and facilities that have been developed for them in the cities, as private schools, universities, recreational facilities, clinics, etc., and exclusive international boutiques. Another remarkable change is the presence of US American fast food chains, luxury hotels, multiplex cinemas, and other entertainment facilities which tend to locate along the infrastructure axes in suburban spaces. The CBDs have also experienced an upgrading, since the most successful (financial and telecommunication) firms have built new buildings or modernised them in the premium spaces of the city. Many of these new buildings have been designed by top international architectural firms as Cesar Pelli, Norman Foster, Frank Gehry, Santiago Calatrava, Hans Hollein, etc.

Morphological transformations

While the metropolises have expanded outwards, the population growth in central areas has slowed down. The populations of central Buenos Aires, Caracas, Lima and Mexico City have been in decline, while in Santiago the historic centre is depopulating. Only Rio de Janeiro and São Paulo have escaped to this trend as a result of new high-rise developments (Villa and Rodriguez, 1996). At the same time new and alternative centres of production and consumption have emerged in the metropolises. Some of them exhibit specialised functions as cultural and/or entertainment centres, commercial centres, or CBDs.

The tendency towards industrial deconcentration observed in most metropolises, has sometimes been encouraged by the state, as in Buenos Aires or Santiago (Villa and Rodriguez, 1996), but this trend affects mainly the manufacturing industries, and in São Paulo the high-technology park, but most other sectors have remained in the central areas.

Research on mobility in the largest cities (Mexico City, São Paulo and Buenos Aires) has proved the stagnation or the decrease in the number of trips per inhabitant, after more than 50 years of continuous increase (Navarro, 2000; citing Henry, 1999), although no reasons have been advanced for this significant change. It may confirm the significance of the peripheral developments as places of production and consumption, as well as the emergence of a polycentric urban structure.

At the same time, the old elite and middle-income quarters have been affected by strong changes of land use. In many cases these transformations have developed informally, as the reduction of incomes of middle income households forced them to rent street-front spaces of their dwellings for commercial purposes. In some cases, the local urban plans have tried to formalise the emerging trends and allowed mixed uses in broad avenues. In this way, the main connective avenues gradually have transformed into new commercial axes, with small shops, bank agencies and all kinds of formal and informal services, increasing traffic congestion along these axes.

On the other hand, the urban poor continue producing the 'other side' of the city by their own effort, neglected by urban plans and policies and by-passed by the recent socio-spatial trends. Their spaces are developing according to traditional 'survival' practices: precarious, gradual, small-scaled, informal and localised in the residual spaces of the city. The combination of these socio-spatial processes has resulted in an increasing spatial fragmentation, increased informalisation and urban congestion, and the decline of public space in inner city areas.

c) The Latin American metropolis of the early 21st century

Analysing the changes in Santiago de Chile, De Mattos (2001) has advanced an explanation of how the new of social and economic context brought about globalisation and restructuring processes have produced a set of transformations in the metropolitan area that result in the deepening of the trends towards a (seemingly limitless) suburbanisation process, the persistence of polarisation and segregation processes and the emergence of a set of urban facilities that accentuate the US Americanisation of the urban landscape. More recently, De Mattos (2002) highlights those changes related to the transition of the Latin American metropolises towards a new network-like type of organisation, in which private car ownership and the diffusion of ICTs play an important role for the emergence of new alternative centres of residence and employment. These characterisations are also useful to understand the nature and direction of the urban changes in other Latin American metropolises, which have evolved from a compact and single-centred city towards an open, diffused and polycentric urban form organized in networks (De Mattos, 2002).

Janoschka (2002) has proposed a new model for the Latin American city, based upon the latest spatial developments in Buenos Aires. He argues that the previous models were focused in the growth and position of informal settlements in the city and not so much in the changes produced by the elites. The demands of elites and middle class, however, have been the drivers of most of the recent changes under the form of urban islands ('islands of wealth'). Janoschka's model, shown in Figure 3.12, illustrates the whole array of new structural elements in the city under the background of the traditional structural zones. The new elements are not urban 'zones' but urban fragments, which he identifies as residential islands, productive islands, commercial islands and islands of decay, with the highways as connecting lines.

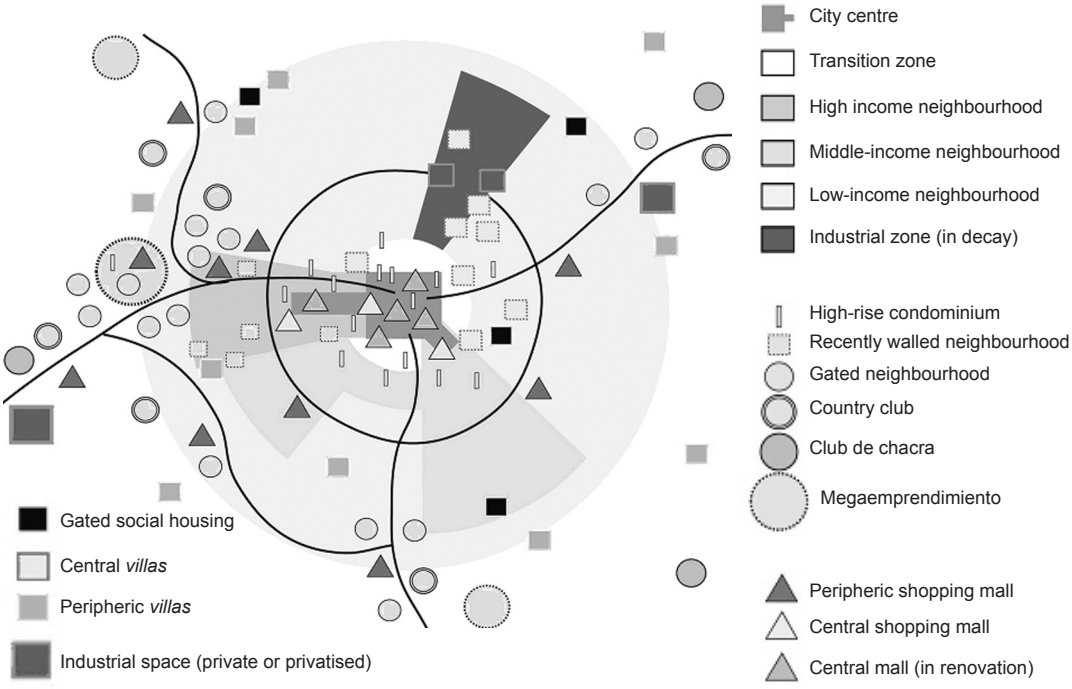


Figure 3.12. Janoschka's proposal for a new model of the Latin American city. (Source: Janoschka, 2002).

Janoschka's model, highly representative of the developments in Buenos Aires, is very useful in positioning the recent transformations in the metropolitan space. The model is also useful to understand recent urban trends in some other Latin American metropolises, but not all, since the depth and modalities of these processes are not so homogeneous.

The examination of the main socio-spatial developments in the Latin American cities has made clear that today, more than ever, the Latin American metropolises are socially-divided cities, developing at different dynamics and ways of production of space. On the one hand, powerful private companies and real estate developers are producing and servicing the privileged spaces for the elites. These are evolving along similar trends than the ones observed at cities touched by economic globalisation processes. On the other hand, the areas of poverty do not recede and continue having a profound impact in the city functioning and structure.

Interpreting the recent urban transformations in a long-term perspective, the last period shows remarkable similarities with the 1860-1920 period, which meant the beginning of the dissolution of the compact city model due the expansion of the city to its outskirts, a process made possible by the new transportation technologies. New ICT infrastructural networks are currently promoting the expansion of the traditional urban boundaries towards new urban frontiers. The first trend is towards its periphery, in a process which is not developing in a homogeneous way but in the context of the privatisation of urban space following the demands and wishes of the elites, and reshaping the metropolitan urban form. The second trend is the extension of the city's domains to other cities and locations around the globe.

3.5. Conclusions

This chapter has set the urban scene of the metropolises of Latin America. To help to understand the urban context, it began with an historic account of the development of the Latin American urban settlements and systems of cities since the pre-Columbian times, reviewing urban growth in the colonial times, and the emergence of the first metropolises until the demographic transition process.

In the following section, the chapter has focused on a fundamental topic for the Latin America region: urbanisation and rural-urban migration, analysing the main views on the topic. Urban concentration is the next topic that has been addressed, stating some elements in order to understand the reasons for the high levels of urban concentration and urban primacy that affect the large metropolises.

The analysis has then moved from the macro scale to the urban scale, describing and examining the changes due to the processes of suburbanisation and 'rapid urbanisation', as well as the spatial consequences in the urban structure, the built environment and the urban form of the Latin American cities.

The following important topic has been the examination of the dramatic transformations that Latin American metropolises underwent regarding economic, political, social and demographic issues since the 1980s and the corresponding socio-spatial changes. It finishes with a brief characterisation of the main features, trends and processes of the metropolises at the dawn of the 21st century.

With the background of chapters two and three, the focus of the following chapters will be on the empirical analysis of the three levels of ICT networks acting in the Latin American metropolises, to ascertain the situation and main trends in each of these levels.

Notes

[1] The cities founded during this period include Santiago de Chile, Caracas, Asunción, Buenos Aires, Córdoba, La Paz, Santa Cruz de la Sierra in the Spanish colonies, Rio de Janeiro, Bahia and São Paulo in Brazil.

[2] Havana was also in this group.

[3] The demographic transition process in Latin America was triggered by advancements in health-, food- and hygiene-related issues after the 1940s, which produced the lowering of mortality rates, therefore increasing natural growth. The demographic transition eventually implies demographic stability as societies become more urbanised. This happens because fertility rates decrease remarkably when women live in cities.

[4] Megacities here are defined as those with populations exceeding 8 million, as in Gilbert (1996a).

[5] By the 1960s, most Latin American countries had raised import tariffs to encourage domestic industrialisation.

[6] Transport nodes also have a hub-effect: the most connected nodes get the most links.

[7] Ades and Glaeser (1995) have identified political instability as a major variable increasing the degree of urban concentration. They assert that dictatorships have central cities that are, on average, 50 % larger than central cities of democratic governments. Since dictatorships have been a common trend in their political scene during the 20th century, this has also contributed to the Latin American urban concentration. Gaviria and Stein (2000), however, have not found any effect of the type of political regime on the growth of major cities.

[8] Urban primacy refers to the demographic, economic, social and political dominance of one city over all others within an urban system.

[9] Foreign industrial investment preferred to settle in these two cities rather than in Bogotá (Gilbert, 1982).

[10] This is the origin of the *vecindades*, *conventillos, tugurios* and other forms of centrally located degraded housing common to all large cities in Latin America.

[11] Gilbert (1990) notes that Latin America's largest countries are the most industrialised, because the capacity to industrialise the country depended upon the size of the domestic market.

[12] There are great limitations to provide precise figures of the share of informal settlements in the cities. There are several types of semi-informal settlements, and the census records do not generally consider them properly.

[13] Apart from *favelas*, São Paulo and Rio have great percentage of semi-illegal peripheral neighbourhoods, general built by the owners. São Paulo's Planning Office recently estimated that 65% of the residents live in dwellings that are illegal in some way (Caldeira, 2000).

[14] "*The car, (international) urban architectural design and planning, and the consumer society have come to dominate Latin American cities*" (Gilbert, 1990:109).

[15] The external debt crisis arose in 1982 when debtor countries, led by Mexico, threatened to default on their repayments to western commercial banks, the main lenders. Because the debt implied very large amounts, the threat had a great impact in the global financial markets. Eventually, the debt crisis was faced with the Brady Plan, which allowed the states concerned the extension of new loans to accomplish the external debts payments in exchange for structural adjustments in the economy.

[16] 'Hot money' is the term used for capitals of speculative nature, searching for rapid and easy returns, which volatilise quickly in times of troubles.

[17] The exception here is Santiago de Chile.

[18] Caldeira adds that the built environment may be the arena in which democratisation and social equalisation processes are contested.

[19] This gap has been related to the sustained growth of television per inhabitant during the 1980s, the 'lost decade', a period characterized by the sustained decrease of the real salaries. This means that there is currently a wide access to symbolic consumption, while access to material consumption is denied for most.

[20] Chile, the most successful economy at regional level, originally received mainly Bolivian and Peruvian migrants. A wave of Brazilian migration followed, and more recently, a new wave of Argentinean migration. Argentina and Brazil have, on the other hand, visible proportions of migrants of Bolivian origin, and (in less proportion) of Peruvian origin.

[21] Recent research in poor youth in Brazil showed that lacking opportunities is the second main reason to engage in violent activities, after family problems (Verner and Alda, 2004). An example of political violence is the armed conflict process that affected Peru during the 1980s and 1990s, which was basically a conflict in which young people without perspective of upward social mobility rebelled against the established order.

[22] They are known as *condominios* in Santiago, *condominio fechado* in Rio de Janeiro, *countries* or *barrios privados* in Buenos Aires, *urbanizaciones cerradas* and *conjuntos cerrados* in Quito, *fraccionamientos cerrados* in Mexico City.

[23] Several studies give account of the main typologies of private neighbourhoods that have emerged: Pírez, 1999, Janoschka, 2002; Coy and Pohler, 2002, Borsdorf, 2002. Caldeira's study, *City of Walls* (2000), depicting the situation in Sao Paulo, describes the underlying social processes that produce the emergence of these 'fortified enclaves'.

Part III.

Empirical exploration

Chapter 4.
ICT infrastructural networks in Latin America[1]

This chapter opens Part III, the empirical exploration of the three levels of ICT networks acting in the Latin American metropolises. This first chapter addresses, explores and analyses the situation and main trends of the ICT infrastructural networks[2] in Latin America.

Since the advent of Internet, rapid and reliable communication systems with global reach have become a crucial element of our economic and social organisation and of the economic progress of cities. The Internet infrastructure that supports the new telecommunications system has, in turn, become a completely new urban and global infrastructure, in which the metropolises and large cities are the main nodes. After the pioneering work of Graham and Marvin (1996) denouncing the neglect of telecommunications in urban studies, different studies have shown the fundamental importance of understanding and analysing these new urban global networks for urban studies.

In few years, this new telecommunications infrastructure has extended itself at a global scale as a new channel of distribution of digitalised information (texts, sounds and images), superimposing itself on the traditional distribution channels, which have a shorter reach. ICTs are gradually becoming the contemporary equivalent to the maritime and aerial commercial routes of the industrial age. Despite of the critical importance of the configuration and characteristics of this new infrastructure, urban professionals know little about it. The technical character of the networks, the rapid pace of technological change and the continuously transforming business environment in the telecommunications sector have constrained their understanding of this evolving infrastructure.

The general purpose of this chapter is to explore and analyse the main features of the telecommunications infrastructures that provide Internet connection in the Latin American metropolises. Under the assumption that the architecture of the digital backbone networks is reinforcing pre-existing urban hierarchies and spatial differences, this chapter seeks to identify and examine how this is happening in the Latin American system of cities and what are the consequences of this for the overall development of ICT networks in the large metropolises.

For this task in the three initial sections is described the context in which the Latin American telecommunications infrastructure is deployed at global and regional level. The fourth section addresses the key components of its physical infrastructure and the international and local connectivity of the metropolises. The fifth section discusses the main urban issues that global and local connectivity bring about in the Latin American metropolises. The last section states the consequences of these developments for the functioning of the two other levels of ICT networks.

4.1. The global telecommunications sector

The telecommunications sector has been subject to constant, far-reaching, change since the late 1980s. Thanks to the growing and constant diffusion of ICT networks and devices in homes and businesses, today's world is different from what it was twelve years ago. Telecommunications have passed from a relatively unimportant and low-growing sector, to a sector of rapid development and of strategic importance for the economic and social progress of nations. It was transformed from being an industry in itself, to become a vital enabler of all other industrial sectors. The telecommunications sector is currently both the core (major economic activities are mostly information processing and transmitting or depend critically on it) and the infrastructure of the information economy (World Bank, 2000).

During this short period, the sector has undergone huge transformations that refer to: (a) the enormous technological innovations, (b) changes in the legal aspects of the business: privatisation and deregulation, and (c) uncertainty and instability that led from a huge telecommunications hype to the crisis of the sector in a short period.

(a) In less than a decade, Internet and mobile telephony have become pervasive in developed countries and increasingly present in the rest of the world. On the other hand, voice transmission and digital technologies are becoming a single industry. For this, the telecommunication companies had to adapt their infrastructures to the new context in a very short period. The networks have been transformed from analogue to digital and from territorially-based local networks to networks with global reach. [3] This modernisation has demanded high investments, and at the same time it has made the business much more complex and diversified than before, multiplying greatly the number of services provided to final customers.

On the other hand, the very logic of the infrastructure system has radically changed: the telecommunications services are increasingly being delivered by a combination of (wireless) radio waves and fixed-line networks. In the past, most long-distance calls were delivered over wireless lines (by satellite), but started and finished in land lines. *"Radio is now being increasingly used to provide access networks, while wired networks provide the long-distance component"* (ITU, 2002a: 4).

New technical advances may bring new drastic changes in the sector. There is still no clarity or consensus about the eventual convergence or specialisation of voice and data networks, or the consequences of the introduction of WiFi[4] or other new technologies. It is difficult to predict the behaviour of consumers, which brings many uncertainties to the sector, which has to invest in advance. For example, despite the great enthusiasm of large firms towards the convergence between Internet and mobile telephony, the users have been very cautious and have not fulfilled the investors' expectations.

(b) The telecommunications sector has rapidly changed from a public and regulated utility into a private and highly competitive business run by corporations, mostly of global scale. This means a great change of legal status and of entrepreneurial logic. Before the reforms, the local telephony segment was giving service to 60-75 percent of the population in rich countries and to the elites of the developing countries. Its emphasis was on standardisation and social and geographical equalisation. Tariffs were the same despite the cost disparities (Graham and Marvin, 1996). But, the high investments that the networks needed to expand and modernise were difficult to get from the state, especially in developing countries.

The reforms have put an end to the telecommunications monopolies in most countries of the world, a fact that is especially visible in Latin America. Large foreign firms have

become important actors at local level. This change of model has determined the shift from a national-wide telecommunications strategy with local networks to a model of large telecommunications carriers that expand their worldwide networks according to their corporate strategies (Paltridge, 2002). In these private strategies, cities and locations are not any more the central object, but merely a point in the map of the world.

As points in the map, cities can become nodes of the network or they can be by-passed according to the firms' objectives, evidently linked to the firms profitability. Graham and Marvin have illustrated the consequences of the introduction of this model in cities and regions (Figure 4.1). Large firms with global reach compete now among them to provide telecommunications service and infrastructures to the most profitable financial, commercial and residential markets at local level.

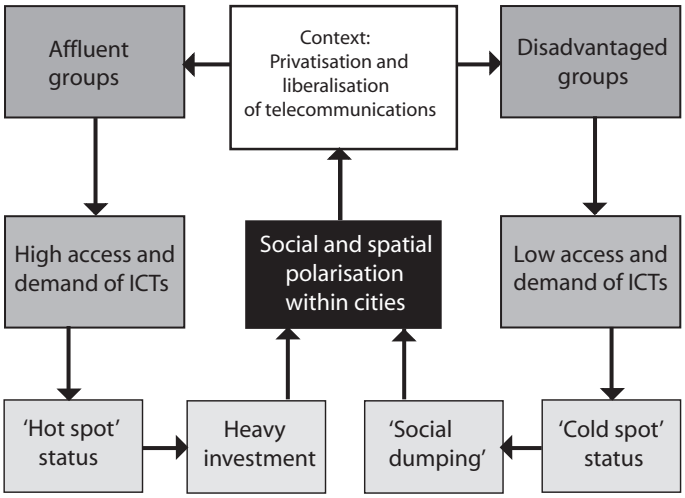


Figure 4.1. The trends in the telecommunications sector are contributing to an unequal development of cities and regions (Adapted from: Graham and Marvin, 1996).

(c) The introduction of the commercial Internet generated a historical hype during 1996-2000, which triggered massive investments and huge expansions that rapidly led into a sector of global and giant operators. Large US American and European operators now dominate the telecommunication scene of entire regions of the world. They followed a strategy of growth through acquisitions of former monopolies and other local firms, under the motto: 'bigger is better'. The dominant idea was that only large companies would survive in the new global context. This expansive trend was supported by the ease of acquiring funds from the world's stock markets in which telecommunications companies were the favourites.

Additionally there were mergers and strategic alliances to gain a global foothold in all markets. Due to the high competition, telecommunications operators had to find new products and services to offer, as well as new markets to exploit (Nellist and Gilbert, 1999). The strategy of expansion of the large enterprises has been not only horizontal (in as many countries as possible) but, also vertical (in as many different segments of the market and strategic sectors as possible). The reason behind these acquisitions mergers and alliances was that it is easier to buy a competitor with an auspicious project than to develop an own project (Nellist and Gilbert, 1999).

However, the confidence that investors used to have in the telecommunications business has decreased hugely with the collapse of the stock market euphoria, in which high profits turned into huge losses for many. By early 2001, the telecom 'gold rush' that characterised the previous years was gone. During that year, enormous job losses in the sector were announced (ITU, 2002a). At present, there exists a huge over-capacity in the telecommunications networks, which has made long-distance traffic prices drop greatly. Only 14% of the trans-oceanic submarine cables is in use in 2003 (Telegeography, 2003a), the rest is still dark fibre[5].

During this hype period, telecommunication companies took on many billions of dollars in bank debts to finance the new acquisitions and expansions. This was possible because the telecommunications business is a very profitable one. In 1996 the top-ten telecommunications firms earned more than the twenty five largest banks in the world (Alaedini and Marcotulio, 2002). It is estimated that its gross operations margins are of the order of 40% (Nellist and Gilbert, 1999). According to the International Telecommunications Union (ITU), the revenues of the total industry have reached $1.37 trillion in 2003 (see Figure 4.2), while at the same time consumer spending on communications has grown faster than any other household spending (Standage, 2003).

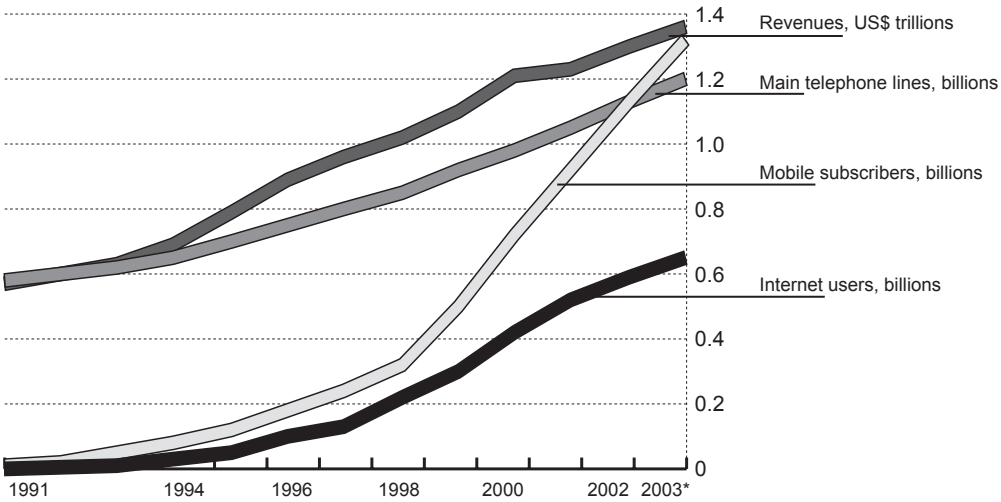


Figure 4.2. Telecommunications global market 1991-2003 (Data source: Standage, 2003, with data from ITU).

Despite the massive revenues, the telecommunications sector is suffering from great financial problems that have gradually increased the instability of the sector and finally produced the crisis in which it is currently immersed. There have been huge miscalculations, moves and risks taken by the telecommunications companies in their expansion fever to become the largest, that have lead some firms into bankruptcy. [6] The main flops refer to network overbuilding, the European 'third generation' (3G) spectrum license auctions flop, and the US management scandals and bankruptcies (Shaw, 2002).

These problems, in combination with the global slow down of economic growth and the dotcom crisis has heavily affected the sector. Critics are now saying that part of the current debacle lays in the deregulation trends. Instead of liberalisation and deregulation, they may have produced cartels or oligopolies. Instead of competition, they may have produced cooperation among, and consolidation of, the largest firms.

4.2. The Latin American telecommunications sector

The reform and liberalisation of key economic sectors was a central element of the structural adjustment measures imposed in Latin America during the 1990s. Within them, the reform of the telecommunications companies became a central element of structural change. The Latin American telecommunications reform has tended to follow the ITU formula which has three basic ingredients: (a) privatisation of the sector, (b) free competition and (c) (independent) regulation of the free competition (ITU, 2002). The results are the following:

(a) More than two thirds of the public telecommunications companies in Latin America have been partially or totally privatised. This is, after North America, the highest proportion in the world. The privatisation process was also a lucrative operation that eventually provided a large amount of cash flow to the governments, namely more than US $40 billion[7] (ITU, 2000). Privatisation processes began with the experience of Chile in 1988. Brazil was the last big country to privatise their telecommunications, in 1998. In the countries still without private operators in the telecommunications' basic services, (Uruguay, Ecuador, Colombia and Costa Rica) there were also plans for the privatisation, but they were finally turned down due to political opposition, a national plebiscite or massive strikes against the plans (ITU, 2000).

The privatisation attracted large foreign investors, as local investors had not enough capital to buy the former monopolies. Large European and US American companies became the new operators. [8] The companies that now dominate the telecommunications market are among the largest companies of the region[9], and sometimes the largest of the country, as in Mexico, Venezuela, Chile and Peru (Hilbert, 2001). One of the most dominant among them is Telefonica, which acquired the networks in Chile, Peru, Argentina, and Brazil (São Paulo). European companies focused on buying the former monopolies, while the US American companies, risking much less capital, preferred to address their businesses to the new segments of Internet and mobile telephony.

(b) But, the opening of markets for competition was not immediate, as most countries granted the new companies a period of exclusivity that varied between four and ten years from the moment of the turning over of the carrier (ITU, 2000). With rising tariffs, the consumers often complained that the public monopoly had become a private monopoly. Even if now most countries allow competition in basic services, the level of competition has remained low. On the other hand, the region enjoys a high degree of competition in mobile and Internet services, segments which do not demand such high investments. In 2000, most countries had more than two mobile operators in the local market and multiple ISPs (Internet service providers).

(c) Hand in hand with the privatisation, most Latin American countries created regulatory bodies to promote an environment that attracts investment in telecommunications and the spreading of services. But, the institutional profiles of the telecommunications regulatory authorities are as variable as the socio-political and economic environment of the country in which they operate. For that reason, there is a wide scope of regulatory bodies in the region, with different attributes and mandates and with greater or lesser independence from the government. Their availability of funds has a direct effect on the quality of staff and, in turn, in the efficiency and effectiveness of its activities (ITU, 2000).

Brazil and Chile, the countries with the highest teledensity of the region, are also the ones with the most progressive and effective regulators: Anatel and Subtel, the Sub-secretary of Telecommunications of Chile, which is not a special regulatory body but part of the Chilean

Ministry of Telecommunications (therefore not an independent'regulator). They are both, with Peru, publicised by the ITU as good-practice examples of effective regulation at global level.

Despite the radical reforms and the good practice examples, a closer look at the performance of the telecommunications sectors shows that the reforms have not been enough to benefit the final customers in most countries. A study of Latin American Economic Commission (CEPAL, 2000) points out that even if the sector has modernised itself and its networks, the users have financed the improvements in many cases. On the other hand, even if average teledensity[10] and the quality of the services have increased, the local access prices have generally risen after the privatisation, excluding a great part of the population from the market (ITU, 2000).

Policy makers assumed that the development targets for the privatised operators would help to solve the low telecommunications diffusion, but so far this has not been the case. Telecommunication services for the middle class and elites have improved, but the poor face a higher barrier to get these services.

4.3. Internet and mobile telephony fever in Latin America

In the mid-1990s, the region became a hot spot for the telecom business. With more than 500 million, mostly urban, inhabitants, a low penetration and a great enthusiasm for the new technologies, the prospects for the telecommunications business were highly auspicious.

And the arguments proved to be right in the case of the new technologies. The region has been one of the fastest growing mobile markets in the world, something remarkable if we consider the relatively low income levels of Latin American households. The rise of mobile telephony is helping to raise the levels of total teledensity, as fixed-lines teledensity is stagnating. At present Chile, Venezuela, Mexico, Paraguay, Bolivia and Peru have more mobile subscribers than fixed lines. [11] Additionally, unlike fixed telephony, the growth in mobile telephony has been sustained in spite of a relatively high level of mobile penetration already. The countries with the highest total teledensity (fixed and mobile) are Chile and Uruguay, and the ones with the lowest Peru and Bolivia (see figure 4.3).

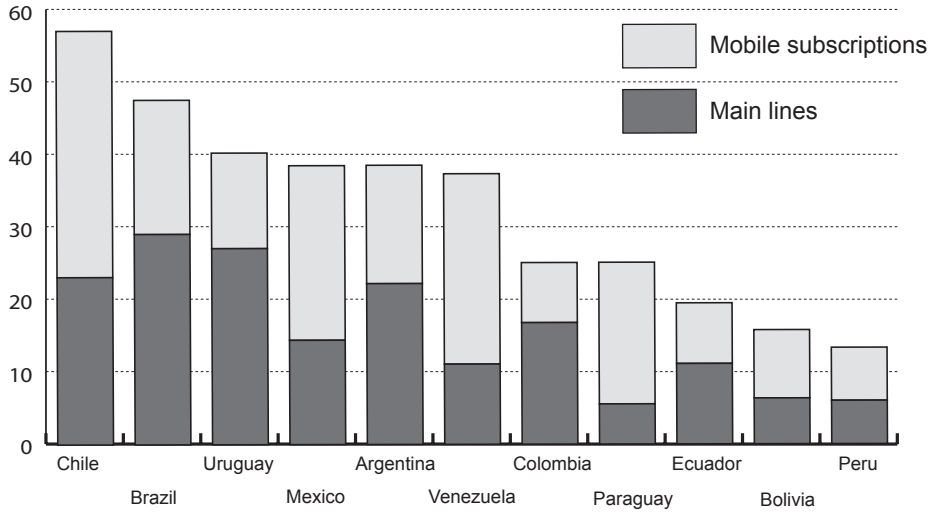


Figure 4.3. Mobile phone subscriber and fixed lines, per 100 inhabitants in Latin American countries in 2001 (Data source: ITU, 2002a).

Internet was introduced in the region during the early 1990s, with the exception of Argentina and Mexico, where it was introduced in 1989 within academic circles. Its initial growth was so outstanding that it led to huge enthusiasm among telecommunications analysts, the media and international organisations about its business possibilities. Their expectations for an 'Internet fever' in Latin America, were based on the (false) assumption of an exponential growth of volume of data traffic (Shaw, 2002). This resulted in investments in two main segments: (a) infrastructure, and (b) contents.

(a) Large international operators and independent consortia invested large capitals to provide Latin America with an appropriate infrastructure and to connect it with the US American backbones with a submarine fibre optic network. Nine large projects were executed to provide the region with 170 thousand kilometres of submarine cables, which amounted to US$ 20 billion (Fernandez-Maldonado, 2000). The total submarine cable capacity of South America increased from 13 Gbps in 1999 to close to 400 Gbps in 2001, an increase of 3000% in only two years (Shaw, 2001). Figure 4.4 shows the percentage of international bandwidth growth during the last years, according to world regions, illustrating the huge increase in Latin America during the year 2000. The figure also shows the slow down of growth since that year.

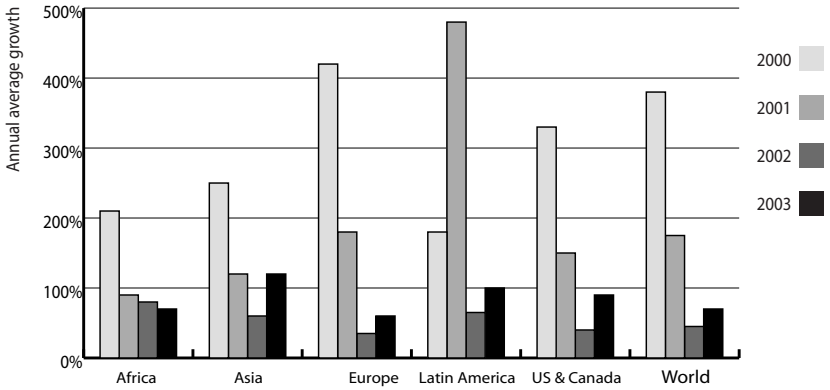


Figure 4.4. Annual growth of international Internet bandwidth in world regions, 2000-2003 (Source: Telegeography, 2003a).

(b) At the same time, there was an aggressive expansion of the telecommunications sector towards content industries (mass media and entertainment industries), considered strategic under the motto: "Content is king". A wave of mergers, mega-fusions, and the buying of the most innovating firms by the giants of the sector followed. The rhythm of mergers and acquisitions was so fast that it was impossible to follow the events in the turbulent telecommunication market. It was worrying that large telecommunications firms were acquiring the power as owners of the networks and the content industries.

But the global economic downturn and the instability of the dotcom business, linked to content production firms, in April 2000 greatly affected the hegemonic ambitions of the large telecommunications firms. Telecommunications investment has slowed down remarkably in 2002 and even more intensely in the Latin American region. The business difficulties the telecommunications sector is experiencing in the region are mainly related to the economic crisis affecting several countries of the region. Even in the mobile telephony business, the best business during the last years, the revenue per user is going down due

to the domination of pre-paid systems (77% in 2002) and the reduction of consumption rates (Petrazzini, 2003). In this context the large firms have decide to change strategies to concentrate in their 'core businesses', the provision of telecommunications services.

After presenting the main features of the global and regional situation of the telecommunications sector, the next section examines the main features the digital networks in Latin America.

4.4. Latin America's Internet backbone network

Digital backbones networks are currently the carriers of the main goods of the information society: information and knowledge, as transportation networks (water, roads, rails, and air) used to transport people and goods across territories during the past centuries. Box 4.1 provides a succinct description of the basic structure of the Internet, considered necessary to understand the situation of the Latin American digital backbone network.

Box 4.1. Structure of the Internet network

As a technology, the Internet is a set of protocols, hardware, and software components that enable users to communicate with, and transfer information to each other, all over the world. As a network, the Internet is composed of a wide variety of small, medium and large networks that interconnect at certain points, giving the impression of a seamless network to its users. But, it actually depends on a structured hierarchy and protocol to operate it.

When the commercial potentials of Internet applications became evident, the US government decide to privatise and commercialise the initial Internet backbone network of the NSF (National Science Foundation), a process which was executed between 1993 and 1995. If the original configuration was a simple open network, the new architecture of the Internet network was a based on access nodes: the NAPs (Network Access Points). These are the physical points where backbone networks firms converge, and where the packet-switched flows are transferred between networks. The first four NAPs of the new Internet infrastructure were located near large US cities: San Francisco, Washington, D.C., Chicago, and New York.

Gorman (1998) explains the structure of the Internet network according to five levels, in which the NAPs constitute the first level, and the users constitute the fifth. The other three levels consist of networks of different hierarchies:

a) Level two consists of the large backbone providers, which interconnect large cities and continents with each other and that interconnect in NAPs with other large backbone providers or with regional networks.

b) In level three one finds the regional (or national) networks. In the US these are the networks serving the different US regions (northeast, midwest, west, east, southeast, northwest, and central California). In most other countries, these are the firms operating backbones at national level. They also (may) interconnect in NAPs.

c) In the fourth level are the ISPs (Internet Service Providers) networks that provide the service to the users. These may be national or international companies, such as MCI and AOL, or smaller firms that provide access in one city or smaller geographic regions.

The Internet backbone infrastructure has a global reach, but is territorially uneven in its layout and capacities (Castells, 2001). Furthermore, as a 'scale-free' network, it has an uneven distribution of connectedness[12] (Barabási, 2002). This unevenness influences the way the Internet network operates, making important nodes grow faster than smaller. Studies examining the accessibility of cities to the global telecommunications network (Zook, 2001; Gorman, 2001) have shown that the most accessible cities are located at major network access points. This suggests that the Internet topology has created a hierarchy of accessibility in which metropolitan nodes are of strategic importance. Cities that are important nodes in transportation networks (air, rail, and highway) are also generally important on Internet backbone networks (Townsend, 2001a).

On the other hand, because of the Internet's historical origins, its nodality is still concentrated in the U.S. For at least a decade, American companies have aggressively dominated the global telecommunications industry, constructing networks primarily designed to meet the connectivity needs of U.S. businesses (Townsend, 2001a). Much of the development of the Internet has been concentrated within developed countries and major urban agglomerations.

Since the main nodes are located in the U.S., and a good portion of international Internet traffic transits via the backbones that traverse U.S. territory (see Figure 4.5). While every region and nearly every country has a direct Internet connection to the U.S., direct connections between other countries have been less common. Furthermore, direct connections between different major regions are weak. The U.S. still serves as a central switching facility for inter-regional data traffic, being used as a transit point for data packets travelling from one major region to another.

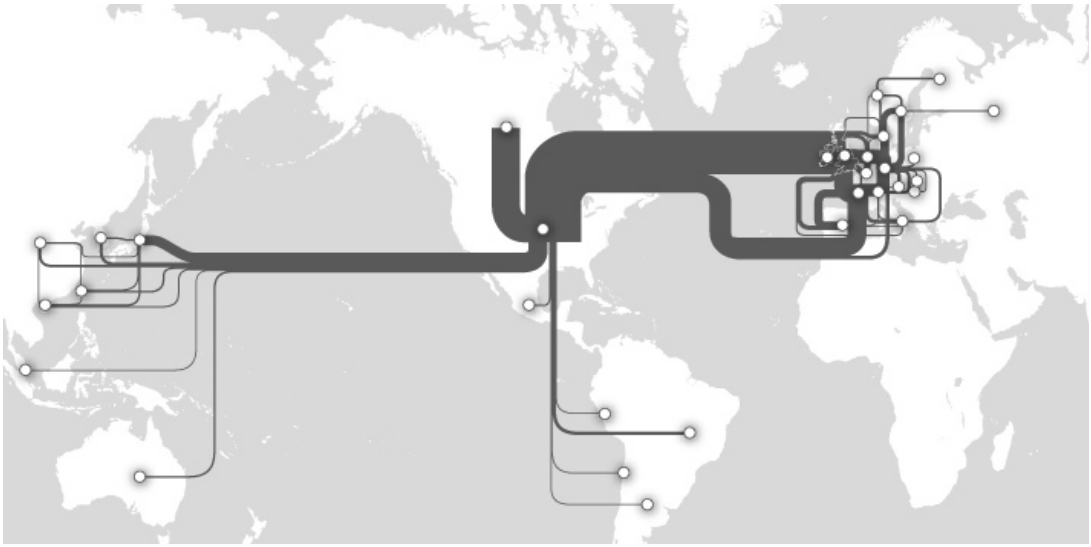


Figure 4.5. Map of major international Internet routes 2004 (Source: TeleGeography Research Group - PriMetrica, Inc. © 2004).

Since 1999, this U.S.-centric structure has begun to diminish (TeleGeography, 2000a), along with the huge deployment of trans-oceanic, satellite and terrestrial fibre optic networks, and the emergence of new Internet exchange points (NAPs) in the rest of the world. In Europe, intra-regional traffic is now mostly locally switched, and does not need to go to the U.S. and back. In 2000 some African countries begun to connect themselves with France, rather than the U.S, showing the importance of cultural and trade links for the Internet connectivity [13] (Bartlett, 2001). At the same time, there has been a shifting away from single dominant regional hubs in

the U.S., Europe and Asia towards a more diffuse network (Townsend, 2001). This trend is the result of the massive deployment of digital backbones that have been made in recent years.

Latin America is still dependent on U.S. connections for Internet traffic. The U.S. dependency is not only linked to the configuration of the networks, but also linked to content dependency as U.S.-based companies are the producers of the content of the most visited sites. Although the major Spanish language content producing countries are Spain and Argentina, still many Latin American portals and e-commerce sites house their data servers in the U.S, although this is slowly changing. Until late 1999, most countries still relied on lower-capacity satellite links for their connections to the US backbones (TeleGeography, 2000a). But, thanks to the culmination of several projects of submarine cables in the region, international Internet connectivity to Latin American countries grew 479.2 % in terms in deployed bandwidth between July 2000 and July 2001, from 2.7 Gbps to 16.1 Gbps (Bartlett, 2001, with data from TeleGeography). In 2003, the total regional bandwidth was more than 25 Gbps[14] (Telegeography, 2003).

The two largest submarine networks that were implemented in the 1999-2001 period, were E-mergia, owned by Telefónica and the Latin American Global Crossing, respectively (see figures 4.6 and 4.7). Surprisingly, both submarine backbones display almost the same layout, being the main differences the connecting points at the Caribbean region. Cities located at the coast have been, obviously, the most favoured by the presence of the new backbones. Colombian cities, for example, are not connected by the Global Crossing trace, but three Mexican cities (Mexico City, Guadalajara and Monterrey) are connected. The increased bandwidth has greatly improved the performance of the networks in all Latin America. The digital backbones are currently lightly loaded, but there is still congestion at the local level.

Figure 4.6. The E-mergia network

(http://www.e-mergia.com).

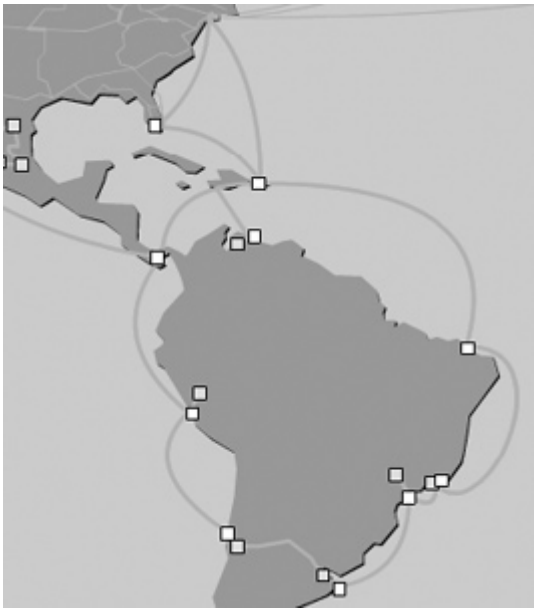


Figure 4.7. The Latin American Global Crossing

(http://www.globalcrossing.com/xml/network/net_map.xml).

Analyses of the Internet traffic routes[15] made from the Netherlands to Latin American sites (financial, media and government sites) in June 1999 and to the same sites in November 2002 show major changes in the routing of the data between these two dates. If in 1999 almost all traffic used the route London- New York and passed through the U.S. nodes and networks to get to Latin America, in 2002 the picture is completely different. A visible proportion of traffic is now passing through Spain and using Telefónica's own network, by-passing the U.S. backbones and nodes and using Telefónica Data networks (E-mergia) as main carrier. Thus, they can deliver end-to-end services from most of the large Latin American cities to Europe in its own infrastructure networks. This shows the power that some large telecommunications firms have acquired, by operating their own networks at the three levels of the hierarchy: international, regional and local carriers. This 'private' way of operations inside the global Internet network may constitute a challenge to the open character of the Internet, since it reinforces the supremacy of the most powerful carriers, and privileges some premium locations over the rest.

As Internet expands, however, it becomes clear that this is a trend: large telecommunications carriers are competing to provide infrastructure and services on an end-to-end basis within private networks (OECD, 2002). In this new scheme, MCI, France Telecom and Telefónica are the dominant regional networks in Latin America. Their main nodes are shown in figures 4.8, 4.9 and 4.10, respectively. Other companies that have developed their own backbones and links to the U.S. during the past few years are AT&T, Latin America, Bell South and IBM.

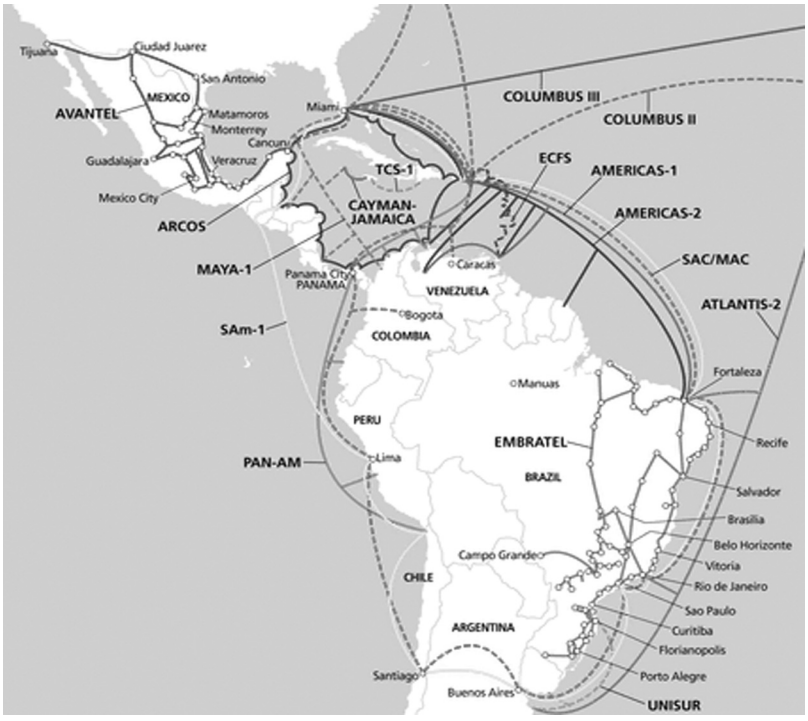


Figure 4.8. MCI's network in Latin America, 2004, showing Embratel network in Brazil and Avantel network in Mexico (http://global.mci.com/about/network/global_presence/latinamerica/).

Figure 4.9. Main nodes of France Telecom's Equant network in Latin America (http://www.equant.com).

Figure 4.10. Main nodes of Telefónica's network in Latin America (http://www.telefonica.es/internationalservices/).

In general terms, the traffic analyses reveal the following trends:

- The cities located at the northern part of Latin America are more intensively linked to the U.S. backbones, using UUNet, Equant, Cable and Wireless, AT&T and France Telecom networks.
- In those cities where Telefónica is the incumbent operator, Santiago, Lima, Buenos Aires and São Paulo, one observes an increased use of Telefónica Data networks, at different levels of intensity.
- Some cities show a dominant backbone carrier: Telefónica in Lima, UUNet in Mexico City, São Paulo and Rio de Janeiro, France Telecom's Global One (Equant) in Caracas, Cable and Wireless in Montevideo. But Buenos Aires, Santiago and Bogotá show a wider variety of backbone carriers.
- Due to Telefónica's dominance in the region and the production of Spanish language content, Spain is becoming an important traffic route.

These trends confirm that the operation of the digital Internet backbones in Latin America is a matter of a few large telecommunication companies, of US or European origin. In this context, Telefónica appears as one of the most important players, with incumbent networks in many of the large cities and operating networks at all levels of the Internet infrastructure.

In this new infrastructural system that is constantly expanding, the metropolises represent then the locations where most of the components of the new system are located. Castells (2001) states it in few words: '*The Internet is a network of metropolitan nodes'*. After the exploration of the main features of the Latin American digital backbone network, the next section examines the position of the main metropolises as nodes in the regional networks.

4.5. Latin American metropolises as nodes in the digital networks

To examine the state of the digital infrastructure the four elements mentioned by Townsend (2003) have to be taken into account: information highways, ports, warehouses and factories. There are different ways to analyse the position of the cities regarding the Internet infrastructure. The simplest is just to measure connectivity (bandwidth) to international backbones. One of the most comprehensive is that advanced by the MOSAIC group (Wolcott, et al., 2001), which evaluates nations according to three main variables: (1) the (national and international) capacities of the backbones, (2) the number of Internet exchange points, and (3) the local connectivity: the type of access networks to end users.

The study of the capacity and features of backbones is difficult because the telecommunications industry, and the Internet industry in particular, are extremely competitive. They do not share their 'strategic' information easily. Besides, there is no central source of information about Internet backbones, routes and/or traffic in the region. For this section, I have mainly relied on information from TeleGeography and the International Telecommunications Union.

a) Backbone capacity

Connectivity indicators for metropolitan areas show that Latin America's Internet geography has a strong relation with the traditional hierarchy of its system of cities. However, as the networks are in constant evolution, the ranking of these node cities, those with the highest Internet connectivity, changes from year to year although it always remains among the same largest metropolises. Figure 4.11 shows the main Latin American metropolises in the global Internet infrastructure, those with more than 5 Gbps of capacity in 2003: São Paulo, Santiago, Buenos Aires and Lima. Not surprisingly, these four cities constitute the most important nodes in the fibre-optic rings that circle the region.

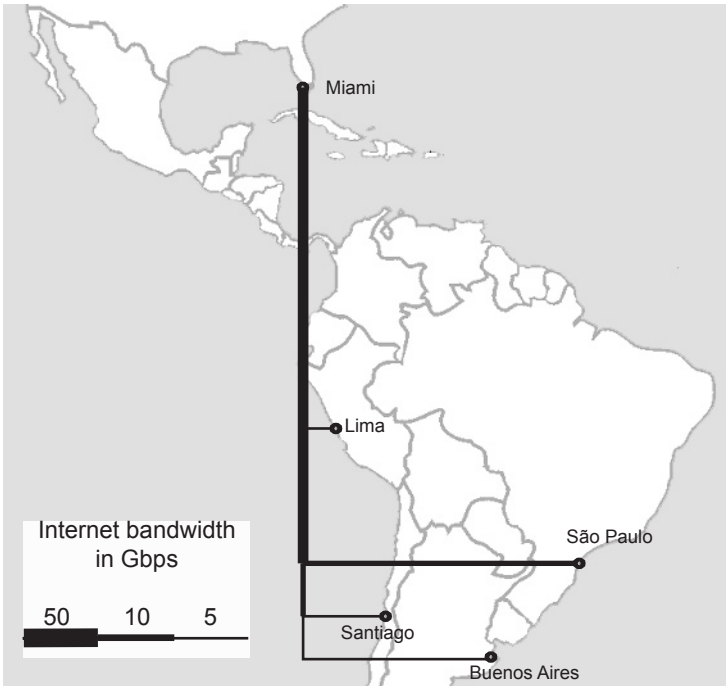


Figure 4.11. Latin American metropolises in the global Internet in 2003 (Data source: TeleGeography, 2003b).

Paying attention to the evolution of the connectivity since 1999, one can see the huge growth in connectivity in the year 2001. The evolution of the position of cities in terms of bandwidth connectivity in the 1999-2003 period, shown in Table 4.1, illustrates how dramatically the bandwidth picture and the position in the ranking has changed between these years. The cities that benefited most from the increase of connectivity are clearly those that have a coastal location. The 2003 ranking shows that three of the four main cities have high urban primacy. Due to these new powerful connections, Mexican cities have decreased their position in the ranking.

Ranking	1999 (in Mbps)	2000 (in Mbps)	2001 (in Mbps)	2002	2003
1	São Paulo (284.2)	Mexico City (749)	São Paulo (4984)	São Paulo	São Paulo
2	Buenos Aires (146)	São Paulo (566.6)	Buenos Aires (4017)	Buenos Aires	Santiago
3	Mexico City (136)		Mexico City (2182)		Buenos Aires
4	Rio de Janeiro (123)		Santiago (1770)		Lima
5	Caracas (96,8)		Monterrey (1077)		
6	Monterrey (79)		Rio de Janeiro (1029)		
7	Santiago (47.3)		Caracas (433)		
8	Lima (38)		Lima (412)		
9	Bogotá (12)		Bogotá (312)		

Table 4.1. Top Latin America Internet hub cities in the 1999-2003 period (Data sources: TeleGeography 2000b; TeleGeography, 2001; ITU, 2002c; TeleGeography 2003a; TeleGeography 2003b; respectively*)*

When one see how the metropolises are connected, the U.S. centeredness appears clearly again. Table 4.2, showing the major Internet traffic routes, illustrates this. It is not São Paulo, but Miami the largest Latin American hub, with 7825 Mbps bandwidth to Latin America in 2001 (Shaw, 2001). New York, with 2003 Mbps, Dallas, with 1546 Mbps, and Los Angeles, with 975 Mbps, have also a position within the 2001 ranking of cities, although they are obviously not located in Latin American territory. Miami's link with Latin America improved greatly since the opening of the NAP of the Americas in its territory in the year 2000. Before that date, New York was the main Latin American hub (TeleGeography, 2000a). This geography reminds us that the Internet geography is still very dependent on the US networks.

Origin	Destination	Bandwidth (in Mbps) in 2000
São Paulo	Miami	3384
Buenos Aires	Miami	1455
Mexico City	Dallas	1340
Buenos Aires	Santiago de Chile	824
Buenos Aires	New York	698
Buenos Aires	São Paulo	666
Monterrey	Los Angeles	656
Santiago de Chile	Miami	503
São Paulo	New York	475
Rio de Janeiro	New York	378

Table 4.2. Major Internet traffic routes in 2001 (Data source: Shaw, 2001).

However, thanks to the improvements in bandwidth, Internet connectivity between Latin American countries grew at the impressive rate of 2500 % during the 1999-2001 period (ITU,

2002c). This implies that a more diffused Internet infrastructure is also developing inside the Latin American region. In the new Internet geography that would be emerging, São Paulo would be becoming a major hub for international traffic exchange in the Latin American region (ITU, 2002c).

However, even if it becomes clear that São Paulo is clearly the major node in terms of capacity, more specific evidence is needed to support the claim of its emergence as an important regional hub. Until now, Buenos Aires seems a better candidate for a regional hub. Figures of intra-regional telecommunications (voice) traffic flows in 2001 and the number of intra-regional Internet backbone connections in 2000 suggest that Buenos Aires is fulfilling that role, as it had more and stronger intra-regional links (TeleGeography, 2001; Shaw 2001) and more intra-regional traffic than any other city. Figure 4.12 shows the telecommunications traffic flows in Latin America in 1999 and 2001, illustrating the dominance of Buenos Aires, although Brazil's position has lightly improved.

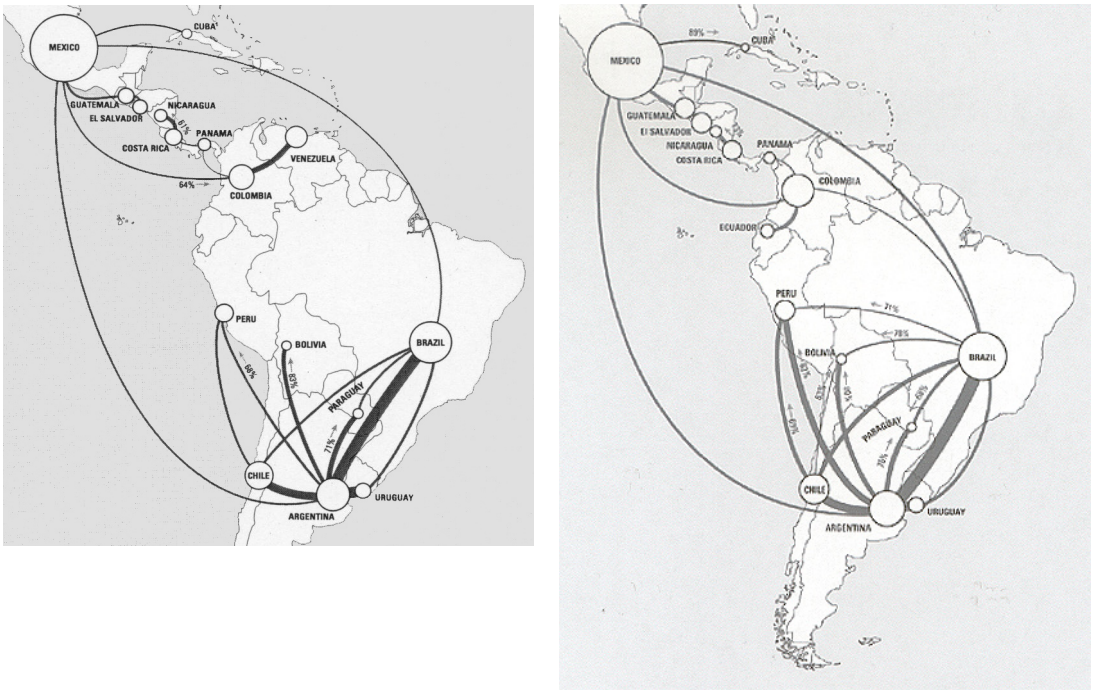


Figure 4.12. Latin American telecommunications traffic flows in 1999 and 2002 (Source: TeleGeography Research Group - PriMetrica, Inc. © 2001; 2004).

Summarising, the connectivity analyses of the Latin American cities reveal the importance of the size of the cities, their geographic location, their urban primacy and their relative importance in the global telecommunications market. This ratifies the trends to concentration already observed in other world regions.

b) Network access points

The architecture of the Internet backbone is made of many smaller networks, joined at key locations called, Network Access Points (NAPs), also known as Internet eXchange points (IXPs) or Metropolitan Area Exchanges (MAEs). They are physical installations created by third

parties to facilitate interconnection between independent ISPs, that aim to be a neutral meeting ground for ISP traffic exchange (TeleGeography, 2000a). Exchange points constitute an asset for the cities that count with them, because as points of local exchange, Internet traffic can be directed to a multiplicity of routes. Without a NAP, carriers have to route local and intra-regional traffic first to the international backbones and then back to the region or city, which is more expensive and inefficient. The importance of an exchange point depends of the number of ISPs involved and the peering between members (Drewe, 1999).

The four initial NAPs that were established in the early 1990s were located near San Francisco, Chicago, New York, and Washington, D.C.[16] These core U.S. cities are the ones with the highest connectivity, more than 500 Gbps in 2002 (TeleGeography, 2002a). Since then, large telecoms or groups of companies have created other NAPs in major cities at global level. In 2002 there were 155 NAPs in the whole world, from which 51 in U.S. and Canada, 57 in Europe, 36 in Asia and Pacific, 10 in Latin America and 2 in Africa (TeleGeography, 2002a).

Latin America had 13 Network Access Points (NAPs) in 2002, located in the largest cities (see Table 4.4). São Paulo concentrates four of them, from which three began to operate in 2001.

	Name	Location	Since	ISPs	Website
1	NAP CABASE	Buenos Aires	1998	40	http://www.cabase.org.ar
2	Diveo NAP	São Paulo	2001	8	http://www.diveo.net.br
3	NAP Abranet	São Paulo	2001	-	http://www.abranet.org.br
4	OptIX LA	São Paulo	2001	17	http://www.optiglobe.com.br/optix-la
5	NAP do Brazil	São Paulo	1997	22	http://www.ansp.br/ptt
6	RSIX	Porto Alegre			http://penta.ufrgs.br/rsix/
7	NAP Chile	Santiago	1997	13	http://www.nap.cl
8	NAP Colombia	Bogotá	1999	13	http://www.nap.com.co
9	Intered Panamá	Panama City	1997	13	
10	NAP Perú	Lima	2001	6	http://www.inictel.gob.pe
11	NAP Mexico City	Mexico City			
12	NAP Guadalajara	Guadalajara			
13	NAP Monterrey	Monterrey			

Table 4.4. Exchange points in Latin American cities in 2002 (Source: TeleGeography 2002a; Haynals, 2002; Thomasson et al., 2002).

c) Local connectivity

Local connectivity depends on the access networks (the so-called local loop) that get to the end users. The analyses of last mile connectivity are highly relevant for urban planners, since they are "*the material basis for the 'death of distance'*" (Graham, 2001:405). To have a good picture of the local connectivity attention must be paid to three main elements: (a) the basic networks, (b) high-speed [17] (broadband) networks and (c) Internet data centres.

(a) Data flows can travel through four main types of lines:

- copper lines (used for the last mile),
- coaxial cables,
- powerful fibre optics[18] (generally used in the backbones), and
- wireless (microwave radio or satellite)

With the advent of digital networking, the architecture of the telecommunications networks at local level began to modify itself. To change from transporting voice flows to digital flows, they transformed themselves from hierarchical bundles of copper and coaxial cable into complex and inter-locking rings of optical fibre (TeleGeography, 2002b). The new telecommunications networks are now hybrids of different kinds of wires. Optic fibre is reserved for the backbone network since it is too costly to deploy it up to the last mile.[19]

Globally, the traditional telephone line is by far the most common way to get connected to the Internet. In Latin America, most Internet access, both business and residential, is via dial-up too, so flows basically run locally over the telephone wires. But, since the telephone network was designed to carry voice flows, when it has to carry packet-switched flows, it becomes a low-speed network. For this reason, the local loop is generally a bottleneck, since the total end-to-end capacity of the network is obviously equal to the capacity on the 'weakest link'. It is possible to make it a high-speed network, by changing the transmission circuits and switches: digitalising the networks. In all the Latin American metropolises the fixed line networks have been steadily expanded along with the digitisation of the networks, in a process that generally followed the privatisation of the telephone companies. Most large cities have now totally digital networks or are close to reach it. As the network operators [20] have the legal duty to provide connection to all locations inside the built-up area (TeleGeography, 2001), a basic coverage is guaranteed in all the neighbourhoods of the city.

(b) In developed countries bandwidth is slowly becoming cheaper and broadband networks are becoming popular, although the diffusion varies according to the particularities of the locations. [21] The most used technologies are coaxial cables networks (the so-called cable modem), and DSL (dedicated copper lines). The operators are then the cable TV networks owners or the telephone companies. Other broadband technologies are more expensive and/or technically difficult to install. This includes the wireless networks, fibre-to-the-house (FTTH), and WiFi (Wireless Fidelity). WiFi is a very auspicious development[22] that is still in early phase, but operational in the main hot spots of the large cities.

Broadband technologies have been used in Latin America since 1998, but their initial growth was slow due to high costs and technical problems. According to the 2002 ITU database, the ranking of countries according to the availability of broadband is topped by Chile, followed by El Salvador, Argentina, Venezuela, Mexico, Brazil, Costa Rica, Guatemala and Peru (World Economic Forum, 2003:301). The position of these countries is not so bad at the global level; all of them enjoy levels of the global mean, or more.

Broadband growth has been spectacular in recent times, especially in the countries with more affluent customers: Brazil, Mexico, Argentina and Chile. For example in Chile, high-speed connections grew at a 162% rate between March 2001 and March 2002, accounting for 217 thousand connections, from which 49.7% were cable modem and 38.7% DSL (Subtel, 2003). Analysts forecast a total of 1.2 million DSL users in Latin America at the end of 2003 (615 of them in Brazil) and 720 thousand cable modem users (30% of the in Mexico) (NUA Internet surveys, 2003).However, forecasts are generally tricky. The high price of these services (not less than $40 per month) makes it unaffordable for most people, so the ceiling of the market might be reached before analysts' expectations.

Even if the metropolises are the locations that enjoy a greater variety of overlapping high-speed digital networks, not all areas are equally connected to high-speed networks, only the business, media and elite districts, in a process that Graham (2001) denounces as the filtering of local connectivity. On the one hand, there exist firms that offer optic fibre to final users to those companies for which a good global connection is fundamental for the conduction of their operations. Despite that, residential consumers are not so important, optic fibre networks

have been reported in the exclusive enclosed neighbourhoods and condominiums that have emerged in some of the large metropolises.

But, the most wired spaces are evidently the business districts of the globally oriented cities, where multiple carriers compete to offer their services. According to the last strategy of data flows in private networks, these firms networks produce a typical example of 'glocal' infrastructural by-passing[23], avoiding contact with the local networks, sending and receiving the digital flows almost directly to and from the outside world. In other words, a process of global connections and local disconnections (Graham, 2001), which is also increasingly observed at differing social levels through the emergence of gated neighbourhoods in the Latin American cities.

(c) Another important feature of the local connectivity is the presence and distribution of collocation and data centres (IDCs), also called carrier hotels, server farms, web hotels, or telecom hotels, in what Stephen Graham (2001) calls 'the geography of back-up'. They are a new urban facility that emerged as a result of the need of interconnection in locations other than NAPs. It houses switches, routers and servers, providing floor space, power and network connectivity to institutional servers and suppliers of content.

The clients can be large carriers, medium-sized ISPs or small dotcom companies, which rent space according to their needs (see figure 4.13). Data centres develop two main types of businesses: shared or dedicated hosting (renting of the technology: hardware, software and technical assistance so that the companies can have their servers in the centre) and housing or collocation (renting of the physical space, plus security and cooling systems) (Jurado, 2001). For technical reasons they need to be located near abundant bandwidth, so its preferred location is in metropolitan nodes, near the connection to the high-speed backbone cables, close to the highest (business) demand, and with easy access to physical transportation (Graham, 2001).

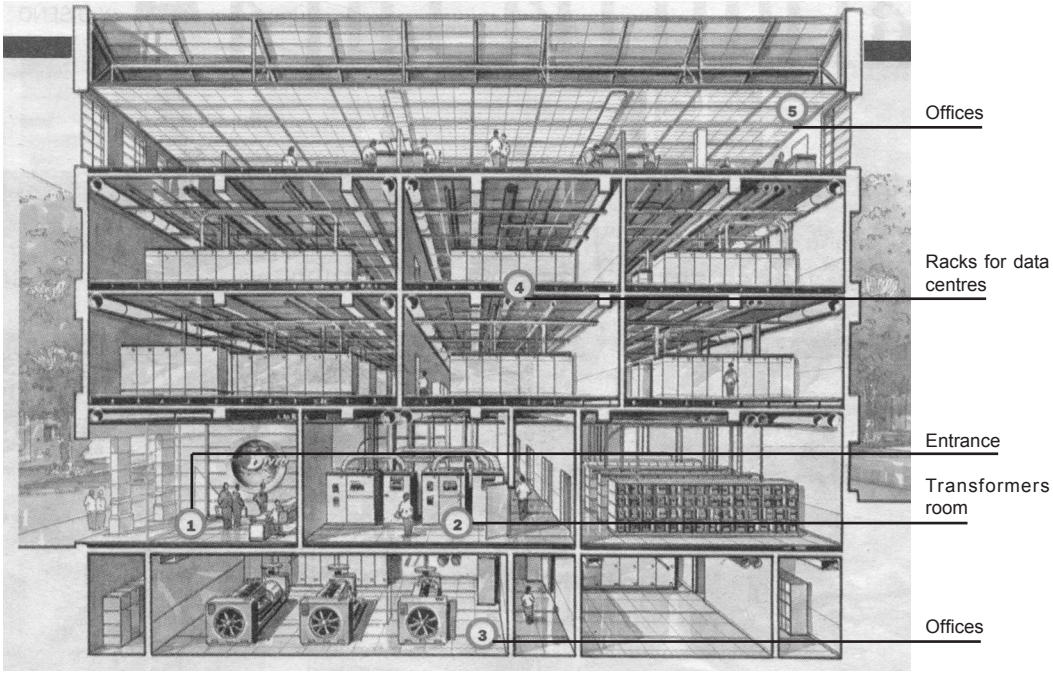


Figure 4.13. Section of the Diveo Data Centre in San Telmo, Buenos Aires (Source: Jurado, 2001).

These facilities grew explosively in cities of the U.S. and Europe until mid-2001. The end of the dotcom boom and the telecom crisis has made their growth less dynamic since then. But, the growth of these data centres has had clear spatial consequences for the cities involved. Large telecom carriers and specialised companies have recently built several data centres in the large metropolises of the region. These new facilities have improved the possibilities for good routing within the networks. Until a few years ago, the largest dotcom firms that provided content to the Latin American cyberspace were hosted in U.S. locations, since high-quality web-hosting did not yet exist in the region. But, due to the long distance between end users (in Latin America) and hosts (in the U.S.), and 'hot-potato' routing[24], the connections had poor performance (Scott, 2001).

New submarine cables that began to operate in the region during 2000 and 2001 have made high bandwidth available and motivated new companies and existing carriers to construct web-hosting facilities. A report by the Phillips Group found 43 operational data centres and collocation facilities only in Brazil, Argentina and Chile in 2001, of which 28 were carrier-based (owned or linked to large regional carriers) (The Phillips Group, 2001). Traditional telecommunications companies, such as Telefónica, Global One or Embratel have entered this new business, but large ISPs as the Brazilian UOL, or U.S.-based regional broadband infrastructure companies, as Diveo Broadband Networks, or specialized companies as Terremark and Optiglobe, have done so too. The main strategy is to link European, U.S. and Latin American cities with the new networks, with the objective to provide end-to-end services, which is the latest trend in the telecommunications business (OECD, 2002). Data centres have a crucial role in this strategy, since they are marketed with the corresponding private networks. In this way, clients are favoured with direct routes and seamless exchanges, and carriers are favoured with only one billing.

The largest player is Telefónica, which has the largest number of data centres in the region connected with each other with its own networks. In September 2001, Telefónica Data began operations in the United States starting the operations of a data centre, the KeyCenter in Miami, to host content and to act as a hub for the exchange of regional traffic. A U.S. $35 million investment, the KeyCenter is directly connected to Telefónica data centres in Buenos Aires, Santiago, Lima, São Paulo and Madrid, the cities where the company is the incumbent operator. The company expects the KeyCenter to play a strategic role in Telefónica Data's further consolidation of traffic from Spanish and Portuguese-speaking markets. The KeyCentre connects the U.S., Spain and Latin America with two global networks: the E-mergia network of submarine cables and the Global IP Network of Telefónica Data (Televip, 2001).

4.6. Conclusions

This chapter has analysed the main features of the infrastructure of ICT backbones in Latin America at both macro and urban scales, whose presence, reach and quality of the ICT infrastructure constitute the basis for the introduction and development of ICTs in the territory of the cities.

At macro scale, the current Internet topology in the region has a well defined structure that provides clear advantages to the large metropolises of the region, their main nodes. The key-components of the infrastructure - information highways (international backbones), information ports (the NAPs), information warehouses (the Internet data centres) and a variety of broadband technologies to transmit the information flows to the information factories (the information producers and end users) – are almost exclusively located in these metropolises.

As the metropolises largely concentrate the Internet connectivity, the other cities tend to link directly with them, producing an architecture of 'hubs and spokes' around the largest

agglomerations, which generally have national reach. This suggests that the current Internet backbones' topology is reinforcing the traditional primacy of the large cities.

On the other hand, in those countries with a less centralised urban system (Brazil, Mexico, Colombia, and Bolivia) a lesser degree of concentration in a singular point is observed. The networks tend to follow the pattern of their corresponding urban system, being monocentric networks in the case of countries of high primacy, and more diffused in the case of countries with a more balanced urban system. In these cases, the concentration is observed in few points. Mexico's proximity to the US networks has favoured its early connection to the Internet backbones, and facilitated a more diffused distribution of direct links to them.

Due to their huge capacity, the optic fibre rings that surround the Latin American region play a fundamental role in the regional Internet infrastructure. In this emerging geography, coastal locations acquire a double importance as nodes. Because of the expensive costs of deploying fibre-optics lines, port cities are favoured spots for the location of the main components of the Internet infrastructure. The information ports (NAPs) and their accompanying information warehouses (Internet data centres) replicate the strategic importance of the real ports for the import/export processes in the industrial era. The most important connecting points in both networks – Miami, Rio de Janeiro, São Paulo, Buenos Aires, Santiago and Lima – have become the more consolidated nodes.

The main node of activity in the Latin American Internet infrastructure is undoubtedly Miami, which through the years has acquired a privileged position as the gate to the U.S. businesses, tourism and immigration flows for Latin Americans. This regional familiarity with Miami has been translated into its new role as main gate to the U.S. backbones for Latin American traffic.

It is considered unlikely that the domination of Miami as Latin American hub will change in the near future, given that the macro-architecture of the Internet networks generally reflects the cultural and trade links among countries and regions and between them. The analyses of traffic routes between Latin American cities have confirmed this for the Latin American backbones. Those cities located closer to the U.S., and which, traditionally, have stronger commercial and cultural ties with the U.S., show less intra-regional traffic than the cities located in the Southern Cone (Mercosur countries), which have stronger economic links with each other, besides their traditional links with European countries. This suggests that the São Paulo-Buenos Aires axis might develop as an important regional hub in the long term. Initial trends in that sense have been observed, but it remains still uncertain to which extent will they consolidate.

Despite the fact that the spatial distribution of the Internet infrastructure does not differ radically from the commercial sea routes used for exports and import of products, a big difference does exist. The traditional advantage of Atlantic coast locations, more closely located to the great world markets disappears in the case of digital traffic flows. In this new network geography, distance becomes irrelevant, although location remains important.

The increase of the telecommunications demand in the secondary cities of the region will lead eventually to a more diffuse configuration of the regional network as more locations get connected with each other. However, due to the particularities of the nature of the networks the present structure will not change dramatically. Once the main spatial structure of a network has been deployed within a specific geographical space, no matter of its size, further changes and upgrades in the system will hardly affect its main overall shape - location of nodes, trunk connections and traffic flows (Goussal and Udrízar, 2000). Indeed, great portions of the global Internet infrastructure have been already completed and there exists a great installed capacity in the main lines of regional backbone networks. A more diffused network morphology may develop in the future. But, if intra-regional links will consolidate or not depends upon the local demand and on the political willingness of the governments involved.

At urban level, the social contradictions of the Latin American metropolises are also valid and visible in the field of telecommunications. Even if in theory, the coverage of the basic telephonic infrastructure extends itself to the whole city, effective access is a matter of economic and technological affordability. For the privileged elite, high-speed networks provide access in home and work. The opposite occurs with poor residents, without access and in low-skilled and informal jobs, and with very limited possibilities for home access due to the high costs involved in domestic connections.

The commercial-financial centres are highly privileged in terms of connectivity, with several layers of fibre optic layers, depending on the position of the city in the world economy. On the other hand, in the deployment of premium networks in business and residential areas different examples of local and glocal infrastructural by-passing can be easily found.

Consequences for urban development

The Internet hype spread the notion that geography and location did not matter any more in the context of global networks. If you were connected you could develop online activities as if being in the centres of the world. The main results have shown because of the existence of great inequalities in the deployment of the networks, their capacity and performance, the production and consumption of the Internet is concentrated in few selected cities, those which have the best telecommunications infrastructure.

It is no surprise that the Latin American Internet infrastructure is concentrated in the largest urban agglomerations of the region. ICT has the potential to disperse activities in space, but the paradox is that as telecommunications services improve and the economy organizes itself globally, spatial proximity and cities maintain their importance.

At macro level, the exposed concentration trends, monocentric configurations, advantages of the large markets and sea locations point out to situations where ‘only the rich get richer’ (Drewe, 2003), obviously detrimental to the objectives of sustainable development. At city level, the features of the deployment of premium networks suggest the deepening of a process of ‘splintering urbanism’ (Graham and Marvin, 2001) in the Latin American cities.

These issues highlight the important role played by large telecommunications firms in the new geography of nodes that has emerged in the last years. Outside the full awareness of urban professionals, large telecommunications firms have become important agents of urban change during the last decade. The decisions about the location of the nodes and the number and direction of the links are, for the most part, in the hands of these private firms and are decided according to agglomeration economies and other imperatives of the business world (Malecki, 2002), and with disregard to regional, national or local priorities.

Evidently, the position of a city within the global backbones is of great importance for the attraction of foreign firms and foreign investments, as well as for the smooth link of the urban economies with the global economy. This leads to two other important issues: competition and dependence among cities. It is clear that the networks deepen these two processes. On the one side, the visible trends to concentration demand the cities a competitive attitude of urban marketing, which has little significance for the solution of the urgent problems that affect urban residents in Latin America.

On the other side, multiple links and relationships constitute a great advantage in a context of rapid technological advances and economic instability, which demand a fast reaction and adaptation to new situations. Additionally, the evolution of the regional backbone towards a more decentralised configuration through the emergence and deepening of links among the cities of the region holds many promises. In the context of regional integration, the Internet

backbone network can play a great integrating role connecting locations according to their cultural and economic interests.

The bottom line is that the Latin American metropolises which are the main nodes in the new Internet infrastructure, have abundant and cheap international backbone capacity that is underused. As such they constitute the best places for the location of the most advanced firms in the new economic logic, and in general for the integration of their local economy into the global. This constitutes a strategic advantage for the metropolises at macro level, but the situation is not the same at urban level, where only premium locations enjoy these infrastructural advantages. Further, the decisions regarding bandwidth are still in the hands of the local telecommunications operators, who as intermediaries, can set limits to the connection to the international backbones according to their own goals and strategies. [25]

Progressive and innovative urban and telecommunications policies are urgently needed to extend the fundamental assets regarding bandwidth to the whole city including less favoured locations of the metropolises. Relatively low investments would be needed to provide network connectivity to those by-passed places of non-affluent demand.

The purpose of this chapter was to identify the main features of the digital backbones infrastructure that supports the new way of organisation of the economy and the society in the Latin America region, making an examination of the situation of its main metropolises as nodes of this network, as well as of the situation inside the cities. ICT physical infrastructure network is a basic requirement for the development of the Information Society, but not the only one. The next chapter continues with the explorative part, addressing the situation and trends of the networks of production and consumption of ICTs in Latin American metropolises.

Notes

[1] This chapter is an extended and updated version of *Explorando la red de backbones de Internet en América Latina ¿Nuevas tendencias urbanas?*, presented at the RIDEAL Seminar in Santiago de Chile, December 2003.

[2] The terms ICT networks and telecommunication networks are used here with the same meaning: the infrastructures that carry digital flows.

[3] For great part, access networks are still the same than before the Internet. For the digitisation of the networks what has changed are the backbones circuits, switches and routers.

[4] Wireless Internet access over unlicensed spectrum technologies (WiFi), such as the IEE 802.11 specification, are increasingly being used in public spaces ('hotspots') in airports, restaurants, hotels, corporate sites, universities and other locations.

[5] Dark fibre is that which is still not lit up to let the digital packages travel.

[6] The most salient among them are World Com and Global Crossing, with assets (previous to bankruptcy) of 103.9 and 25.5 billion US$ respectively (Shaw, 2002). Historically World Com is the biggest bankruptcy ever (Standage, 2003).

[7] The most spectacular sale was the one of Brazil's giant firm Telebras, which was divided into twelve independent companies and was auctioned for US$ 20 billion in 1998 (Lenzen, 1999).

[8] The Mexican Telmex is the only large telecommunication company in the region in which national capital is in control of the firm.

[9] In 1998, 29 of the 100 largest companies in the region were in the telecommunications sector according to the Financial Times (Callaos, 1999).

[10] Teledensity is the number of telephone lines (or subscribers) per 100 inhabitants.

[11] Data taken from the ITU and the websites of the regulatory bodies of these countries (October 2002)

[12] Barabasi (2002) explains this uneveness through preferential attachment. In networks that expand through the addition of nodes to an existing network, the new nodes prefer to attach to nodes already well-connected.

[13] However, the Telegeography 2001 study concluded that 80 percent of international capacity in Asia, Africa and Latin America is still using U.S. backbones.

[14] The final capacity of these two rings is in Terabytes per second (one Terabyte equals thousand Gigabytes), so there is a huge installed capacity.

[15] The analyses were made with Visual Route software, available at http://www.visualroute.com

[16] The National Science Foundation created and maintained these NAPs with the help of a company called MSF to help make the transition from a US government-owned Internet to a commercially-operated Internet.

[17] High-speed networks are the ones with more than 384 Kbps (Staple, 2000) ISDN lines are not considered broadband (Paltridge, 2002)

[18] The high transmission capacity of fibre optics is amazing: a hair-thin fibre can transmit 60 thousand telephone calls (Graham and Marvin, 1996). They provide essentially unlimited bandwidth, what makes the marginal costs of transmitting additional information on any portion of the route to tend towards zero (Staple, 2000).

[19] Optic fibre deployment costs between $ 100 thousand and $ 500 thousand per mile (Acampora, 2002).

[20] The incumbent carriers in the large metropolises are Telefónica in São Paulo, Santiago and Lima, Telefónica and Telecom in Buenos Aires, Telmex in Mexico City, ETB in Bogotá and CANTV (owned by Telefónica and Verizon Communications) in Caracas. With sales of 12.14 billion US dollars in 2001, Telmex

is the largest Latin American firm in terms of revenues (Carrasco et al., 2003), which has recently acquired AT&T Latin America.

[21] In the US and those countries with high cable TV diffusion, cable modem is the more popular broadband service. In Hong Kong and North Korea, which have very high rates of DSL diffusion, this has been part of a telephone company police to prioritise these services.

[22] Kofi Annan has challenged ICT experts to think of new ways to bring WiFi applications to developing countries, so as to make use of unlicensed radio spectrum to deliver cheap and fast Internet (Annan, 2002).

[23] Local by-pass refers to the deployment of a parallel infrastructure network that connects valued users and places while it bypasses non-valued users and places within a city. Glocal bypass does the same but connecting local users and places with global circuits (Graham and Marvin, 2001).

[24] Routing through multiple hubs and NAPs that provide cheap routes. This happens because the network providers inside the Internet cloud are not motivated to optimise the route, only to minimise the costs. They route the session across inexpensive and usually overloaded links or pass the session off to another cheaper and lower-quality network (Scott, 2001).

[25] This situation happened in Buenos Aires, where the carriers who participate in CABASE (the local NAP) limited the international capacity, which resulted in delays and congestion at local level.

Chapter 5.
ICT industries and businesses in the Latin American metropolises

Having explored the Internet backbone infrastructure in Latin America in the previous chapter, the main purpose of this chapter is to explore and analyse the main features of the second level of ICT-related networks, as they are operating in the Latin American metropolises. These are crucial for the economic growth of the cities as they concern the processes of production and consumption of information and communication technologies in the urban economy.

Since the advent of industrial capitalism, economic growth has become a significant factor for explaining urban growth and development. Consequently, urban studies have paid considerable attention to urban economic issues. Political economy studies have been centred on the urban effects of the macro-economic structures, while locational analyses and the new urban economics studies focused on the spatial effects of economic flows. Further, modern spatial planning has focused on the analysis of the spatial activities of the urban households and urban firms in the frame of the industrial city paradigm.

The shift towards a more flexible type of economic organisation is currently questioning the industrial base of cities as major source of economic progress, and with it, the industrial paradigm for urban and spatial planning. Major production processes are increasingly linked with knowledge production and information. The economy is transforming from material production and processing to information production and processing, which implies a shift from mass production and accumulation to customised production and reflexive accumulation (Harvey, 1999; Lash, 2001). These structural transformations introduce new and more complex types of spatial arrangements in activity and communication patterns of firms and households, which superimpose upon the previous dynamics. However, despite that ICT networks and globalisation trends have expanded the geographic reach of economic interactions, cities still remain central to economic development in the current economy.

The first section explains the analytical approach used in this chapter, briefly dealing with some locational aspects of the production of the Internet, considered necessary to understand the global spatial trends. The second describes the main features of the urban economies of the Latin American metropolises and their links with the global economy and knowledge firms and institutions. The third section addresses the networks of production of the Internet in the urban economies, their main features and trends. The fourth section analyses the local urban economies regarding their ICT consumption networks. The last section points out the findings and the possible effects for the urban functioning and urban form.

5.1. Main issues of the digital economy

The digital economy is becoming an integral part of the global economy and its impact goes far beyond dotcoms[1], given that the new economic forces are gradually transforming established business sectors, firms and jobs. Changes are not limited to the purchasing of goods and services over the web but, more important, they are changing business chains, processes and cultures (Castells, 2001). In this context, it is of strategic importance to explore and measure the extent and scope of those industries that produce and consume the local Internet.

The University of Texas' Center for Research in Electronic Commerce (University of Texas, 2001) has advanced a comprehensive proposal of the main structure of the digital economy, making a distinction between four layers of businesses that produce and consume ICTs (coinciding with, for example, Gorman, 2001; Hilbert and Katz, 2002; Drewe, 2003). These are:

(a) The Internet infrastructure layer → the suppliers of telecom equipment and hardware products,

(b) The Internet applications layer → the suppliers of software products and services,

(c) The Internet intermediary layer → the suppliers of content,

(d) The Internet commerce layer → the businesses and industries making use of ICT.

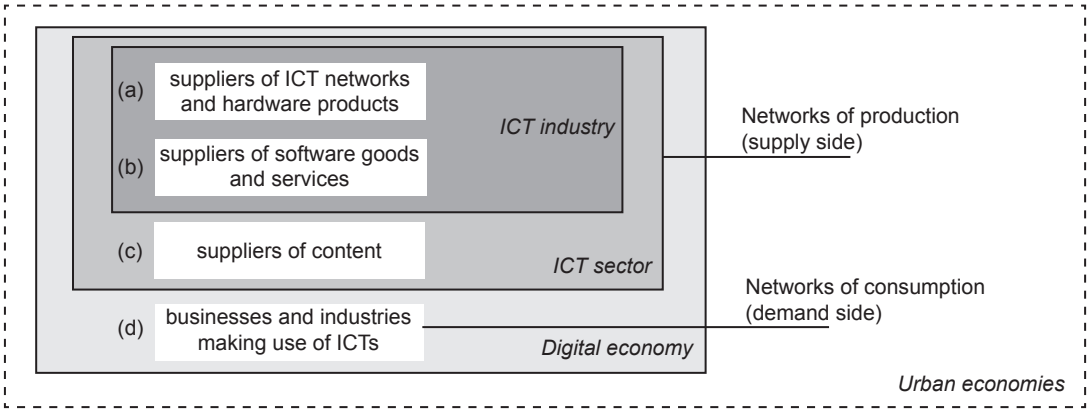


Figure 5.1. Main layers of the digital economy.

The first three layers constitute the networks of production of ICTs, or the supply side. This is the industrial machinery, the so-called the ICT sector[2], which is in charge of supplying the increasingly ubiquitous Internet system, plus other (mobile) digital devices and their content. This sector constitutes an essential part of the current trends towards the globalisation of economic activities (OECD, 2002).

The ICT industry, consisting of the first two layers, is one of the world's largest industries, which had a turnover more than US$ 350 billions worldwide in 2001. It is an industry marked by rapid technological change, which generated around 44% of the GDP in the U. S and 33% in Europe in 2001, respectively. It accounted for 22% of developing countries' exports in the same year. Investments of multinational firms in the ICT industry have been highly concentrated in South and South-East Asian countries[3] (UNCTAD, 2002). It is a highly and increasingly globalised sector, not only the producer of ICTs, but is also a heavy consumer of them. The general

prospects of the whole ICT industry remain strong, despite the general decline of the first layer since the NASDAQ crash in 2000 (OECD, 2002).

The fourth layer comprise the networks of consumption of the urban economy, the demand side, consisting of those firms making use of ICTs services and applications. Castells (2001) has emphasised that the most advanced business patterns are not only followed by global corporations, but mainly by 'network enterprises', traditional businesses that increasingly use ICT networks for production purposes and for business transactions. These are working in permanent strategic alliances and/or temporary projects with other (network) firms. This type of networking organisation is highly dependent upon knowledge and high technology. Infrastructural connectivity is very important for them; but also material and human resources, and social networks become relevant for their performance. This new networking logic represents a large-scale transformation in the whole economic organisation of nations.

a) Locational aspects of the production of the Internet

Moss and Townsend (1997; 2000), Zook (2000; 2001, 2002a, b) and Gorman (1998; 2002) have been conducting studies on the geography of the digital economy in the US since the late 1990s. Their work suggests that, despite the futurists' announcements on the dispersal and deconcentration powers of the Internet, rather than simply dispersing, the Internet economy exhibits an uneven spatial pattern that is clustering the Internet firms in core cities and privileged areas. The new digital industries are, therefore, a tale of a few metropolises, the same as the nodes of the technical infrastructure of the Internet. In general, the location tendencies follow the existing systems of location, physical infrastructure and human networks, and the economies of scale (Leamer and Storper, 2001).

Regarding the ICT industry clusters, their difficulties since the end of the Internet hype in 2000 is producing an important shift in their global geographic distribution. The Economist (2003) reports that the ICT industry investors are not focused any more on innovation and start-ups, the fundaments of the Silicon Valley, but more on consolidation, integration and execution. This is causing the rapid decrease of the Valley's traditional role as the centre of the industry. The new trend is favouring other locations in the US and Europe, where large successful ICT firms (as Microsoft, IBM, Dell) locate and, more important, some off-shore locations. India, China, Russia and Vietnam are the new preferred locations, given their low labour costs. India has been the success story in off-shore ICT services but, according to some analysts, 'near-shoring' can become more attractive in the future. In this context, countries as Brazil and Mexico might have advantages as they score better than India in some areas, while having 'near-shore' advantages (The Economist, 2003).

Regarding the spatial distribution of the content industries, several methodological difficulties appear for their analysis. The studies of the growth and concentration of Internet companies are based on bandwidth, the density of users, the geography of domain names, the location of top websites, listings of Internet firms and tracking of e-commerce sales (Zook, 2002a). The number of domain names registered by geographic area has been the most used indicator, but all these indicators have limitations since they give only partial views and suggestions of the clustering of Internet firms.

Gorman's study (2002) on the location of e-businesses has been useful to make one aware of the extent of which e-business has an urban bias. His findings, based on the match of connectivity and domain names point out that the 'web factories' tend to locate in dense urban areas instead of suburban ones. Although the hardware industry may be scattered in suburban areas[4], the important software, content and new media industries (second and third layers)

tend to be concentrated in urban clusters. Several reasons have been advanced to explain the preference of these new digital industries for urban milieus. Among them (a) availability of infrastructure, (b) proximity to other knowledge intensive firms, (c) proximity to high-technology firms, (d) proximity to venture capital firms, and (e) a lively cultural environment.

(a) The need for access to high capacity bandwidth is, without doubt, the most studied location factor for the ICT sector. As the economy becomes more and more dependant on electronic means and digital networks, the telecommunications infrastructure is becoming increasingly important for the development of ordinary commerce, in the same way as roads and highways are. Even if businesses can locate wherever they want, this does not imply they are in the same connection conditions as those located in ICT hot spots. Those sectors more engaged in electronic transactions, as the financial and business sectors, are located in the CBDs, which are the best connected locations in the globe. High-speed telecommunications connections are also of essence in the high-technology sectors, which tend to cluster in technology parks. For Gorman (2001), there exists a correlation between ICT density and productivity: the higher the ICT density the more productive the agglomeration. In turn, "*this results in a cumulative causation cycle in which agglomeration increases productivity, inducing growth, which increases density, further increasing productivity*" (Gorman, 2001:7).

(b) Software and content industries tend to locate close to information-intensive industries. The new media clusters emerge in densely populated metropolitan regions, in locations close to traditional media (especially television and publishing), advertising, computer science industries, universities and research centres.

(c) Software and content industries also tend to settle within close reach of telecom and Internet technology industries firms that provide the technology necessary to operate. Zook (2000) investigated the location preference of content firms in the US in 1998. His findings suggest that, over time, there is a stronger connection between Internet content industries and information-intensive industries (mainly software) than between Internet content and the Internet technology industries.

(d) Credit and venture capital are important factors for the start-up of new e-businesses. Castells (2001) has remarked the significance of credit, stating that the financing of new firms is the cornerstone of the existence of the new economy; no new companies can start up without money. Zook (2002b) has recently argued that the regional distribution of venture capital firms in the US has played a central role in determining the location of Internet start-ups. This correlation occurs because, on the one hand, entrepreneurs need speedy money flows and, on the other, venture capitalists rely upon local networks and knowledge for their investments.

(e) Another factor that seems to promote the emergence of content and new media clusters, the so-called 'Silicon Alleys' is the existence of a dynamic cultural life in the city. The presence of 'artistically creative people' as authors, painters, musicians, and other bohemians in cities is being increasingly linked to the existence of this sort of clusters and to economic prosperity. According to Florida (2002), cities with artistically creative people are more likely to have highly-educated workers and high-technology industries. [5] The availability of cheap real-estate space in central locations is an advantage for attracting artists and creative people.

5.2. Latin American urban economies

This section describes how the new way of organisation of the economy manifests itself in the urban economies of the Latin American metropolises. Economic globalisation, changing forms of production and the spreading of global telecommunications networks are slowly, but surely, affecting the methods of operation of institutions and firms in most sectors of the economy,

and more rapidly in the information-handling and service sectors. A great deal of business transactions is not local, but transcends city borders toward national, regional or global scales, which determines new types of production and distribution chains.

Two inter-related processes become of crucial importance for cities in the new context. The first one refers to the internationalisation of the urban economy, in which cities become much more dependent on other cities for their economic development, as part of a network of cities. The second refers to the increasing importance of the new industrial and high-technology spaces as factors of innovation and economic growth. The Latin American situation regarding these issues is described in the following subsections.

a) Latin American urban economies' links with the global networks

Within the current networking economy, cities play an important role in linking their own economies with global circuits (Sassen, 2002). Some (so-called global) cities are having a much more important role that which they had during the industrial era, raising themselves upon their national networks.[6] These first order cities function as seats of the command, coordination and management posts of the global corporations (Sassen, 2001; Castells, 1996; Graham and Marvin, 1996). But, these cities are not important in themselves, but as part of a network of cities, whose backbone is supported by the Internet backbone network.

Two inter-related trends affecting the urban economies of the metropolises deserve some special attention: (a) the opening of the economies to foreign investments and (b) the rise of enterprises providing specialised services to international corporations.

From local to foreign control and ownership

In the Latin American region, and, as a result of the changed economic context, foreign direct investments (FDI) expanded more than 600 percent in eight years, from less than eight billion dollars in 1989 to more than 56 billion in 1997 (IADB, 1999). As the investments tended to be concentrated in the largest cities, this had a great impact in their urban economies. The main modes of penetration of foreign capital was through the expansion or diversification of existing operations, the acquisition of privately owned local firms or acquisition of publicly-owned firms. In the whole region in 1997, these would account for 43%, 26% and 31% of the total, respectively (ECLAC, 1998). However, these averages hide great differences in the destination of the investments from country to country, which are attributed to the different stages in the processes of privatisation.

Most of the investments were addressed to the urban tertiary sector. Banking, urban public services (energy, water, communications and transportation) and retail were the preferred sectors (ECLAC, 1998). The financial sector underwent the most radical changes, as the largest banks of most countries were sold or began to work under the control of foreign banks. [7] Table 5.1 shows the dramatic changes in bank ownership between 1990 and 2001. The integration of financial markets also produced the opening of offices and affiliates of large foreign banks and financial institutions in the capital cities. At the same time, the stock market exchanges of Mexico City, Buenos Aires and São Paulo were introduced into the globally integrated stock market system during that period (Sassen, 2002). Foreign venture capital began to be addressed to funding and starting up new businesses linked with the most innovative and globalised side of the economy. Finally, the telecommunications sector was another strategic sector acquired by transnational firms that attracted large amounts of investment, which soon produced high revenues. Of the hundred largest branch firms, according to sales revenues in Latin America in the year 2000, 26 were operating in the telecommunications and electronics sector (CEPAL, 2001).

	1990	2001
Argentina	10%	61%
Brazil	6%	49%
Chile	19%	62%
Colombia	8%	34%
Mexico	-	90%
Peru	4%	61%
Venezuela	1%	59%

Table 5.1. Foreign control of banking in some Latin American countries in 1990 and 2001. (Source: CEPAL, 2002).

The regional economic reforms not only affected public enterprises, but also traditional private enterprises that were sold to foreign corporations, which rapidly increased their importance in the urban economies. In 1997, 40% of the total sales of firms in the region were in the hands of transnational firms. Most of these were working in telecommunications, finance and retail. In Mexico more than half of the national exports in 1997 were conducted by global corporations (ECLAC, 1998). Particularly those advanced sectors of the local economy have been the most affected by the penetration of foreign capital, in a process that has brought about transformations in urban employment, business practices and, in some cases, production modes.

The rise of specialised global firms

Of equal importance to define the position of a city in the global networks is the presence and quality of specialised firms that provide "*the management and servicing of much of the global economic system*" (Sassen, 2001). Service firms of this type have opened offices and affiliates in global cities of both North and South, according to their interest in operating in these markets. They are greatly concentrated in the central areas of those cities, close to the networks of global finance. Their main clients are the transnational corporations. They have become an essential part of the functioning of the network economy and, as such, crucial for the existence of the globalised segments of the urban economies.

Two studies provide some information about the size and nature of specialised services in Latin American cities. Sassen (2002) has researched which cities are the nodes of networks in specific financial and information-intensive sectors as insurance companies, lawyer firms, accountants, consultants, advertising, marketing, etc. Her results show how some cities are completely excluded from these networks and some others are present in some sectors. For example, her explorations in the top ten Chicago advertising (in 1999) and accounting (in 2000) firms showed that nearly half of them were operating in Latin American cities. These cities were Buenos Aires, Caracas, Mexico City, Santiago and São Paulo, which are precisely the five cities which are most integrated to the global financial markets.

A more comprehensive study was carried out by the Globalization and World Cities Study Group (GaWC) from Loughborough University, to create a roster of 'world cities' based on the presence, size and roles of four services of the global economy (accountancy, advertising, banking/finance and law firms). 122 cities were ranked according to a score from 0 (not qualified) to 3 (prime centre). This gave a total score from one to 12. The top cities were London, Paris, New York and Tokyo, all of them with 12 points. The five top Latin American cities correspond with five cities identified by Sassen. Table 5.2 shows the scores for Latin American cities. According to the study, Mexico City and São Paulo can be considered mayor world cities; Caracas, Santiago

and Buenos Aires minor world cities; and in the other five cities there would be different degrees of evidence of world city formation. It is interesting to see that six cities (the first five cities plus Bogotá) are considered mayor global banking service centres (Beaverstock et al., 1999).

Mexico City	8	Rio de Janeiro	3
São Paulo	8	Bogotá	2
Caracas	6	Lima	2
Santiago	6	Montevideo	2
Buenos Aires	4	Brasilia	1

Table 5.2. Ranking of specialised service firms in Latin American cities (Source: Taylor et al., 2002).

The presence of transnational corporations and specialised services produced an increased economic dynamism in the urban economies of these cities, as they attracted related services addressed to the new affluent groups and business visitors. Hotels and congress centres opened up their doors, and also a series of lower profile amenities considered essential for the formation and maintenance of the social networks which are indispensable in business life, such as bars, restaurants, exclusive shops and health clubs. In this way, the urban economies of the large metropolises profited from the renewed business environment linked to global circuits.

Global corporations and specialised services firms generate extremely high profits in comparison with the traditional modern and informal sectors, a fact which gives the new corporate class of professionals and executives a position of great power in the urban scene. This reordering of forces has eventually produced spatial changes that mainly benefit the new elites. The rapid and, in many cases, spectacular changes include the privatisation of large portions of urban space, the rise of consumer places and the polarisation of social groups. A real estate boom in central areas of the city was observed, in some cases with the redevelopment of old industrial spaces, the expansion of CBDs, or the gentrification of picturesque neigbourhoods.

The most dramatic changes have been in those cities which belong supposedly to the second tier of global cities: Mexico City, São Paulo and Buenos Aires. Mexico and Brazil became industrial powers in the 1970s, due to their large domestic markets and protectionist policies. Mexico City and São Paulo thus have the most dynamic urban economies, well beyond other cities in their country and in the region. Even if Buenos Aires has been traditionally an important centre at regional level, its smaller domestic market and level of local technological development makes its inclusion in the second tier cities a matter for debate.

b) Latin American metropolises in the knowledge economy

If in the industrial economy production was organised around vertically structured firms with high communication and transportation costs, in the current digital economy production is increasingly structured along horizontal networks, where firms focus on competitive niches (UNDP, 2001). In this new context, the success of firms depends highly on their ability to be involved in a knowledge-rich environment and a continual learning process. The presence of an educated work force, knowledge intensive institutions and research centres is, therefore, a requirement for the establishment of clusters of highly-specialised firms in cities with aspirations to a high position in the global economy (Basant, 2002). But, an economy based upon knowledge requires investments in human resources and in the promotion of high technology

industries (CEPAL, 2000). The United Nations' Human Development Agency insists that in the network age, even the poorest countries "*need to implement policies to encourage innovation, access and the development of advanced skills*" (UNDP, 2001: 5). The next sub-section gives an overview of the situation in Latin America.

Research and Development in Latin America

Technology has been in the spotlight of urban economic studies for decades. Since before the 1980s it has been considered that the (high) technology industry is the engine of economic growth of cities. Technopoles to promote them by linking them with research institutions emerged in different points of the planet [8], and science parks were established in the cities. The high technology industry was highly mobile, very much internationalised, and very dependent on research and development (R&D). It also relied heavily on ICTs, which were, at that time, rapidly evolving to support the new informational needs of the high technology industry, as information gathering, processing, managing and, some years later, the exchange of information. Gradually, the emphasis in economic importance shifted from the traditional production processes to the production of knowledge[9] and the knowledge sector became a fast-growing area of the global economy. The share of high-technology products in international trade doubled between 1990 and 1994, from 12% to 24% (UNDP, 1999).

In the 1990s two important trends have become visible in the R&D sector at global level. The first one is the privatisation of research, which has been linked to decreasing public funds for science and technology. The second trend is the shift away from developing countries. Research and development in developing countries has decreased from 6% of the global R&D in the mid-1980s to 4% in the mid-1990s (UNDP, 1999). Further, foreign investments for R&D in ICT, which offer good opportunities for technology transfer, is heavily concentrated in South-East and South Asian countries (UNCTAD, 2002).

Technology and knowledge-intensive firms often locate in large cities and metropolitan areas, where they can have access to highly-qualified workers, but also to a variety of educational, cultural and research activities. For this reason, the large metropolises of the region concentrate the knowledge and technology intensive industry. But, a look at the regional knowledge landscape in Latin America does not give an optimistic picture. The region lags in domestic technology effort and has a weak R&D base (UNIDO, 2003). Compared to emerging economies in South-East Asia, Latin American countries have addressed far less resources to knowledge and technology programmes and cooperation between industry and universities. In general terms, Latin American national governments have not promoted local innovation environments, letting the initiatives in hands of the private sector. Due to their (mainly extractive and tertiary) type of activities, however, the private sector has not prompted sufficient technology demands to work in close contact with local knowledge institutions and universities, to generate a 'virtuous circle' between technology innovation, growth and investment [10] (Moguillansky, 2003).

Box 5.1 shows the main issues of Latin America regarding education and technology.

Brazil constitutes the only exception to the traditional low interest of Latin American governments in technology development. Brazil is broadly considered a success story by its government's strong commitment to research and technology. In 1999 Brazil spent 0.9% of their GDP in R&D, and the goal is to get close to the 2% spent by countries as France, the Netherlands and Belgium (Ministério da Ciência y Tecnología, 2002). As a consequence of these policies, since 1996 the number of citations of Brazilian scientists has increased three times faster than the rate at global level and the country ranked 17th at global level in 2001 (Sardenberg, 2001). Brazil has achieved high FDI growth rates in software industries, telecommunications equipment and bio-technology. In terms of government usage of ICT, Brazil ranks 10th out of 82 countries in the

Box 5.1. Education and technology in Latin America

A recent World Bank report *Closing the Gap in Education and Technology* (De Ferranti et al., 2002) addresses Latin America's main deficits in skills and technology. Educational attainment at regional level is low in comparison with East Asian countries. Argentina and Chile have an educated population, but other large or even relatively affluent countries, as Venezuela, Colombia, Costa Rica, and Brazil, have great educational deficits. On average Latin Americans have 1.4 years fewer in education than would be expected for their income levels, although there are high performer countries such as Peru.

A second disadvantage noted in the World Bank report is the uneven distribution of education among adults. While in some countries there are relatively high portions of people with tertiary education, there are also high numbers of people with few years of schooling. Although primary school enrolment in the region has an adequate level, most countries present problems in secondary enrolment and some in tertiary education On the other hand, the Latin American countries have a good stock of scientists and engineers for their income levels. Enrolment rates in science and technology are not low on average. Bolivia, Peru and Costa Rica have a relative abundance of scientists and engineers, while Colombia and Venezuela have relatively few.

The report asserts that access to foreign or domestic technology is low in the region. Import penetration in general and import penetration of capital goods are both low. Workers have access to fewer computers than in East Asian countries. Besides, the average R&D expenditure per person and as percentage of the GDP is also low. Table 5.3 shows the figures for the largest countries of Latin America, East Asian 'tigers' (Hong Kong, Korea, Malaysia and Singapore), and resource-abundant countries (Australia, Canada, Finland, New Zealand, Norway, Sweden).

	Total R&D per worker (US$)	R&D as percentage of GDP
Latin America	35.6	0.5%
East Asian tigers	329.6	2.2%
Resource abundant countries	725.4	1.9%

Table 5.3 Expenditures in Research and Development in Latin America (Source: World Bank, 2002).

The report concludes that Chile, Mexico, Uruguay and Argentina are better positioned in the knowledge economy, while Brazil, Colombia, Costa Rica, Peru, and Venezuela, still need more specialised skills. Although Brazil has large number of universities and technology centres, its high level of inequality places it in the second group. Bolivia, Ecuador and other Central American countries have few innovation-related institutions such as universities and research centres and need to invest for the long term.

Global Competitiveness Ranking made by the World Economic Forum (2003). Brazil is the third developing economy in R&D expenditures financed by productive firms (see Table 5.4), having spent 1.8 billion dollars in its Information Society Programme (Sardenberg, 2001).

Country	Percentage of the total R&D
South Korea	53%
Taiwan	14%
Brazil	12%
China	6%
Singapore	3%
South Africa	3%
India	2%
Other developing countries	7%

Table 5.4. Leading developing countries economies in R&D financed by productive enterprises in 1998 (Source: UNIDO, 2003).

Technology parks and innovation clusters in Latin America

With the purpose of encouraging and the development of high technology firms and technological innovation in their localities, technology parks[11] and other 'modern' industrial units have been implemented in the last few decades in places with technological ambitions (Alaedini and Marcotulio, 2002), especially in South-East Asia. The most salient examples of this investment-oriented industrialisation strategy are Malaysia's Multimedia Super Corridor, the Dubai Internet City and Singapore's Intelligent Island. In other cases these technology parks have been the fruit of public and private efforts as in Hong Kong's Cyberport or India's software technology parks.[12]

Although there are not such huge projects in Latin American, the experience of Brazil in technology parks is remarkable. Brazil accounted for more than 150 start-up 'incubators'[13] and 40 technology parks in 2003 (Cobos, 2003). Campinas, in São Paulo, is the largest and more significant technology park in Latin America (see Box 5.2).

Policies to encourage technology parks in other countries than Brazil have been much more recent, weak, or in some cases simply do not exist. Mexico, the tenth world economy, began to create business incubators in 1990. There were fifteen incubators in 1999, and there are two technology parks in Morelos (created in 1988) and Guadalajara, Mexico's Silicon Valley, (in 1997) linked to the respective universities (IADB, 2001). The Sartenejas Technology Park linked to the Simon Bolivar University in the hills of Caracas and the Mérida Technological Park, linked to the University of The Andes are the examples in Venezuela. In Argentina and Chile technology parks are a recent policy. There are nine parks and eleven incubators in Argentina, according to the Argentinean Association of Technology Parks. Seven of them are linked to the National Institute of Agronomic Technology, one to the Litoral National University and the Constituyentes Technological Pole in Buenos Aires, linked to the San Martin National University. The only technology park in Chile is the Valparaiso IT-port. In all these countries (Brazil, Argentina, Chile, Mexico and Venezuela) there are active policies to promote technological parks and, in many cases, associations promoting high-technology firms.

Innovation clusters also appear in a given location around firms that belong to the same or to related lines of business. According to the definition of the UNCTAD, innovation clusters are clusters of knowledge intensive activities that are able to undertake technology innovations, design new products and processes and bring them to the market[14] (IADB, 2001). The most known world example is Silicon Valley. The existence of a cluster in a region is an important indication of its economic dynamism. Since the most complex, innovative and advanced activities require long-term relationships, closeness and agglomeration, high-technology manufacturing firms and knowledge-intensive industries are highly clustered. (Storper and Leamer, 2001).

Box 5.2. Technology parks in Brazil

Brazil turned into a true industrial power, the eighth in the world, in the 1970s. Its large-scale and diversified industry is the result of an economic history which relied heavily on the substitution of imports, and more recently internationalisation of production processes. Brazil launched its Technological Innovation Programme in 1982 as the first initiative to link academy and industry. Universities and research centres initially created thirteen nodes. In 1984 a programme for the implementation of Technology Parks was created. In 1987 there were sixteen of them in Brazil, and the ANPROTEC (National Association of Institutions Promoting High Technology Firms) was established. But, the economic crisis triggered a period of low activity between 1987 and 1992.

Since 1993 a new impulse was observed, linked with increasing links between academia, commercial and industrial associations and (public) development banks. In 1996 there were sixty start-up incubators and seven technology parks. With the leadership of ANPROTEC and the clear support of SEBRAE (Brazilian Service of Support to SMEs) there have been great advances in this area in the latest years, although a drawback is observed in the concentration of innovation firms in the South and South West regions of the country. At present, the most important technology parks in Brazil are Campina Grande, Campinas, Curitiba, Florianópolis, Rio de Janeiro, Santa Rita de Sapucaí, São José dos Campos and São Carlos.

Campinas is the most consolidated park, with innovation clusters in micro-electronics, telecommunications, computer science and informatics. It counts with the State University of Campinas (UNICAMP), the Pontifical Catholic University (PUC-CAMP), the Research and Development Centre (CPqD/TELEBRAS), the Technological Centre of Informatics (CTI), the Síncrotron National Light Laboratory (LNLS), the Agronomic Institute of Campinas (IAC), the Centre of Technical Integrated Assistance (CATI), the Institute of Technology of Food (ITAL), the Biologic Institute, the Brazilian Company of Agronomic Research (EMBRAPA), the Technology Development Company (CODETEC) and the Research and Technology Foundation André Tosello. It also counts with excellent ICT infrastructure and fast accessibility to São Paulo airports and other main highways. It is located at one hour from São Paulo.

(Source: Theis, 2002 and Firmino, 2000).

An inventory of (high technology) innovation clusters over the region in 2000 pointed to 33 clusters, with a great concentration in Brazil, which had two thirds of the total number (22 clusters). There were also six clusters in Mexico, two in Argentina, one in Costa Rica, Uruguay and Cuba (IADB, 2001). The segments that they cover include microelectronics, telecommunications, computer science and informatics, software, automation engineering, biotechnology, electronics and aeronautics.

The outlook regarding research and development and technological innovation in Latin America indicates that there are great challenges and gaps in the knowledge base of the Latin American metropolises, as well as the region's technological capabilities. The main problems refer to the limited knowledge flows, low innovation output and low synergy among universities, private sector and the government (IADB, 2001). This adverse situation endangers the economic performance

of the region. Latin America's low productivity and capacities regarding technological innovation are not only making its future problematic, but they are also considered to be an important reason of the poor performance and the recurrence of crises of its economy since the 1980s.

Furthermore, there are great intra-regional differences, which reflect the socio-economic conditions of the different countries. Geographical and locational conditions may also play a significant role. As Jeffrey Sachs (2000) explains, technology is absorbed easily when places are close to big world markets and/or located in important sea routes. It does not 'flow' easily to remote mountainous regions, or areas far from seaports. According to these criteria, in the Latin American region, Mexico, and the Mercosur countries are much better located than the Andean countries for technology transfer. Correspondingly, the geographical distribution of technological development in the region has two sides: the technological adopters: Argentina, Chile, the South and South-East of Brazil, Uruguay, Costa Rica and Mexico (except the South part); and the technological excluded: the rest (Sachs, 2000).

Looking at the global picture, not even 'the technology adopters' of the region are in a good position. Table 5.5 shows some important indicators of the state of the local production of knowledge and technology, showing the great differences that the largest technology producers have with Spain and the Netherlands in the 1997. A significant leap forward regarding science and technology is indispensable to become integrated in global flows of production, commerce and innovation.

	Scientists & engineers in R&D Per million inh.	**Technicians in R&D** Per million inh.	**Tertiary enrolm. science & techn.** Last available year	**Graduates in science & techn.** % of older than 24 years population	**PhDs in science & techn. 1996-97** Per million inh.	**Scientific and technical articles** Per million inh. 1995	**Patents granted** Per million inh.	**Receipt from licenses** US$ per thousand inh.	**Expenditure in R&D**	
									In % of GDP	In US$-PPC per inh.
Argentina	660	147	0.641	1.5	11	75	8	0.5	0.38	45
Brazil	168	59	0.238	1.7	11	34	2	0.8	0.81	55
Chile	445	233	1.080	2.5	3	97	0	6.6	0.68	57
Mexico	214	74	0.528	2.7	4	32	1	0.4	0.33	27
Spain	1305	343	1.320	6.0	65	392	42	8.6	0.90	162
NL	2219	1358	0.595	6.0	98	1637	189	151.2	2.08	502

Table 5.5. Performance of four Latin American countries in the knowledge economy in 1997, in comparison with Spain and the Netherlands (Source: Moguillansky, 2003).

5.3. Networks of ICT production in the urban economy

Having analysed the situation of the Latin American urban economies regarding the most important criteria for the adoption of ICTs, the present section focuses on the production of ICTs by the same urban economies: the ICT sector. In general terms, the largest players in this sector are Brazil and Mexico. Brazil's ICT sector growth has been very dynamic and now it is considered among the world ten largest markets with annual revenues of approximately of US$55 billion in services and products in 2001 (OECD, 2002). Mexico is another important world player, one of the largest ICT manufacturers among OECD countries.[16]

a) Hardware industries

The computer industry had an impressive growth during the last fifteen years, as the personal computer jumped from the work floor to the home environment. But, computers are only the terminals in the global infrastructure that connect us to the world. The growth of industries that manufacture the equipment (networks, switches and routers) that make part of the Internet infrastructure has also been remarkable in the latest years, as the world has become more and more interconnected. The main segments operating in this first layer are:

- Hardware products: computers, their components and peripherals;
- Telecommunications equipment;
- Digital electro/electronic equipment;
- Electronic components, microelectronics and general opto-electronics

Multinational companies which control global technology standards dominate most of the four layers, but particularly hardware. The main centres of hardware and telecommunications equipment firms at global level are located in Silicon Valley (Cisco, Intel, etc.) and around the headquarters of the largest enterprises: Nokia (Finland), Ericsson (Sweden), Sony (Japan), ATT, IBM, Microsoft, Motorola (US), Phillips (the Netherlands), Siemens, (Germany), etc. These are the powerful corporations that produce great part of the technological knowledge in technology parks located at the edge of large metropolises. Most of these corporations have branches and offices in the Latin American metropolises, which vary in size according to the size of the markets. [17] In Latin America the largest innovation clusters focused on electronics are Santa Rita de Sapucaí, (Brazil) Cuernavaca and Guadalajara (Mexico), and Campinas (Brazil) in micro-electronics (IADB, 2001).

Hardware production is a particularly difficult segment because it requires massive economies of scale and good funding. The only Latin American countries that count with an indigenous hardware industry are Mexico and Brazil, the countries with the largest domestic markets and largest metropolises. Both countries used to have highly protectionist policies for their computer markets. Brazil's policy was to reserve the mini-computer and PC markets for local firms and joint ventures. Mexico banned or limited some categories of computer hardware import to promote own production (Kraemer and Dedrick, 2001). But, after the computer markets became ICT markets with the introduction of Internet, international pressure for liberalisation forced these two countries to open up their markets.

Mexico passed rapidly to nearly complete liberalisation, abandoning its Computing Program in 1990. The remaining 20% tax on hardware imports was withdrawn in 1998 due to NAFTA's economic integration policies. Brazil has been more cautious, removing most protectionist measures in 1992 but has retained some policies favouring local production (Kraemer and Dedrick, 2001).

The impacts of the opening-up to foreign competition in the hardware industries were dramatic in both countries. Most local producers were driven out of business. Brazil has not developed export oriented hardware production, but has had an important growth of production for its large local market (Kraemer and Dedrick, 2001). The most interesting local innovation is the 'popular computer'.[18]

Mexico eventually created a more attractive environment to develop as an export base, which has worked because of its nearness to the U.S. market. Currently the electronic industry is the first export sector (30% of total exports which account for US$ 43 billion in 2001), generating

employment for more than 360 thousand employees (Secretaría de Economía, 2002). However, this industry is not the product of Mexican own industrial development, as in the hardware industry in Brazil, since the growth has been mainly supported with the establishment of *maquiladoras,* which are assembly plants. Since 1994, the opening of the US and Canadian markets with the NAFTA gave a great new impulse to the industry, especially in the late 1990s. Four main clusters have emerged: Baja California (manufacturing of audio and video equipment); Jalisco (computers and telecommunications); Mexico State (telecommunications) and Chihuahua (audio and video). In 2001 there were more than 1300 enterprises in this segment, from which 56% were *maquiladoras* (Secretaría de Economía, 2002).

However, the hardware and telecommunications equipment industries have experienced great difficulties since late 2000 (OECD, 2002). This was partly because of declining ICT spending rates by companies in the U.S. (Castells, 2001). Brazil has not suffered from this because its industry is not exporting. In Mexico this contraction of the global market has had a great impact. The industry reduced itself 8.8% in 2001, which was translated in a decrease of 5.6% of jobs.

Beside Brazil and Mexico, there are no other countries with a sizeable domestic manufacturing industry for hardware, telecommunications or digital parts or equipments. However, some multinationals have opened up plants in other countries, from which the largest is Intel in San José, Costa Rica.

b) Software industries

Because of the difficulties in manufacturing, the focus of international investment in ICTs is shifting from manufacturing towards software. Software is one of the most rapidly growing and evolving sectors, with a crucial role in the ICT sector and the digital economy (OECD, 2002). Software industries not only produce the computer programmes that we use in computers, but also the software that programs the functioning of the increasingly complex electronic devices embedded in cars, household appliances, traffic control systems, security systems, elevators, telephones, photo cameras, audio and video equipment, etc. Trade in software goods and services has increased visibly in the latest years, but it is difficult to measure (OECD, 2002).

Large multinationals also dominate in this industrial sector, in which Microsoft, the firm that has made its owner the richest man on earth, is the first player. This industry is highly attractive because its products are essentially pure added value (Baeza et al, 1995), as software production is an industry based on skills and knowledge. In this segment, considered to be at the heart of the digital economy, firms can start up without massive investments finding niche opportunities in the local market. Software has become one of the most rapidly growing and evolving segments of the whole ICT industry, growing at 16% a year in OECD countries and in Brazil and China at even higher rates (OECD, 2002). It generates high revenues, with operating margins up to 80%, as in the case of Microsoft (The Economist, 2003).

In Latin America, local software and services firms have benefited from the effects of the liberalisation of the hardware segment, which has produced cheaper hardware and a growing domestic market. Brazil is the only large player at global level; most countries have developed a modest software industry for the domestic demand, and some are exporting to the region. But in general, the Latin America software industry, which tends to be composed by micro (less than 15) or small enterprises, lacks appropriate distribution channels and is mainly geared to its domestic market. As human resources are a basic requirement, these industries are undoubtedly larger in those countries with the highest proportion of engineers. Other factors that promote the growth of software firms are good financing possibilities, strong marketing capabilities, product quality and proximity to centres of technological innovation (Baeza et al., 1995). Table 5.6 gives an idea about the size of this sector in some countries in 1999.

	Turnover (in million US$)	Exports (in million US$)	Persons Employed	Number of firms
Brazil	8038	40	na	2500
Uruguay	180	60	2500-3000	150
Argentina	1340	35	15 000	500
Costa Rica	n.a	50	3500-4000	150
Chile	125	15	n.a.	n.a.

Table 5.6. Software sector in some countries of Latin America in 1999 (Source: Chudnovsky and López, 2002).

Brazil launched a policy to promote their local software industries in 1993, the SOFTEX 2000 plan, addressed to investment incentives, incubators for start-ups and software export promotion. A recent study on the software industry in Brazil (MIT & Softex, 2002) has pointed out its main successes and challenges. Between 1991 and 2001, the participation of the software industry in the Brazilian GDP has tripled. Brazil is now rivalling India and China in size and constitutes the seventh software market of the world. Compared to China and India its products have a high level of quality and sophistication.

There are five innovation clusters dedicated to software in Brazil, located in Curitiba, Espírito Santo, Porto Real, Porto Alegre, Rio de Janeiro, and San José (IADB, 2001). Brazilian companies are characterised by their high flexibility and creativity, and some engage in forceful experimentation in software products. The private sector invests a growing part of their revenues in R&D (8.4% from their total turnover in 1999). It has good possibilities to continue growing by local demand, since some of its customers are demanding world-class sectors as the Brazilian finance sector, e-business, e-government, telecommunications or retail. However, this strong domestic demand discourages export. The market is fragmented and dominated by small companies with little synergy and the industry is highly concentrated in the South East of the country (MIT & Softex, 2002).

Argentina's software industry is not known outside its borders. However, this industry continued growing in times of deep economic recession and is now the second in Latin America. A recent survey (Chudnovsky and López, 2002) indicates that most firms in this sector are young, having been established after 1990. The main customers in this segment are large firms and the government, which buys exclusively from the large (foreign) firms. These account for two thirds of the total turnover of the sector. On the other hand, the main clients of the smaller software firms are SMEs.

The structure of the software industries in Argentina is similar to situation in the rest of the countries, with the exception of Brazil. Software industries, both products and services, are generally dominated by large foreign firms. These sell foreign software products and usually provide software services. On the other hand, there are several small and young local firms that develop software products and provide services. Networking between them is weak, there are almost no R&D activities and there are few innovation possibilities. Access to investment and capital is another problem that constrains their growth.

Of the largest countries Mexico has three advantages for software export: good location, demographic profile and technological level. However, the software industry is still incipient, accounting for only 0.1% of the GDP in 2000 (Secretaría de Economía, 2002). Chile used to have a successful software industry in Latin America in 1995, exporting its products to other Latin American countries (Baeza et al, 1995). However, the industry lost momentum with the

advent of Internet and now the government tries to once again promote it. In Venezuela, despite the ability of local engineers, the lack of public policies and financing, bad marketing and the preference for property software has produced an under-developed software industry (UNDP, 2002a). Some governments have begun policies to promote the software export industry, with more successful results in Uruguay and Costa Rica.

Besides the great difference in size and development, what all the local Latin American software industries have in common is that they have developed in order to attend the domestic demand and not to export. However, at present, the export base of a city and region is increasingly considered as a crucial asset for its economy. According to the type of product (goods or services) and the type of market of these products, the software sector can be divided in four main sectors (see Figure 5.2). The current economic trends towards services and exports make segment (A) the most advantageous for urban economies and (D) the least (Heeks, 1999). However, in Latin America, as in most of developing countries, most ICT sector industries are found in the D segment.

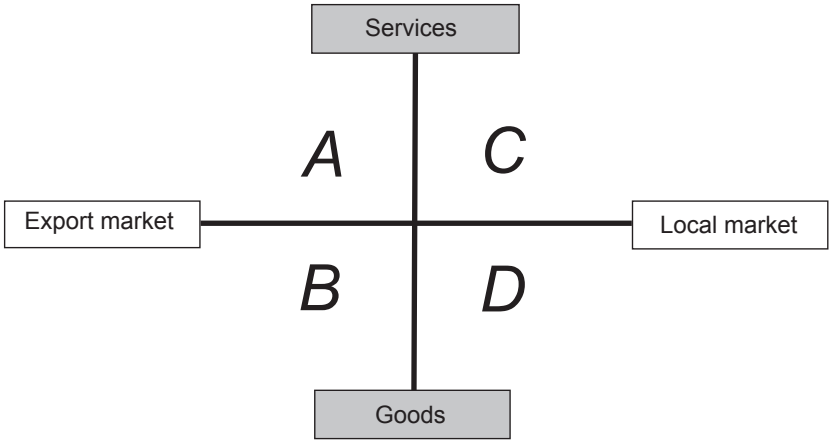


Figure 5.2. Software sector according to type of market served and type of business (Source: Heeks, 1999).

Statistics show that the penetration of high quality software systems in Latin America is very low, especially in the productive sector (CEPAL, 2002). This is not a surprise, considering that great part of the economic activity in the large cities is in the informal sector, and in SMEs. In Chile, for example, only 28% of the SMEs working with PCs used software applications for their business relationships, although 54% used email (CEPAL, 2002). In Mexico, it is considered that 98% of the potential market consists of 'emergent' type of enterprises, which consume few software and of low level of sophistication. This means that the local market is not large and demanding enough to develop a strong software sector.

c) Content production industries

As the software industry, the content provision industry is another segment that is knowledge intensive and with high value added. It consists of professional providers of online entertainment, news, e-marketing, e-advertising and new media.[19] In cyberspace, these new business activities are translated into portals, online newspapers, journals and magazines, bulletins, and websites where people can read or download information or get content services. As the cultural weight of content production is highly significant, these industries have a strong relationship with the cultural industries.

It is clear that the distribution of firms supplying Internet content or services is highly concentrated in some locations. Although the US supremacy is slowly decreasing over time, content production is still concentrated in the US[20] and the English language is still the main language in the World Wide Web. This industry emerged only after the advent of the commercial Internet, specifically of the World Wide Web in the mid-1990s. Therefore, it is very young and still evolving, and maintains strong links with the ICT industry and to traditional media firms, their main suppliers. Partly for this reason, content industries tend to function in clusters. Three regions - San Francisco, New York and Los Angeles, are the main centres for Internet content in the United States both in terms of absolute size and degree of specialisation (Zook, 2000).

Argentineans were considered the largest producer of Spanish-language content on the Latin American cyberspace during the early years of the introduction of the Internet (Hilbert, 2001). Argentina experienced a spectacular growth in domain names during 1999 and 2000. [21] In 2001 it had the same number of domains names than Brazil, which meant a high number of them per person (Zook, 2001), since Argentina's population is 8 times smaller. Later, Hispanic groups living in the US acquired a strong presence in the Latin American cyberspace. [22] The other large producers are Brazil (in Portuguese for its large domestic market) and Mexico, the countries with the largest amount of users of the region. The region is highly appropriated for a pan-regional production of online content due to the characteristics that most Latin American countries share, as language, religion, historic past, demographic trends, similar values, attitudes and lifestyle of their population. For that reason there was a large potential market for the production of Spanish-language content in the region. Three main groups began to undertake activities in this industry: (a) the telecommunication providers, (b) the traditional media conglomerates, and (c) smaller local firms.

(a) For the first group, the production of content has been considered a crucial activity. As 'owners' of the networks that distribute digital content, their obvious next step as telecommunication carriers was to produce content in order to control the whole business. Since digital convergence, fixed and mobile telephone, broadcast and Internet network firms have been coming together, establishing multi-provider partnerships to deliver digital context through text, voice, data, music and images. Later, they have also made alliances with media giant firms searching to have a pervasive control of these industries considered as a strategic branch for the dominance of the whole telecommunications market. The capability of (digital) content to influence large audiences, to filter messages, and to funnel and direct audiences to other lucrative economic activities makes these industries strategically important. Examples of large portals established with the object of the domination of the Latin American market are the ones of Terra Lycos, owned by Telefónica, and Brazil's UOL.

(b) The second group was established by the leading media groups producing contents in traditional media for the local or regional market. Knowing their exceptional advantages for the provision of news and entertainment, they decided to turn into the business of online content to promote their TV channels, newspapers and magazines, expecting to generate synergies between old and new media. Aware of the importance of the distribution of content, they also jumped into Internet provision. The early adopters in this process were Televisa in Mexico; Abril, RBS and Globo in Brazil; the Venezuelan Cisneros Group in the US; and the Clarín Group in Argentina. Not long after Univisión, a Spanish-speaking U.S. chain, and El Comercio Group in Peru followed (Smirnoff, 2000). This group has so far the greatest success in this business, as the online versions of the most popular newspapers, transformed into successful portals, are now among the most visited websites in their respective countries[23].

(c) The third group was the product of the enthusiasm of small entrepreneurs that viewed the Internet as a new medium for business. Soon after the launching of the commercial Internet,

small content firms were rapidly established throughout Latin America, following the Internet hype, whose slogan 'Content is king' became very popular. Foreign venture capitalists were pumping money into emerging Internet start-ups in Buenos Aires, Paulo, Mexico City and other major cities, seeking business ideas for portals that could reach Latin America's large population. A portal is typically a 'gate' to other websites, it has a search engine, and generally offers news and registration for (free) webmail and other services The so-called vertical portals are focused on specialised topics as stock market news, financial services, retailing, sports, entertainment, automobile sales, real estate, etc. Their multiple features allow portals to generate as much traffic through their site as possible. Due to the interest of companies in the other layers, portals often are combined with an ISP (as AOL, TerraLycos, StarMedia) or a browser (Netscape, Microsoft Explorer) (Hilbert, 2001).

Figure 5.3. Total number of country code domains per city in Latin America during January 1999 (The size of the balls correspond to the number of domains) (Source: Zooknic, 2000a).

From all Latin American metropolises, Buenos Aires was which experienced the largest growth in content industries during the period of the Internet hype. One year after the introduction of the commercial Internet in Argentina there were more than 300 firms trying to provide content in Buenos Aires (Clarin Digital, 1996). Sixty-seven new portals went online in Argentina during the month of November 1999 alone (Smirnoff, 2000), most of them in Buenos Aires. Figure 5.3 shows the total number of country code domains by city in 1999, illustrating the leadership of

Buenos Aires. In 2000, Argentina ranked 12th in the list of countries with the higher percentage of the world's domains (Zooknic, 2000b).

However, the Internet hype did not last and the economic conditions in Argentina deteriorated dramatically with the peso devaluation in December 2001. According to a study of Price and Cooke 79% of the Argentinean dotcoms disappeared between November 2000 and April 2001 (Millán, 2001). 60% were in their initial phase of development and could not find credit to finance their continuation in business.[24] But the downturn of the telecom business and the dotcom crash affected not only small beginners, but most content firms, even the largest. Most had to downsize, reducing their number of employees from 25% up to 30% less (Millán, 2001).

The most successful Internet portals in Latin America are StarMedia (Cade in Brazil), Terra, ElSitio, Brazil's Universo Online (UOL), Yahoo! and Patagon, a financial portal. UOL is an important player as it holds more than 60% of the large Brazilian market (Hilbert, 2001). These pan-regional portals offer content in Spanish and Portuguese and customising information for the individual Latin American countries.

5.4. Networks of ICT consumption in the urban economy

This section refers to the enterprises and institutions which use ICTs to carry out their business activities with both clients and other businesses, and which, in reality, constitute most part of the new logic of the urban economy. Immediately after the opening up of the Internet to the broad public, electronic commerce became a segment embraced with great enthusiasm and optimism by business people. The initial enthusiasm of (venture) capitalists was focused towards the establishment of new (dotcom) firms, but this changed drastically after the dotcom crash in 2000. The enthusiasm of capitalists has decreased greatly and the interest is now geared towards established (brick and mortar) firms that increasingly use ICT network and flows. Castells summarises the new spirit: "*The commercial Internet is not about web companies, but about companies on the web"* (Castells, 2001:213)

A recent e-commerce report by The Economist (Markillie, 2004) states that e-commerce is getting bigger each year, especially in books, music, leisure travel, but several other sectors such as pornography, online auctions and gambling are also highly profitable. But, not only a large portion of the global economy is moving into cyberspace, more importantly, the report confirms Castells' observations, verifying that the Internet is exerting great influence over offline purchases, profoundly changing consumer behaviour. This, in turn, is having great implications on the way businesses are conducted. Websites, even if only informative, have strategic importance for business.

In Latin America, the introduction of the Internet is also having clear effects on the organisation of productive processes of traditional businesses (CEPAL, 2000). The diffusion of Internet in established businesses is relatively high: between 50 and 70% of Latin American firms operating in the formal sector are estimated to have access to the Internet (UNCTAD, 2002). The Internet has become widely used for business contacts (through email) and business information gathering. Although many enterprises also publish webpages as a brochure of their activities, and marketing campaigns through electronic media are increasingly popular, only a minority of established firms carries out electronic transactions or uses business software as a tool for efficiency and lowering costs. An example of this trend is seen in the main activities of the firms connected to the Internet in Chile in 2003, as Figure 5.4 illustrates.

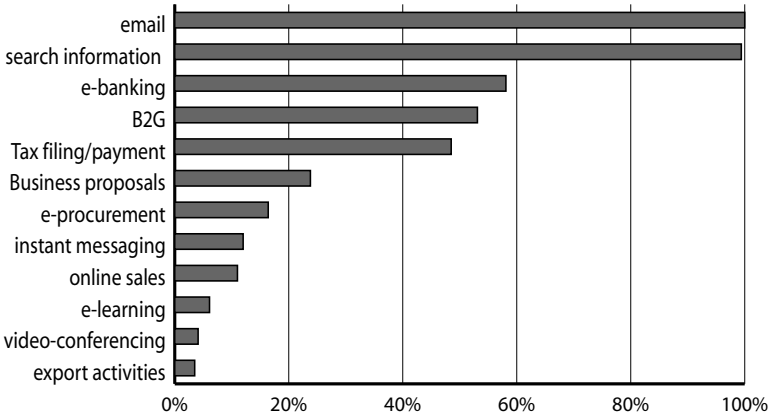


Figure 5.4. Main online activities of firms connected to the Internet in Chile in 2003 (Source: CEED, 2003).

Electronic transactions for business and commercial purposes are better known as e-commerce flows. There are multiple interpretations of what it understood by e-commerce flows. The narrowest definition includes only effective online transactions while the broadest definition includes the phases of interaction and information management. OECD's definition, one of the most used, is among the broadest: "*the exchange of information, services, products and payments by means of an electronic medium*" (OECD, 2002). There are two main types of electronic commercial flows: B2B (business to business transactions), and B2C (business to consumers transactions). There are also other less sizeable types as C2C (consumers to consumers): electronic marketplaces and auction sites, G2C (government to consumers): as online tax filing and paying, and B2G (business to government): e-procurement. At global level e-commerce is slowly growing, but it is still in its infancy (OECD, 2002). In OECD countries e-commerce accounted for 1.33% of the total GDP, and 1.63% in the US in 2000 (Tigre, 2003).

The main model of e-commerce in Latin America is B2B rather than B2C, accounting for more than 90% of the total e-commerce transactions in 2000 (see Table 5.7). The low levels of B2C are linked to several limiting factors: low Internet penetration, low credit card penetration, low confidence in Internet transactions and small domestic markets.[25] On the other hand, B2C in the region still mainly involves imported goods, although the picture is slowly changing. The most developed e-commerce markets are located in the largest and most developed economies: Argentina, Brazil, Chile and Mexico (UNCTAD, 2002). Table 5.7 gives an idea of the e-commerce flows in 2000. However, in some countries e-commerce flows have increased notably since then. For example in Chile, the total e-commerce amounted US$ 2470 millions in 2002, and it is expected that will increase up to US$ 3800 million in 2003 (CEED, 2003). Most of the flows are in the B2B segment.

OECD IT Outlook (2002) highlights that at global level Internet transactions remain concentrated in a few sectors of the economy. Even in the US there are significant divides regarding e-commerce adoption, which is shaping a new geography characterised by hot spots and by-passed regions (Zook, 2000a). This is also the case in Latin America, where the information-intensive sectors have been the early adopters. High technology manufacturing, financial and business services firms have been the first ones to adapt to the new business models and network flows, and they are the most sophisticated users. But, as a large part of the economy is constituted by SMEs and functions in the informal sector the prospects for the whole economy are not too favourable.

	Trade in B2B in 2000, in US$ millions	Trade in B2C in 2000, in US$ millions	Percentage of B2B from total e-commerce	e-commerce as % of GDP in 2000
Argentina	634.99	52.58	92.4%	0.24%
Brazil	1720.78	202.86	89.5%	0.32%
Chile	228.61	15.86	93.8%	0.35%
Mexico	1753.86	82.35	95.5%	0.32%
Venezuela	285.44	9.10	96.9%	0.24%
Latin America	4323.66	362.74	94.2%	0.30%

Table 5.7. E-commerce in Latin America during 2000 (Source: Tigre, 2003).

Due to the expensive prices, only recently has it made sense for Latin American firms to consider technical innovations as an effective business tool. EDI (Electronic Data Interchange)[26] and ERP (Enterprise Resource Planning) solutions, the predecessors of e-transactions, were seldom adopted in Latin America given the high costs involved in setting up these systems and maintaining them (Tigre, 2003). But, the Internet based solutions have become a good, cheaper and easier alternative. In some sectors as e-banking and Internet tax collection, the large Latin American countries are considered as world players.

Brazil was the first Latin American country to move into electronic banking, while Mexico, Argentina, Chile, Venezuela and Colombia have been following its steps quickly (IADB, 2001). E-banking became diffused and accepted within Brazil considerably earlier than in developed countries.[27] In 2001, more than two-thirds of all banking transactions done in Brazil (67.1%) were labeled as 'electronic,' according to the national banking association (Tigre, 2003), and some time later the figure grew to 81% (AHCIET, 2002). In November 2002, the director of Unibanco stated that Brazil has the second largest market in e-banking in the world (AHCIET, 2002). In January 2003, a study of Nielsen/Net Ratings positioned Brazil fifth in e-banking penetration among Internet users, with a percentage of 36,2% (AHCIET, 2003). With their successful experience, major Brazilian banks are entering the retail e-business, taking advantage of their existing infrastructure and client base.

National governments are also important participants in the e-commerce flows, especially in those countries with more progressive policies such as Chile and Brazil. Governments are important traditionally in Latin America as large producers and consumers. Currently, their main governmental activities online include e-procurement, information services, and tax collection through the Internet. In Brazil 90% of people and all firms send electronic tax filing (Tigre, 2003) and in Chile this is 49% (CEED, 2003), a high portion for developing countries.

Online retailing is only focused on the high income market and is still at an early stage of development. However, major supermarkets and department stores in the large cities are already heavy users of e-commerce to deliver purchases, and to manage their logistic activities. They are capitalising on migrants' wishes to help their families back home, ordering gifts for Christmas, Mother's Day, birthdays, etc. An interesting example is Magazine Luiza, one of the four largest department stores in Brazil. Since 1992, Magazine Luiza has opened 37 virtual stores, several of them in low-income neighbourhoods in São Paulo. The virtual stores have large PC screens operated by store employees to help the customers choose what they want. The store also gives credit, because their low-income customers usually do not have a credit card (Carrasco et al., 2003).

Brazilian businesses are very open to innovation and are enthusiastic early adopters of the new technologies. The high levels of penetration of electronic banking and e-commerce, the huge growth of mobile telephone subscriptions; and the remarkable percentage of Brazilian tax payers who deliver their annual tax declaration via Internet are some examples of the depth of ICT use in the Brazilian context. Table 5.8 gives the list of the ten most important sectors engaged in e-business and e-commerce in Brazil, and their main online activities.

Sector	Online activities
1. Finance	Procurement, logistics, B2C
2. Government services	Information services, tax collection, elections, procurement
3. Retailing	Transactions, investments, B2C
4. Automobile industry	Supply chain management, components trade, on-line sales
5. Transportation and distribution	Auctions for idle capacity, transport supply sites
6. Construction	Bidding, sub-contracting, material trade
7. Pharmaceutical	Supply chain and distribution to retailers
8. Electronics Supply	chain management, distribution, B2C
9. Agriculture and food	B2B marketplaces, equipment and parts supply
10. Petrochemicals	Sales of intermediary goods, plastics and chemical products

Table 5.8. Top ten e-business and e-commerce sectors in Brazil (Source: Tigre, 2003).

However, analysing Latin America's domain names to try to identify the main concentration points of ICT consumption and their size is of no use in the Latin American context. This is because a large number of the Latin American dotcoms or even the established firms, as banks and retail stores, have a (.com) US commercial domain instead of their own country domain. This is happening because although the firms are physically located in Latin America, their server is in the US, in most of the cases in Miami. If they are virtually located in Miami, in the domain counts they appear as Miami firms. Miami is not only the main node of the Latin America Internet backbone, it is also an important site for the collocation business (data centres) at global level. Gorman (2001) has identified Miami as the top location in the US in number of domains served per firm, which gives a good indication of possible demand for e-business services. Miami is well ahead the rest of the US cities, which is remarkable because Miami is a not location often seen in other top Internet indicators. Gorman states that the possible reason comes from Miami's role as an ICT gateway to Latin America. This suggests Miami has become the main node of e-business for the Latin American region.[28] This position of Miami as main e-business node, coinciding with its position as main node in the Internet backbone network, suggests a degree of correlation between the situation of the cities regarding the first level of networks and the networks of consumption in the urban economy. [29]

The position of Miami as the most important node in the Internet backbone network, and as equally important e-business node should not be a surprise within the context in which the introduction and development of ICTs in the region occurs. Miami is, undoubtedly, the best geographic location to bridge Latin America and the US networks. Additionally, Miami has enjoyed a reputation as the business and finance capital of the Latin American market for decades. US firms in both finance[30] and entertainment sectors, have made Miami their

headquarters for the Latin American market. With respect to its high proportion of Hispanic population, Miami advertises itself as “a Latin American city in the United States”. These strong economic and cultural links and its favourable location make it the ideal ICT gateway between the two worlds.

5.5. Conclusions

This chapter has provided initially the analytical frame to guide the exploration in the following sections, describing some locational aspects of the production of Internet. The following section has explored the main links of Latin America’s urban economies with global networks and the place in the knowledge economy. It has been useful to point out the huge differences in terms of high-technology and knowledge industries among countries of the region. Methodological limitations have to be acknowledged, given that most information on these issues is only provided at aggregated (national) level and not at city level. However, since ICT industries rely heavily on good ICT connectivity, it seems obvious that most of these types of industries are located in the large metropolises.

Regarding ICT production, while most countries score low in high-technology production, Brazil stands out as a remarkable exception, as a good example of government promotion of (high) technology for more than a decade. The size and nature of the ICT industries and the ICT sector among countries are both very variable. The hardware industry is of great importance in Brazil and Mexico, the largest markets and the only significant manufacturers of the region. As most Latin American cities have almost no home-grown hardware sector, the largest and more profitable industries of the first layer are large foreign corporations (Cisco, Intel, Nokia, IBM, Motorola, Sony, NEC, etc.) which decide to establish and locate their businesses according to their own goals and profits.

The opportunities for other countries are mainly centred in the software and services industries. A positive factor for them may be that in the ICT sector the largest added value lies in software and services, not in hardware. However, the situation of hardware is reproduced in the software industries, also dominated by large transnational companies. Microsoft, Sun, Oracle, Adobe, IBM, Siemens, are examples of these. Some countries have more opportunities to develop local software industries, especially when there is government promotion and availability of funds.

With regard to the strategic content industries of the third layer, they are dominated by two main groups: large media conglomerates and the same large telecommunication firms that dominate the infrastructure networks. Additionally, many of these corporate giants are working in more than one of these layers, and/or have made alliances with large players working in other layers. The general tendency of the last years has been to concentrate ICT businesses as much as possible, especially among carriers and content industries.

As a result of the merges, alliances and other circumstances of this rapidly evolving ICT sector, the greater part of the networks of Internet production in the Latin American metropolises are in foreign hands, and respond to decisions that are strange to the local circumstances or in benefit of the whole society. The largest cities and markets have a more important share in the local Internet production. This is especially clear in Brazil, where the government has developed a long term technology promotion policy that is already harvested fruits. Most firms originated in Brazilian incubators belong to the software sector. This successful example highlights the relevance of the role of the government in promoting the urban economy.

Regarding the local consumption of ICTs by the urban economy, part of the local economies have modernised their business activities and office spaces, providing them with specialised

software and high-speed ICT connectivity. Indicators show that intensive ICT use is present and visible in the more advanced and modern side of the city and of the urban economy, mainly in hands of foreign corporations, which is in fact a world-market oriented sub-economy. The main business sectors involved with ICT consumption are linked to finance, banking, advertisement, accountancy and legal services. Although the presence and extent of these global oriented firms in the local economy differs greatly from city to city, most of the Latin American CBDs have experienced great changes in these sectors, leading to visible expansions and spatial transformations, documented in recent urban literature.

On the other hand, the integration of ICTs into small and micro-enterprises obviously develops at a slow tempo. Even if most formal and established firms of the most advanced sectors do have access to ICTs, and use it, at least for communication purposes, small, micro- and informal enterprises, representing a great portion of the total economy, have greater difficulties to modernise and integrate ICTs into their business activities. E-commerce and e-business indicators show that it is still a very low proportion of the total GDP in Latin America.

In general terms, the final assessment of the situation of production and consumption of ICTs in Latin America's urban economies is not optimistic. The technology weaknesses of the region play an important role in the development of the whole Internet economy. Despite the relatively good level of human resources in the metropolises, the region is hardly developing local ICT, high-technology or knowledge-based industries. There are no available funds to finance new start-ups or to finance the expansion of successful firms. ICTs are used intensively only by a small portion of the urban economy. The incorporation of ICTs to make local industries more globally competitive is developing at a slow pace. The difficulties with integrating ICTs in the economy are deepened by the region's course of economic development, in which economic and political instability is playing a major role.

With the exception of Brazil, governments have been more of an impediment than an advantage for the production of ICTs. Even the measurement of the state and progress of the digital economy, has been out of governmental supervision. Pro-active government policies have been scarce or completely absent. "*Even in the network age, domestic policy still matters*" (UNDP, 1999:5). The evidence from Brazil suggests public agencies play an important role as users and inducers of e-commerce practices (Tigre, 2003). Given that each country has different features and assets they must find their own way according to their own particularities. But, some countries have not even developed a vision for the future.

City policies can also help in the activation of the urban economies through ICTs, but they, also, have been practically absent. Since urban competitiveness has become of great significance in the new global scene, the usual way of cities to improve the local economy is trying to attract foreign firms and promote local high-tech firms and clusters, in a context in which ICTs are considered a major driver of economic growth and progress. However, focusing only on global competition contains the implicit threat of giving more privileges to the groups already privileged, and to foreign firms. A major challenge then becomes how to avoid that the incorporation of ICTs contributes to the 'richer get richer' effect in the urban economy.

A more sustainable urban strategy would be to promote the expansion and thriving of the ICT sector from the bottom-up, triggered by the local demand. This implies promoting the diffusion of ICTs in the whole economy to raise its productivity and efficiency. The Internet and the network economy undoubtedly contain an enormous potential for rising productivity and efficiency as a result of the uses of the Internet in different kinds of inter-business operations, rather than just selling products online. Internet provides great opportunities for cost reductions through access to market information, less bureaucracy, and better supply-chain management. Evidence shows that in Latin America even some enterprises of the informal sector are using the Internet for

marketing and advertising their products at local level, and in some cases they have entered the ICT service business with a certain degree of success (Fernández-Maldonado, 2001).

Consequences for urban development

Transformations related to the ICT production and consumption industries have been observed in three main types of urban locations: technology parks and media clusters, for the production industries, and the central business districts, which house the largest firms consuming ICTs. Brazil is where most technology parks can be observed, located in different cities, and the product of a long-standing policy for technology promotion. After this successful example, some cities of the region are trying to promote technology parks for the necessary synergy between universities, R&D and high technology. But, the results are mixed and highly dependent on policies, funds and overall economic performance of the urban economy.

Regarding media clusters, the situation is also very different. They have developed in some cities, but not all cities have experienced this type of 'spontaneous' process. In Buenos Aires, for example, a new media cluster has been developing in the San Telmo neighbourhood according to local observers. This fact corroborates the notion that locations with a dynamic cultural environment are to the advantage of the knowledge economy. Buenos Aires is considered the cultural capital of Latin America, with a large number of artists and creative people, and, at the same time, a large proportion of engineers and scientists.

On the other hand San Telmo has the main 'requirements' for the emergence of such a cluster. It is an old and picturesque neighbourhood located in the centre, at walking distance from Puerto Madero, where many specialised global service firms locate, and Buenos Aires' traditional CBD. San Telmo has housed local artists and slowly attracted dotcom and new media firms. A data centre was established there by Diveo in 2001 (Jurado, 2001) to attend to the local telecommunications demand. The national economic circumstances and the global downturn of the ICT sector have affected the expansion of the cluster after 2001, but its locational and 'creative' advantages are still present. Buenos Aires is a city with a substantial level of the 'creative class'[31] at the Latin American scale. Other cities also count with similar 'artistic neighbourhoods' (as Bellavista in Santiago, Barranco in Lima, etc.) with art galleries, antique shops, cafes, theatres and restaurants, but there is no information on the presence of ICT or new media firms in these.

Similarly, CBDs, the best wired locations in terms of capacity and variety of networks, are the preferred location of the headquarters of large firms and the most advanced sectors of the economy, the highest consumers of ICTs. CBDs have experienced great transformations, expanding themselves to house new and established firms requiring high level ICT connections. It is precisely in the cities which experience a more active presence of the global sector in their urban economies, as São Paulo, Mexico City, Buenos Aires and Santiago, where these types of spatial transformations are more visible, radical and extensive.

The renewed CBDs now accommodate a new and modern type of architecture of office towers with high-speed telecommunications equipment, which represent the new economic powers at urban level. Banks and insurance companies' headquarters, transnational corporations building towers, telecommunications firms high towers, luxury hotel towers, and airports have been built or modernised and intensively cabled in the recent years. These high-tech towers, designed by architects of world fame, have changed the urban landscape of the districts where they locate.

Headquarters towers of telecommunication firms, especially the incumbent carriers, have a dominant presence and location in this new landscape. The examples of Buenos Aires and Santiago illustrate this trend. The 'intelligent' towers that house the headquarters of the two

incumbent carriers (Telefónica and Telecom) in Buenos Aires are the two most important landmarks in Puerto Madero, and in the whole CBD area. They have been located looking at each other on both sides of the North-South axis to the docks of Puerto Madero: Telecom on the North and Telefónica on the South, as supervising their 'own' area of operations in the city (see Figure 5.5). In the same way, Telefónica's headquarters in Santiago are housed in a 34-floor tower located in Plaza Baquedano, on the border between the city centre and the elite district of Providencia. Telefónica's tower is the second highest building in Santiago, which, according to local people, has the form of a huge mobile phone.

Figure 5.5. Telecom and Telefónica towers in Puerto Madero, Buenos Aires. (Source: http://personales.ciudad.com.ar/bs-as-arq/)

At metropolitan level the more salient changes related to the introduction of ICTs and its economic logic have great similarities to the developments linked to the constitution of new nodes and the formation of novel types of centralities in the metropolises of the global North. New financial, high-technology or industrial nodes have emerged outside the traditional CBD, generally close to the elite districts, which count with private neighbourhoods and other private urban facilities. These inter-related processes are configuring a new metropolitan urban form, characterised by the decreased importance of the traditional centre and the increased and

transnational importance of the CBD, linked to a grid of nodes in the former periphery, but which differs from city to city.

After analysing the ICT physical infrastructure network in the last chapter, the purpose of this chapter was to identify the main features regarding the local networks of production of ICTs, and the main trends of the digital economy within the local urban economies. Economic aspects are obviously very important for the functioning of cities, but ICT-related transformations cannot be understood merely in economic terms. The next chapter is then addressed to explore the consequences of ICT networks as social networks.

Notes

[1] Dot com companies were only 9.6 % of the overall 'Internet economy' in the US in 2000 (University of Texas, 2001).

[2] In 1998 OECD member countries agreed on a definition of the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically (OECD, 2002)

[3] This had a dramatic and positive effect on some cities of the Asia-Pacific area. An industrial belt has emerged connecting the major South-East Asian metropolises, which have become the main locations of global manufacturing (Alaedini and Marcotulio, 2002)

[4] As in the case of *maquiladoras* industries, a common type in Mexico. These are factories that assemble goods for duty-free export, mainly to the United States.

[5] "*Access to talented and creative people is to modern business what access to coal and iron was to steelmaking. It determines where companies will choose to locate and grow, and this in turn changes the ways cities must compete*" (Florida, 2002:6).

[6] Sassen (2002) makes a distinction between three different scales, according to their degree of participation in specialised global circuits of economic activities: (a) supra-national entities; (b) cross border regions encompassing two or more sub-national entities, and (c) sub-national cities and regions.

[7] The financial sector in Latin America mainly consists of banking services (CEPAL, 2002)

[8] French regions were particularly keen on creating technopoles to promote economic development in the frame of the 1982 French laws on political and administrative decentralisation.

[9] Daniel Bell was the first to see this significant shift coming in his work in 1973, where he envisaged the central position of science and technology in the post-industrial society.

[10] Moguillansky (2003) argues that the recent structural transformations, instead of strengthening the virtuous circle that feed innovation, capital accumulation and growth, have actually weakened the process. This weakness is not only coming from the incapacities observed in the local systems of production of knowledge and technology, but also from the asymmetrical workings of the global systems of production and commerce.

[11] Technology parks are areas that link research institution with high technology firms, in areas with a good ICT infrastructure. The implicit idea is that they stimulate technology production contributing to the development of urban economies (Theis, 2002)

[12] India's technology parks constitute the most successful case as they are, in a great part, responsible for the extraordinary development of India's software industry.

[13] Start-up incubators are flexible and stimulating environments that favour the emergence and growth of new enterprises, providing assessment, infrastructure and shared services. Besides the creation of new firms, they are focused in the fostering of an entrepreneur culture (Theis, 2002).

[14] In the 1980s cluster studies focused on the advantages of clustering that emerge from lower transaction costs, vertical disintegration of production, availability of skilled workers and firm inter-actions. But, the more recent studies focus on knowledge flows, or the value that originates from learning at the cluster level (Basant, 2002).

[15] Experts estimate that to compete at world level, Latin American countries have to increase their expenses in R&D from its present 0.5% to 2% of the GDP.

[16] Mexico is the only Latin American country in the OECD.

[17] The largest branches of these firms in Latin America are IBM Mexico, Hewlett-Packard Mexico, General Electric Mexico, Sony Mexico, Intel Costa Rica, Ericsson Brazil, Lucent Technologies Brazil and Philips Mexico. They are among the 50 main transnational firms according to their levels of revenues (CEPAL, 2001).

[18] At the end of 2000, Brazil asked a group of academics to develop an inexpensive personal computer to help overcome the digital divide. This PC, with open software to avoid paying property rights, will be used originally in schools, libraries, hospitals and communal facilities. Later, the users would buy it at approximately $15 per month (CEPAL, 2002).

[19] New media is a term used to differentiate these media industries from the traditional media.

[20] In 1998, 94 of the 100 most visited sites were physically located in the US. From them, 42 were in California and 13 in New York (ITU, 1999).

[21] Domain names are useful indicators for the location of the production of Internet content and websites, as they represent a decision to make information available to people through the WWW (Zook, 2001).

[22] From the 35 million Hispanics living in the US, 63% were online in February 2004 (Pew Internet, 2004), which is more than double than the percentage of Internet diffusion in the most connected Latin America country, Chile.

[23] For example in Argentina Clarin.com is the most visited site (Frascaroli, 2002), while the online version of El Comercio is the most visited in Peru (Apoyo, 2002).

[24] Traditionally, the development of businesses in Latin America is severely limited by poor access to, and excessive cost of credit, given that the Latin American banks tend to be distrustful of start-ups and interest rates on bank loans are prohibitively high in most countries (Chong and Micco, 2002).

[25] At global level, the main reason for the low level of B2C is the low interest of consumers (OECD, 2002)

[26] The exception was Brazil's financial sector which was a pioneer in EDI since 1979 (Tigre, 2003).

[27] One of the reasons for this was because speedy transaction flows pay off in a scenario of very high inflation

[28] In a survey made with a sample of 1600 Latin American business executives, Miami was considered the best city for business, followed by São Paulo and Santiago (Abarca, 2003).

[29] Some authors go further stressing the role of Miami for Latin America: "…*Those talented people who can leave, do leave, often for Miami, the magnet that has attracted the greatest amount of Latin American talent, and is an, if not the, IT capital of Latin America*." (Treverton and Mizzel, 2001:51).

[30] Miami has the largest concentration of multinational banks after New York.

[31] Creative class is here understood as in Florida (2002).

Chapter 6.
ICT networks in everyday life

This chapter explores, documents and analyses ICT diffusion in Latin American metropolises and its contribution to urban transformations and urban development. Its specific purpose is to identify the main ways in which the new information technologies are being used by people and groups from different socio-economic sectors, and the ways in which the new ICTs affect urban activities and urban functioning in everyday life.

During the last ten years a whole new range of communication media, characterised by its powerful and cheaper communication capabilities, has become available to the public. They have the potential to increase everyday contacts with family members, peers, colleagues and also with people with similar interests or backgrounds, without being in the physical presence of each other. Understanding what people do with the new technologies is a new field of study for social scientists, who need to know what it is that changes and why it changes to in order to construct an appropriate basis for future service-oriented ICT strategies. In the urban field, professionals need to become aware of what people do with the new technologies and how this matters for the population and, in turn, for the city.

Unlike urban professionals, social scientists have been quick to acknowledge the transformative character of the Internet. Because of its singular capabilities of integrating modes of communication and content, researching the users and uses of Internet is critical to testing theories of technology diffusion and media effects (DiMaggio et al., 2001). Various domains of study have already produced a rich body of literature, congresses, journals and an association of Internet researchers (AoIR). Wellman (2004) points out three 'ages' of Internet studies, in which the first (from 1990 to 1998) was full of anecdotes, hypes, dark fantasies, utopianism and dystopianism. As ICT use became more prevalent and sophisticated, these over-optimistic technological determinism and political-economic fears have been left behind and the understanding of the social implications of the new technologies has improved.

In the second age (from 1998 to 2002) documenting and situating with reliable data became a priority. Ethnographies and surveys of users and uses produced a general awareness of the strong relationship of online and real-life contacts, producing a new paradigm that asserts the complementary character between traditional and computer-mediated social ties. The third age, which began in 2002, is dedicated to longer-range changes to grasp the features of the network society, using detailed in-depth analyses and focused hypotheses testing. Very little attention has been paid, however, to Internet access and use in everyday life in developing countries (Chen et al., 2002).

The attention addressed to ICT-related societal issues in Latin America comes basically from the 'ICT for development' approaches. Since ICTs have become the new paradigm for development, international institutions and foreign donor agencies have funded thousands of ICT-related programmes and projects to fight the 'digital divide' in developing countries.[1] Activists, practitioners and researchers linked to the Community Informatics (CI) field constitute an important part of this approach, whose main focus is the implementation and sustainability of socially-oriented telecentres. Despite some exceptions[2], however, there is still not enough local empirical research to support theoretical interpretations about the effects of the use of ICTs in the everyday life of different population groups. Local social scientists have been slow and conservative regarding this new topic (Holmes, 2001; Finquelievich, 2002).

There have been, on the other hand, significant contributions to the understanding of the role of mass media industries that are very useful in providing a background to the features of the socio-cultural scene in the large Latin American cities. Mass communication media became pervasive during the 1980s in Latin American cities. García Canclini (2002) argues that while the demographic and spatial expansion of the cities has forced most people to settle in the periphery and away from cultural facilities, radio and television now bring culture to 95% of the households. The cultural flows they spread have been gradually modifying cultural habits and consumption strategies in the Latin American city, and are leading to heightened expectations regarding well-being and consumption.

The changes have reached the political scene: citizens now express their demands and discuss their problems in TV or radio programmes instead of the traditional political channels. In *Consumers and Citizens. Cultural conflicts in globalization*, Garcia Canclini (1995) explains that the pre-eminence of 'global' over local origins of goods and messages produced by economic and cultural globalisation is redefining the sense of belonging and identity, a process which is especially seen in the youth. Therefore, cultural identity and citizenship is now more frequently expressed in private consumption of goods and mass media than in political participation or activism. The citizen is now a consumer that wishes to enjoy a certain quality of life. This may explain partly the high affinity of youth for ICTs, which represent a symbol of modernity and citizenship.

To give a good picture of the diffusion and use of ICTs in everyday life, it is necessary to begin to examine the situation of access to them. A general view of the regional situation of PC possession, fixed and mobile telephony and Internet use is initially provided, supported by studies, observations and quantitative surveys. Despite the fact that that mobile phones and Internet are both important and popular nformation and communication technologies, the main emphasis lies in Internet diffusion. The first and most important reason for this is that Internet exceeds mobile telephony in its powers to transform society. Within the broad offer of telecommunication services that exists in the Latin American metropolises, Internet is both the cheapest and most versatile technology up to now. The second reason concerns the sources for the exploration: the studies and most available data refer to Internet users and uses.

The structure of this chapter is as follows: the first section addresses the general situation regarding access to ICTs, paying special attention to socio-economic status (in terms of income and education), age, gender and geographic location of users. The following section explores the main features of usage: where do people connect and what users do with the new ICT services and applications? The transformations of urban functions and new types of social interactions arising from Internet use constitute the topic of the third section. The last section makes conclusions about the main urban effects arising from Internet use, and their relevance for the social and cultural life of the city.

6.1. Access to ICTs in Latin America

The previous chapters have shown that the telecommunications networks in most large Latin American cities provide a relatively good geographic coverage within them. This means that most neighbourhoods enjoy basic connectivity services. However, even if citizens in large cities can get better prices due to stronger competition and more options for connectivity, access affordability is still out of reach for most. To measure how much this failure in access affordability is translated into actual connectivity, we analyse access to (a) computers, (b) fixed and mobile telephony and (c) the Internet.

a) Access to computers

At global level, the Latin American region scores low in access to computers, with almost one tenth of the number of PCs (4.36) per hundred inhabitants than the number in OECD countries (39.19) in 2000 (Braga, 2003). There are also wide differences between countries within the region. Figure 6.1 illustrates the five groups in terms of PC ownership in Latin America. The most urbanized and educated countries of the region, Uruguay, Chile and Argentina, have the lead in PC penetration in the region, with 11.01, 10.29 and 9.11 PCs per 100 inhabitants, respectively. Hardware-producer countries Brazil and Mexico belong to the second group, with a rate of PC ownership ranging from 6 to 8 computers per 100 inhabitants.

Figure 6.1. Personal computers per 100 inhabitants in Latin America in 2001 (Source: ITU, 2002a).

Analysis of the evolution of PC ownership during recent years (see figure 6.2) shows that Uruguay maintained its first place in the ranking, but expanded very little in the latter years, so the difference it had with the rest of the countries almost disappeared. Peru, Chile, Brazil and Argentina have increased their PC ownership rates by more than 100% in the 1998-2001 period. Mexico, despite the presence of a relatively solid national hardware industry has evolved modestly, as is the case with Colombia. Venezuela shares with Uruguay a more modest growth performance.

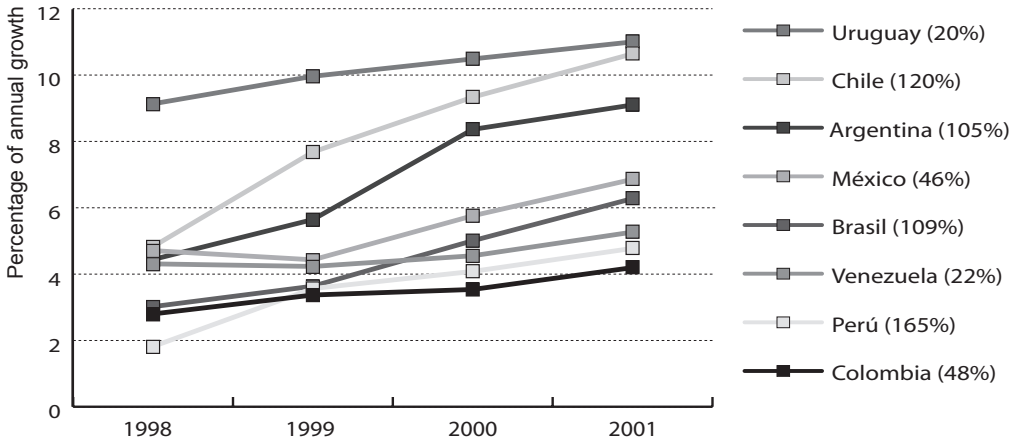


Figure 6.2. Evolution of PC ownership and percentage of growth in the 1998-2001 period in eight countries of Latin America (Own elaboration with data from ITU, 2000; 2002a).

These figures, however, represent averages for the whole country. Disaggregating the data the picture varies greatly, since there is a large concentration of PCs in urban contexts and in large cities. For example, in Mexico 10.4 % of households had a PC at home in 2000, which increased to 21.6 % if measured in Mexico City (Distrito Federal) (Nambo and Nava, 2002). In Colombia, whose average PC ownership rate is 4.21 PCs per hundred inhabitants, the rates of PC ownership increase to more than double in the four largest cities of the country, as shown in Figure 6.3.

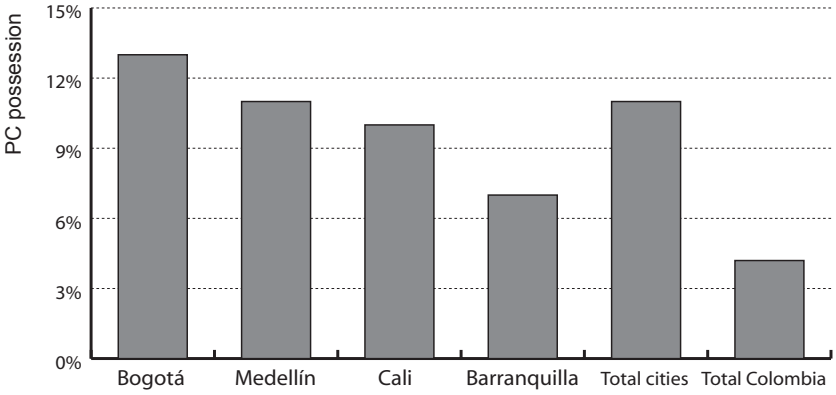


Figure 6.3. PC ownership rates in cities of Colombia in 2001 (Source: Estadísticas Delta, 2003).

Unsurprisingly, all studies and surveys report that PC ownership is highly correlated to income. In Mexico, Nambo and Nava (2002) have reported not only the positive correlation between household income and computer ownership, but also a stronger correlation between the level of education of the household head and PC possession. They also identified the age of the household head as a good predictor of PC possession.

b) Access to fixed and mobile telephony

The number of fixed telephone lines per hundred inhabitants is another significant indicator of ICT penetration, since still most households access the Internet via dial-up connection. Mobile subscriptions are becoming increasingly important too. These are a new possibility for digital access, but due to high prices, it does not constitute a viable alternative for universal access. At global level, OECD countries had an average of four times more fixed lines and five times more mobile lines than Latin American countries in 2000 (Braga, 2003). Since then, although fixed telephony growth is decelerating, mobile penetration rates are still growing fast and, in many cases, surpassing fixed telephone rates.

Taking a closer look at teledensity in the Latin American territory, we can distinguish four main country groups according to teledensity (see figure 6.4). The fixed and mobile penetration rates tend to be similar in the same country, so countries with more fixed lines also have more mobile subscribers, as in Argentina, Uruguay, Chile and Brazil. Exceptions are Paraguay (low fixed lines and high mobile teledensity) and Costa Rica, Ecuador and Colombia (higher fixed lines and lower mobile teledensity).

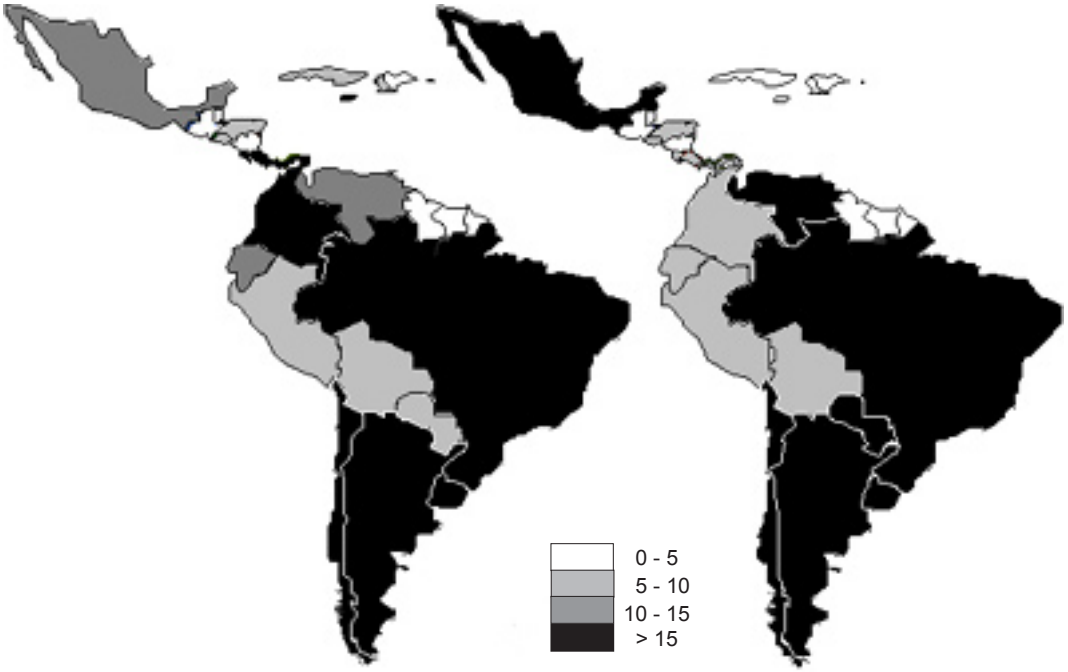


Figure 6.4. Teledensity in fixed and mobile telephony in Latin America in 2001 (Source: ITU, 2002a).

Analysing the evolution of fixed lines teledensity since 1991 one observed:

- A general improvement in teledensity in all countries. The rise is more pronounced right after the period of the privatisation of former monopolies, which produced the modernisation and expansion of the telephone networks. However, Uruguay, Costa Rica and Colombia, who have not undergone privatisation processes, also show a steady growth.
- After 1998 some countries, as Peru, Venezuela and more recently Costa Rica and Argentina, have shown signs of stagnation in fixed line teledensity.
- The more successful examples of teledensity growth are Brazil and Chile.

With regard to the evolution of mobile lines teledensity in Latin America one observes a sustained growth of teledensity in almost all countries, with an explosive growth in some of them, as seen in Chile, Venezuela and Paraguay. The rise was more visible since 1996, when new entrants began operating in the mobile telephony segment, which finally produced a lowering of the prices.

c) Access to the Internet

At global level, Latin America is the developing region with the highest per capita income and the best educated population, and it is also the developing region with the highest Internet penetration rates. Table 6.1, an educated guess elaborated by NUA Internet surveys as of September 2002, shows the Latin American global position.

	Population (in millions)	Users (in millions)	Percentage of users
US and Canada	305.88	182.67	59.72 %
Europe	798.16	190.91	23.91 %
Latin America	519.14	33.35	6.42 %
Asia/Pacific	3481.26	187.24	5,37 %
Middle East	167.37	5.12	3.05 %
Africa	792.59	6.31	0.79 %
World Total	6094.87	605.60	9.93 %

Table 6.1. Internet users across the world, as of September 2002 (Source: NUA Internet surveys, 2003a).

If one analyses the Internet connectivity situation per country in 2001, four groups can be distinguished: countries with higher connectivity (Chile, Peru, Uruguay, Costa Rica and Argentina), middle (Venezuela), low (Brazil, Mexico, Colombia and Ecuador) and very low connectivity (Bolivia, Guatemala, Paraguay, Cuba, etc.) (See figure 6.5). Once again the countries of the South Cone enjoy the highest connectivity, this time accompanied by Peru and Costa Rica. The figure also illustrates how the largest and more industrialised countries are the best connected whilst the smaller and less urbanised countries are also the least connected.

As in other regions of the developing world, the use of Internet in Latin American metropolises is generally associated with higher income, higher than average level of education, younger age and being a male individual. However, as Internet usage spreads there are signs that the profile of the users is changing not only regarding gender, but also in regard to age, education level and also income level. Currently, even if Internet use is pervasive in the elites[3], due to their low participation in the totality of Latin American population, the majority of users come from middle and lower-income segments. To get a more precise picture of who are currently the users in Latin American cities the following sub-sections analyse users' trends in terms of income level, education, age and gender. It is important to note that these general trends differ from country to country according to the corresponding socio-cultural differences between them.

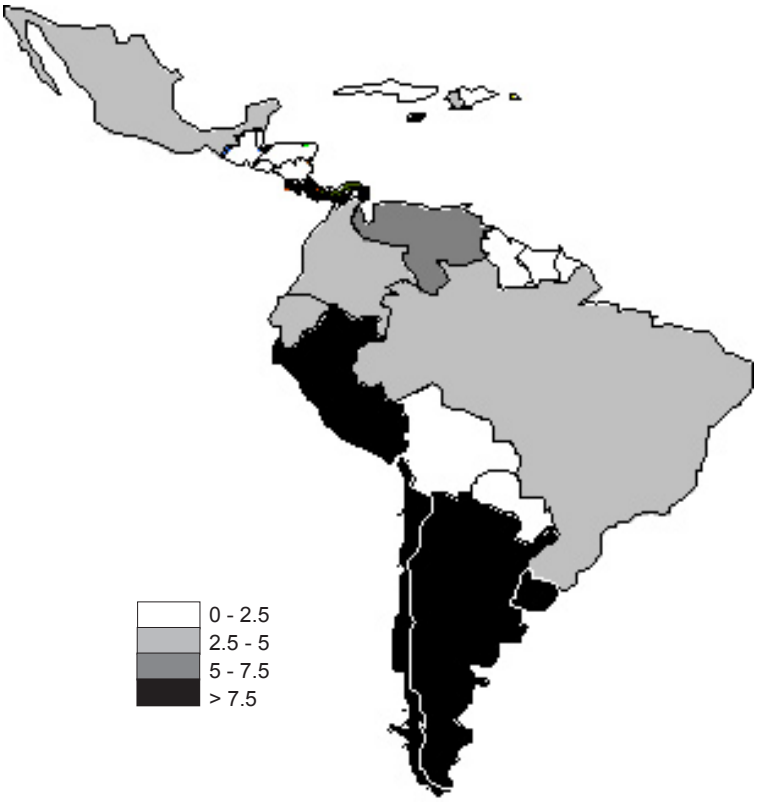


Figure 6.5. Internet users per hundred inhabitants in 2001 (Source: ITU, 2002a).

Income level

The fact that Internet can only be available to the groups that can afford to pay for it constitutes the first great danger in the process of introduction of ICT in developing countries, as it threatens to polarise the existing societies even more into the areas of those who are connected to the global networks and those who are excluded - and for whom the threshold has become higher. The high price of ICT equipment and services relative to the average income of the urban residents constitutes then the first barrier to its use. The precise proportion of the population who can afford Internet connection has been studied by marketing firms working at regional scale, to calculate the size of their potential market. The so-called 'Internet-ready' portion of the population are the ones who can afford the Internet, while *"…most of the region's people are simply too destitute to go online*" (Cohen, 2000:1). The 'target market' for active Internet use in the region becomes then the wealthiest fifteen percent, who are also the best educated and skilled in the use of technology. [4] According to these marketing studies, the proportion of this technological elite varies from country to country, being a smaller minority in the poorer countries and a broader segment in, for example, Brazil (Cohen, 2000).

Three cities, São Paulo, Buenos Aires and Lima, are illustrative in showing how much usage depends upon income level. Table 6.2 shows the levels of Internet penetration in São Paulo Metropolitan Region, which has an average of 20.5% of Internet penetration. [5] The privileged urban minority belonging to the upper and middle class (sectors A and B) which enjoys high penetration rates (45.4%), comparable to those in developed economies, while a great part

of the urban residents has very low diffusion. A finer disaggregation between high and middle income sectors would have showed the extremes more clearly.

Socio-economic sector	Percentage of Internet users	As percentage of total population
High- and middle-income (A/B)	45.4 %	36.3 %
Low-income (C)	9.5 %	35.5 %
Very-low income (D)	2.2 %	28.1 %
Average	20.5 %	100 %

Table 6.2. Percentage of Internet users in São Paulo metropolitan region according to socio-economic sector in 2001 (Source: Agune, 2002 with data from IBOPE, 2001).

The situation in Buenos Aires has changed deeply in the 2001-2002 period, as half a million users have stopped using the Internet for economic reasons. However, there were no signs of great differences in terms of penetration according to socio-economic sector before and after the crisis (Clarín, 2002c). Despite the high rates for the high and middle income sectors the average penetration rate of the whole city is relatively low (14%) due to the high proportion of low and very low-income citizens (see table 6.3). Despite the crisis, compared with the penetration rates in São Paulo, the low and very income residents are much better off in Buenos Aires than they are in São Paulo.

Socio-economic sector	Percentage of Internet users	As percentage of total population
High- and upper middle-income (ABC1)	79%	9%
Middle income (C2)	60%	14%
Middle-low income (C3)	36%	21%
Low income (D)	7%	56%
Average	14%	100%

Table 6.3. Percentage of Internet users in the Greater Buenos Aires according to socio-economic sector in October 2002 (Source: D'Alessio and Pradas, 2002a).

In the Peruvian scene, Apoyo, Opinion y Mercado, a marketing firm specialised in surveys carried out representative surveys each year since 2000, with the purpose of evaluating the advance of the use of Internet and attitudes towards it in Lima (Apoyo, 2000a; 2001; 2002a; 2003). The data from the 2003 survey shown in Table 6.4 reveals the percentage of users in the population from ages 12 to 50. The level of use in very the low-income sector is high in Lima, 26%, remarkably higher than in São Paulo and Buenos Aires.

Socio-economic sector	Percentage of Internet users	As percentage of total population
High income (A)	83%	6.1%
Middle income (B)	81%	31.8%
Low income (C)	44%	30%
Very low income (D/E)	26%	32.1%
Average	33%	**100%**

Table 6.4. Percentage of Internet users in the Metropolitan Lima according to socio-economic sector in October 2003. (Source: Apoyo, 2003b).

The data from the three tables and observations in the three cities[6] suggest that the reasons for such differences in the distribution of Internet penetration are related to the possibilities of accessing the Internet from public access points. The wide availability of these Internet centres also explains the high level of Internet penetration among the poor groups in Lima. It is also evident that the lower-income groups in Buenos Aires connect to the Internet in the so-called *locutorios* or cybercafés, which have been proliferating recently (Fernández-Maldonado, 2002a). In São Paulo the federal government has implemented a successful programme for that goal, *Acessa Sao Paulo*, but its coverage was not reflected in the access figures of 2001.

Education level

Universities, NGOs and other research or non-profit institutions were the main stakeholders of the initial connection to the Internet networks in most Latin American countries (such as Argentina, Chile, Mexico, Brazil, Costa Rica, Peru, etc.). When the commercial launching of the Internet occurred in 1994/1995, the first groups to connect were obviously those who were familiar with the new technologies and aware of their advantages. Therefore, these groups linked to education and research field were the ones who spread the diffusion to other groups.

Ten years have passed since that period, but the Internet is still very much linked to the educational sector, as students constitute a high proportion of users. Results from the survey conducted by Robinson (2002a) in cybercafés located in five Mexican states showed a proportion of 84% of students among the users. A high proportion of students has also been observed in Quito's cybercafés (Ponton, 2002). A survey of Internet users conducted in Lima in 2002 showed that the percentage of students was higher in the very lower income sectors than in the middle and higher (Table 6.5).

	A Sector (high-income)	B Sector (middle-income)	C Sector (low-income)	D/E Sectors (very low-income)
Percentage of students	53%	59%	57%	65%

Table 6.5. Percentage of students among Internet users according to socio-economic level in Lima in 2002 (Source: Apoyo, 2002a).

The level of education of Internet users in the region is predominantly higher than average. In Venezuela, for example, 73.9% of users enjoy university education. An example of the high correlation between education level and the usage of Internet is given in Table 6.6 for Mexico. The average education level, however, tends to decrease as Internet use becomes more common and diffuses to lower-income groups. For example in Chile, which enjoys a larger population of Internet users, the proportion of users with university education in 1996 was 68.8% (Mendoza and Alvarez de Toledo, 1997), which decreased to 60% in 2002 (Ceo.cl, 2002). In Argentina the proportion of users with university degree in 2004 is 46% (Clarín, 2004).

	Percentage of Internet users in the whole population	Distribution from the total users
Without completed primary education	0%	0%
Primary education	2%	9%
Secondary education	7%	22%
Preparatory education	18%	28%
University degree	36%	42%
Total Internet users	8%	100%

Table 6.6. Educational level of Internet users in Mexico in 2001 (Source: Arellano and Meza, 2003).

Disaggregating the data according to income levels, one sees how the education level of the users correlates with income level. Table 6.7 shows how the average education level of Internet users in Lima in 2002 decreases with income. Despite the lower education level in lower income groups, the tendency is still a higher-than-average education level. The study of Proenza et al. (2000) in telecentres in Peru confirmed this trend, asserting that the low-income users using the Internet are the educated segment of the poor.

A Sector (high-income)	B Sector (middle-income)	C Sector (low-income)	D/E Sectors (very low-income)
University (57%)	University (47%) Technical education (17%)	Technical education (38%) Secondary school (40%)	Secondary school (59%)

Table 6.7. Predominant level of education of Internet users according to socio-economic level in Lima in 2002 (Source: Apoyo, 2002a).

Age composition

Across the region it can be clearly observed that Internet users tend to be young. This does not constitute a surprise considering the region's demographic characteristics. Latin America experienced explosive population growth in the middle of the twentieth century as it entered into a demographic transition process. With annual growth reaching 2.8% in the 1960s, Latin America's population grew faster than any other world region, with the exception of Africa. The pace of growth slowed after 1970 as fertility rates fell, but the number of people added to the population each year continued to grow. [7] As a consequence, Latin America's population is young. Figure 6.6 shows the age pyramid of the Latin American population in 2001, illustrating the region's youthful population and the recent decline of fertility rates.

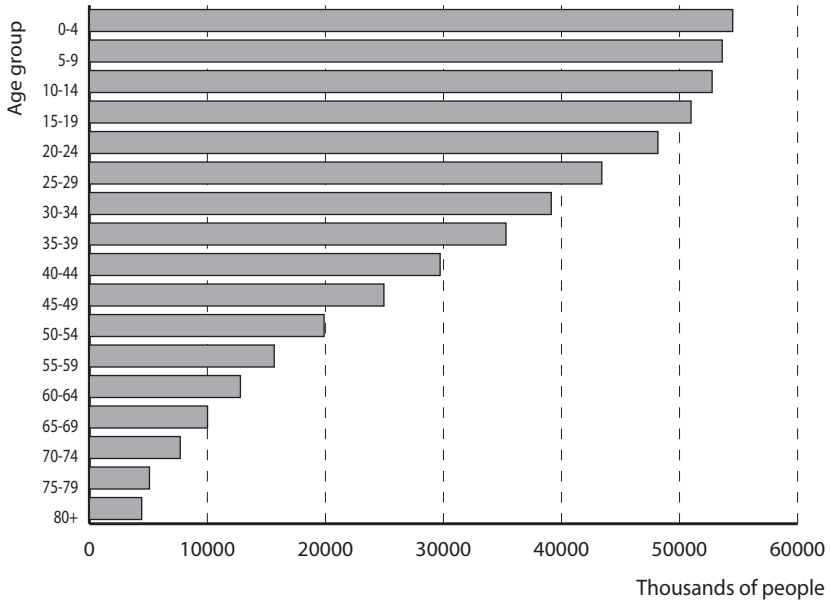


Figure 6.6. Age pyramid of the Latin American population in 2001 (Source: CEPAL, 2002a).

The second reason for the high number of youngsters relates to the abilities and enthusiasm of young users when in contact with the new technologies. An additional reason is the evident link between computers and education, as explained in the previous sub-section. Figure 6.7 shows the age groups of Internet users in two countries and two cities in Latin America, illustrating the great generational gap. Even if the used age groups are not the same, the figures show that Internet is mainly used by young people. The proportion of people older than fifty using the Internet is, in some cases, minimal. In the case of Lima, the group of the older than fifty were not even considered in the sample of the survey carried out to monitor the use and attitudes of Internet users (Apoyo, 2002a).

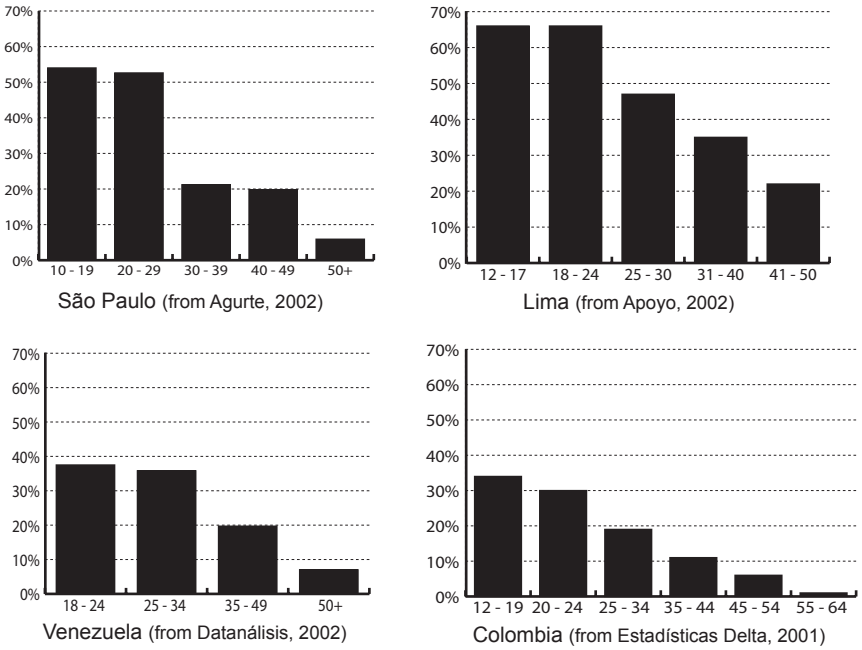


Figure 6.7. Internet use in the different age categories in two countries and two cities.

From the situation in these two cities and two countries it becomes clear that the younger age segments (up to 24 years old) are the most enthusiastic Internet users in Latin America. There is a real generation gap, which makes the people younger than 25 much more frequent users, thus suggesting a link between Internet use and education. Comparing to the US and European countries the young age of Latin American users is remarkable. Pew Internet statistics[8] shows that the generational gap in Internet use is in the US at the level of senior citizens (see Table 6.8), which suggest the importance of Internet use at work.

Age group	Internet penetration
18 to 29 years old	78%
30 to 49 years old	74%
50 to 64 years old	60%
65 +	25%

Table 6.8. Percentage of Internet use according to age group in the US in May-June 2004 (Source: Pew Internet & American Life Project, 2004).

This same trend was also observed when comparing data with European countries. A survey carried out in 2000 by NetValue, showed that while in France, Germany, the UK and the US the largest age group was that of 35 to 49, in Mexico the 15 to 24 age segment was by far the largest (NetValue, 2000). This was confirmed by a survey one year later, which measured the proportion of the 15 to 24 age segment as 47% (29% belonged to the 12 to 17 age segment and 18% to the 17-24). Only 3% of users were 45 or older (Arellano and Meza, 2003). Additionally, cybercafé users tend to be younger than home users. In Robinson's (forthcoming) survey on Mexican cybercafés, 85% of the users were younger than 25 years of age. In Quito's cybercafés 65.5% of users were younger than 30 (Ponton, 2002).

However, this youth predominance is not so marked in Uruguay, Argentina and Chile, which have a traditionally high level of urbanisation and low growth rate, thus evidently a different age pyramid pattern than the one showed in Figure 6.11. In Argentina, for example, a survey in March 2004 showed that 67% of total users is older than 25, and that the largest age group (31% of all users) belonged to the 25 to 34 years of age segment (Clarín, 2004), which means younger users than the US and European countries, but older than in the other Latin American countries. This 'intermediate situation' is not only matter of demographic trends, but also illustrates their intermediate situation regarding overall development. These three countries of the South Cone are among the countries with a high Human Development Index, have a higher income per capita, and their population enjoy a higher level of education.

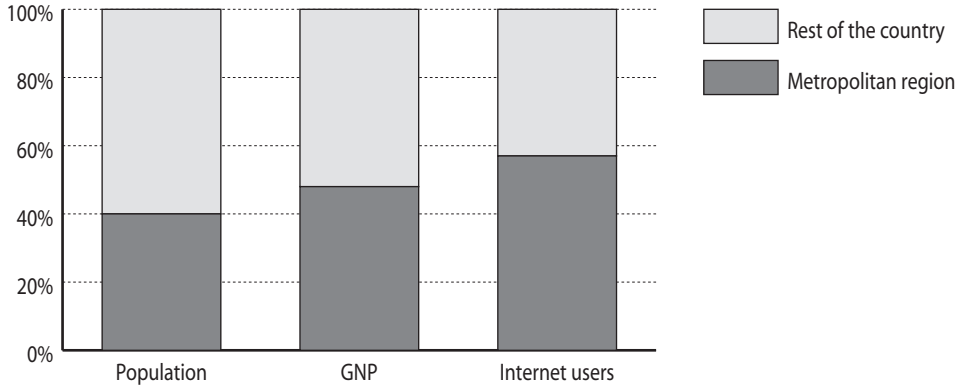
Gender composition

If the proportion of male and female individuals using the Internet in Latin America was initially on the side of males, a clear trend towards gender parity has been observed in most countries, a trend which becomes clearer inside the cities. Elkin (2000) reported that a survey at regional level provided a percentage of 76% of male users in 1997, which decreased to 60% in 2000. This information is confirmed by different surveys at local level. Although the proportion varies according to local situations, the trend towards gender equality in the use of Internet is present almost everywhere. For example, in Quito a percentage of 52.5% men users (Ponton, 2002) was observed in 2002, in São Paulo of 53.5% (Agune, 2002), whereas in Lima 54.7% (Apoyo, 2002a), and in Buenos Aires 61% during the same year (Clarín, 2002). 43.3% of Brazil's Internet users are women (Cisco, 2000), a proportion which decreases to 41.97 % in the case of Venezuela (Datanalisis, 2002).

This tendency to gender parity may seem a surprise for those who consider Latin America exclusively as a traditional Third World region. In fact, the equivalence in Internet use by men and women in the region is an expression of the equivalence in education enrolment throughout the region. Male and female youth living in Latin American cities are equally educated. Analysing primary, secondary and higher education enrolment figures in the whole Latin American region in 1997 similar proportions between male and female enrolment can be observed to those observed in developed countries (UNESCO, 1999).

Geographic location

Another level of inequality is observed between regions of each country, where metropolitan areas have a clear advantage. This feature does not constitute a surprise in view of the traditional urban primacy and the concentration of economic activities in the largest cities of the region, a trend that becomes more intense due to the features of the Internet backbone architecture. For example, 58% of the dial-up connections and 76% of the dedicated connections (including broadband) in Chile were located in the Santiago Metropolitan Region in June 2002 (Subtel, 2002). Figure 6.8 illustrates the regional inequalities in Chile during 2001.



6.8. Regional divide inside Chile in 2001 (Source: Ceo.cl, 2002).

A report of the ISV (2002) in Venezuela points out that 80.2% of Internet users in Venezuela were concentrated in only three cities: Caracas, Maracaibo and Valencia. Even in Colombia, a country with traditional low urban primacy, 57.9 % of the number of total households with Internet connection lived in Bogotá in 2001 (Dane, 2002)

However, there are indications that the concentration in the large cities might be decreasing recently. This is because growth in the capital and largest cities is slowing down or coming to a point of saturation. Recent surveys and observations in Peru, Argentina and Chile show that Internet growth is accelerating in the secondary cities while slowing in the large cities. This trend is more clearly observed in Argentina. Until April 2001, Buenos Aires concentrated almost three times the number of Internet users than the rest of the country. But, due to the severe economic crisis affecting the country, there was a negative growth in Buenos Aires during the 2001-2002 period, which combined with the growth of Internet penetration outside the capital city has been translated into a more balanced Internet diffusion (Clarín, 2002), as Table 6.9 shows.

	April 2001		December 2001		October 2002	
	Users (thousands)	Percentage	Users (thousands)	Percentage	Users (thousands)	Percentage
Greater Buenos Aires	1 400	10%	2 100	15%	1 600	14%
Rest of the country	500	2%	1 000	4%	2 000	8%
Total	1 900	5%	3 100	9%	3 600	10%

Table 6.9. Evolution of Internet penetration in Argentina during the period April 2002 up to October 2002 (Source: Clarín, 2002 with data from the D'Alessio survey).

The same type of process applies for Peru, where Internet access grew by twenty percent in Lima in 2002, but in other cities there was an estimated rate of fifty to sixty percent of growth, due to the extended coverage of public access centres in these cities, which in turn was promoted by the lowering of costs of leased lines for the Internet connection (AHCIET, 2002a).

d) General access to ICTs

After giving a general picture of the situation in quantitative terms, which is indispensable to provide a valuable basis for discussion, it is useful to qualify the quantitative results. The methodological limitations of quantitative surveys in developing countries have already been advanced: the scarcity, different methods of data collection, the reliability of the data, the problems regarding averages, etc. Regarding access to ICTs, another important limitation refers to the ways of measuring, designed for the type of access observed in industrialised countries.

Recently, two economists from the World Bank have challenged the logic of measuring access in developing countries, provoking a lively discussion within academic and practitioners' circles.[9] Fink and Kenny (2003) have pointed out that measuring absolute differences in access to ICTs is not sensible, because, given the presence of collective ways to access telephone (even mobile telephones) and Internet services in developing countries, per head measurements do not constitute a good indicator of diffusion. They propose another indicator, which gives a better idea of the relative importance attached to ICTs by its very users: the 'per-income' availability of ICTs. On this indicator, low- and middle–income countries are ahead of affluent countries, which means that poorer individuals and households spend relatively more of their income on ICTs than affluent people. For Fink and Kenny, this fact becomes more surprising given the worsening of income inequality between the developed and developing countries during the last decades. This suggests that developing countries' people have found other ways to 'catch up digitally' (Fink and Kenny, 2003: 1).

If Fink and Kenny are surprised about this situation, few researchers in Latin America would be surprised, since the high 'per-income' availability of ICTs is manifest. There has been a real telecommunications boom in the region, people are much better connected than before the 1990s and obviously using a higher part of their income to get (home) access to them, given the high prices for telecommunication services in the region. The telephone bill is a monthly worry for most households in the cities of Latin America. Per-income availability of ICTs is also relatively high in lower income groups. Surveys in low and very-low income households in Lima, have shown that these groups use a relatively high percentage of their income to get access to telephone services and the Internet (Fernández-Maldonado, 2001).

This paradox of increased access to telephony and Internet despite economic crises and social polarisation during the 1990s is nothing new. [10] During the 1980s, the lost decade for Latin America, characterised by the decrease of real salaries, a similar trend was observed regarding a remarkable increase in the number of television sets. In the large metropolises there is currently a very high access to television, which varies from total access in high and middle income households to more than ninety percent of access in lower-income households. This mass media predilection is the likely product of socio-cultural processes affecting the Latin American society, which represent important shifts in consumption patterns, privileging cultural consumption over material consumption. [11]

Finally, access to ICTs is highly related to the 'digital divide', matter of multiple debates in the academic and practitioners fields. To begin with, the very existence of a 'digital' divide is a matter of debate. In developing countries, the digital divide is just another symptom of the social and economic divide among rich and poor and, as such, not a very useful category. In the cities, the 'digital divide' represents the more recent addition to the series of lacks of the poor urban residents: land, housing, basic services, employment, etc. To alleviate this requires structural solutions. To solve the digital divide would be then, a matter of development.

Another important debate is about the nature of the digital divide. The initial conceptualisation of the digital divide as a difference in access to the networks has given way to a more comprehensive concept that encompasses the notion of 'effective use'. The idea behind this is to redirect the resources to fight the digital divide from simple access towards more sensible strategies that provide more visible benefits to users (Gurstein, 2003). Because it is obvious that large hardware and software corporations and telecommunications firms are the great winners from the increased global connectivity.

The situation of access examined in this section has illustrated the rise in access during the 1980s across the region, but at the same time the exclusion of great part of the population belonging to lower income sectors. The fact that per-income rates of access are higher than in developed countries, and that ICT use keeps on growing in the middle of economic hardship, suggests the affinity of Latin Americans with the use of ICTs. The examination of education level, age and gender show that up to the present young people and students are over-represented among the Internet users, although there are some intra-regional particularities.

6.2. Internet usage in Latin American cities

This section is intended to explore what the users do when they make contact with the new technologies and their different applications. Data on Internet use in Latin America is scarcer than data on access. When it is available it generally comes from marketing companies interested in commercial applications.

There exists a high affinity with ICTs and a positive regard about their possibilities and potentials in most corners of the Latin American society. This can be clearly seen in the educated and cosmopolitan elite, who are media-savvy and 'early adopters' of new electronic devices. But, lower-income users are no less enthusiastic about Internet use. A survey among Internet users in the three largest countries, Mexico, Argentina and Brazil, showed that ninety percent of users stated that Internet had a positive impact in their lives, enhancing their possibilities for communication, entertainment, work and education (El Universal, 2002). Surveys in *cabinas* and cybercafés in Lima and Quito point in the same direction. The high overall enthusiasm is corroborated by the high per-income availability of ICTs observed.

The trends in Internet use in the Latin American cities suggest that two distinctive patterns of Internet use coexist. On one extreme, the higher income sectors (ten to twenty percent of total of Internet users) connect to the Internet from home and work, on a daily (and, increasingly, permanently online) basis. They are generally older, and used to conducting multiple types of electronic activities, from communications up to transactions and entertainment. They are not only frequent users, but also more experienced as they generally began to use the technology earlier. The Internet is for them as pervasive as it is in advanced ICT countries: its use is fully integrated into everyday life.

On the other hand, the lower income sectors, unable to afford domestic connections, but eager to participate in the mainstream society, are increasingly opting for the public access centres to connect to the Internet. They are mainly young people and students connecting with less frequency than inside-home users and who have less experience with the technology. However, the younger segments are visibly using the Internet as a multifunctional tool. The next sub-sections analyse Internet usage according to its location and functions.

a) Internet use outside the home

Most people from all over the world connect to the Internet through home access with a dial-up connection. But, this home connection implies enough income to have a telephone at home, to

buy hardware and software equipment and to pay the monthly telephone and Internet charges. This way of connecting to the Internet is evidently not adapted to universal access, as most people in the world do not have the resources to afford all this. Public access centres have been growing steadily in the cities of the developing world, since they are evidently the only possibility for providing Internet to the population groups that cannot afford home connections.

In Latin America's large cities, this process has been having an increasing relevance and is becoming a particular trend regarding the features of Internet. Already in August 2001, the Second Quarter 2001 Global Internet Trends Report from Nielsen/NetRatings, measuring the Internet populations in thirty countries, reported that "*out-of-home Internet access[12] is a particularly important location for Internet use among adults in Latin America*" (Cyberatlas, 2001:1). 51% of the Internet population in Brazil, Mexico and Argentina (accounting for nine million users) connected to the Internet away from home in that period, although not exclusively. This was significantly higher than the proportion of adults accessing the Internet outside their home in Europe/Middle East/Africa (33 percent) and Asia-Pacific (23 percent) (Cyberatlas, 2001). The process of 'cybercafeisation' of Latin America is in 'full swing' (Robinson, 2001) and as such recently becoming an interesting object of study for academics from different disciplines.[13]

Indeed, public access centres have been flourishing in Latin American cities' neighbourhoods since approximately 1998, when competition in the telecommunications sector decreased the prices of dedicated lines. They are mainly small-scale business initiatives of local entrepreneurs. There are also several 'socially oriented' public access centres run by non-profit organisations, the so-called telecentres. A third type of public Internet centres refers to those created by government initiative to serve the demand of disadvantaged population groups. From these, the great majority are dedicated to expand public telephony and Internet to rural contexts.

Cybercafés or commercial Internet centres

Increasing numbers of users attend the commercial type of public access centres[14] that are flourishing in places of concentration of activities in most cities of the region. Commercial cybercafés have existed in the large cities almost since the commercial introduction of Internet in cities. Originally, they were basically addressed to the demand of tourists or businessmen and located in business and commercial districts. However, the new trend is another type of cybercafé run by local entrepreneurs in their own neighbourhoods, not focused on the affluent demand, but addressing the demand of those who cannot afford home connection. Therefore, the prices per hour in this new type are much cheaper and tend to decrease when new businesses open their doors in the vicinity. This could only be possible thanks to the increased availability of reasonably priced infrastructure connections (generally through leased lines).

This phenomenon began to be observed in Lima since 1998 (Fernández-Maldonado, 1999; Nagaro, 1999). There, two hundred cybercafés were operating at the end of 1999, and approximately one thousand at the end of 2000 (Fernandez-Maldonado, 2001). In Mexico *"… since about 1999 cybercafés began sprouting at a growing rate*" (Robinson, forthcoming: 2). Soon after it became evident that these type of locally-oriented cybercafés were emerging in many other cities in Bolivia, Ecuador and Venezuela, and especially in the ones which counted with a high proportion of informal economic activities.

Recent empirical studies have documented similar processes that have been developing in cities of Mexico (Robinson, 2002a), Venezuela (Datanalisis, 2002) and in the cities of Caracas, Buenos Aires, La Paz, and Quito. Robinson (2001) asserts that some urban contexts in Mexico are close to the point of saturation with cybercafés, a fact that is also observed in Lima, but in most other cities the process is still in full motion.

In Caracas, the number of public access points grew from fifty in 1999 up to more than one thousand in 2002 (La Red, 2002b). In Venezuela, 39.9% of users were connecting from cybercafés in 2002, which now constitute the most common way to access the Internet in Venezuela. If counted with the percentage of users connecting from Infocentros, the rate of users connecting from public access points raises to 44.8% (UNDP, 2002a). A similar study states that during 2001 there was a notable growth of public access centres. These include the telecommunication centres implemented by CANTV (the main carrier) and in smaller numbers by Telcel (the main competitor), as well as the explosive growth of commercial cybercafés and the Infocentros implemented by the Ministry of Science and Technology (La Red, 2002).

In Quito, a city of one million 600 thousand inhabitants, public access has been steadily increasing: from the 166 legally registered commercial cybercafés in 2002, 56% had less than a year of operation. These businesses were mostly addressed to the local public as forty percent of them charged less than a dollar per hour (Pontón, 2002). La Razón (2000) acknowledged that Internet use was proliferating in La Paz in July 2000, due to the emergence of Internet cafés that charged between 0.50 and one US dollar per hour of service. According to this, there were approximately 50 cybercafés giving service from fifty up to a hundred persons per day in La Paz in 2000.

In Buenos Aires there was a spectacular increase in the demand for public access points which coincided with the dramatic crisis in the Argentinean economy. During 2001, these businesses offering Internet grew visibly while most of the already existing 1500 *locutorios*[15] in Buenos Aires began to include Internet as an additional service, decreasing the cost per hour from US$4 to US$2 (Davidziuk, 2001). The deepening of the crisis increased the competition and the prices have continued decreasing up to one or two pesos, according to the location.

A survey from March 2004 has confirmed the trend of increasing Internet access from public places in Argentina, revealing that the percentage of Internet users connecting from *locutorios* or cybercafés has increased to 37% (D'Alessio, 2004). The same survey states that the cybercafé phenomenon explains the greater part of the total Internet use growth in Argentina during the last year. This process is important because it is allowing the increase of Internet access for people from lower-income groups.[16]

The type of public access centres is evidently dependent on the location and the type of public they serve. The expensive cybercafés are located in airports, commercial areas for the elite, malls, central business districts, etc., while the great majority of less expensive cybercafés tend to cluster close to educational institutions and neighbourhood commercial facilities of middle and lower income districts.

Socially-oriented telecentres

Telecentres are public access centres run by NGOs or other non-profit institutions with socially oriented goals, which have been emerging in developing countries thanks to the support of the international development community, which sees in them the best feasible model for providing universal access in rural and poor areas. Besides initial access to the Internet, telecentres generally provide training in new technologies, youth and community meeting points, and promote local economic activities through support to micro-enterprises and associations.

Despite the low number of telecentres in Latin America[17], the regional telecentres movement is quite organised and dynamic.[18] Most practitioners are in contact with each other through different discussion lists and are active members of the new discipline of community networks/ community informatics that links academics, practitioners and activists advocating ICT for development.

Most telecentres are located in rural areas or small towns, because when located in urban areas they have to compete with the commercial cybercafés, which generally offer lower prices. Indeed, economic sustainability is one of the main problems of telecentres, which is, conversely, the *raison d'être* of the commercial type. Because of these problems there has been the tendency of members of the telecentres movement to disregard the commercial cybercafés as places of banal media consumption. Robinson (2001; 2002b) has verbalised these reservations against cybercafés as places of few incentives for learning activities and a constraint to community networking in Latin America.

The most remarkable network of socially oriented telecentres in the region was not created with the support of foreign donors, but by the individual initiative of Rodrigo Baggio in *favelas* of Rio de Janeiro in 1995. Baggio has received worldwide recognition for his work and was designated by Time Magazine as one of the 'Leaders of the New Millennium'. The organisation behind his work, the Committee for Democracy in Information Technology (CDI) is currently running Schools of Information Technology and Civil Rights (EICs) which provide the youth of low-income communities access to information technology in ten countries (see Box 6.1).

Box 6.1. The Committee for Democracy in Information Technology (CDI)

CDI is a non-profit organisation that, since 1995, has been developing a pioneering initiative to promote social inclusion, by using information technology as a tool for achieving citizens' rights and development. CDI implements educational programs in Brazil and other countries through its Information Technology and Citizens Rights Schools, mobilising excluded segments of society and helping them to transform their reality. They work in partnership with low-income community centres and special needs individuals, such as visually impaired, psychiatric patients, homeless children, prisoners, indigenous people, etc. Mastering the new technologies should not only give access to better work and income opportunities, but also to new information sources and social networks.

CDI has developed a socio-educational approach to ICT training. Students learn how to use computers and software while discussing issues of particular interest to their community, such as human rights, environment, sexual education, health and non-violence. The model is based on the concept of helping people help themselves with a methodology developed by CDI in partnership with specialists from Campinas State University.

CDI is continuously expanding its national and international network. Their offices are located in most Brazilian states and in other three continents. CDI Regional Committees are self-managed, self-sustained and administratively autonomous. Their mission is to replicate CDI experience and educational strategy when implementing new schools. Periodic follow-ups by the Committees guarantee the quality and the continuity of CDI projects. CDI is represented by Regional Committees in twenty Brazilian states. Outside Brazil, CDI has offices in Colombia, Uruguay, Chile, Mexico, Guatemala, Honduras, Japan, Angola, South Africa and Argentina with a total of 62 Information Technology and Citizens Rights Schools.

Taken from the CDI website at http://www.cdi.org.br.

Government Internet centres

Universal access to the Internet is acknowledged by most governments of the region as an important step towards the progress of their nations. A whole assortment of programmes with that purpose have been launched in the region, sometimes under an umbrella programme, sometimes as fragmented small scope policies aimed at different target groups (students, low-income groups, isolated communities). There also have been very different ways to fund these programmes. Five countries (Brazil, Chile, Peru, Ecuador and Colombia) have financed their universal access programmes with funds coming from profits of telecommunications companies (Robinson, forthcoming). These have been mainly addressed to expand the geographic coverage of public telephony and Internet in their national territories. Public funded programmes have also been implemented in Venezuela, Argentina, Uruguay and more recently Mexico. However, most programmes have modest goals, target populations and funds.

Three national governments stand out because of their efforts in providing their connectivity programmes with substantial funds: Brazil, Colombia and Venezuela. Brazil's e-government programme has been praised for its commitment to universal access, as strategic forerunner to other important e-tasks such as the provision of government services and improvement of administrative procedures through the Internet. Further, the government of the State of São Paulo has carried out an effective programme *Acessa São Paulo* to provide Internet access in poor areas through *Infocentros*. There are 72 state *Infocentros* in São Paulo's peripheral neighbourhoods (plus 105 municipal *Infocentros*) and 69 in other municipalities of the state in May 2004, giving online courses to twenty thousand people (see http://www.acessasaopaulo.sp.gov.br/).

Colombia's *Agenda Nacional para la conectividad* consists of thirty different programmes that cover specific needs of the society, from the creation of community Internet centres to programmes for e-government, tele-health and tele-education. Venezuela is an interesting example, as it has been able to establish in a very short time a network of *Infocentros* that provide free Internet access to low-income population groups in the cities, an initiative is highly appreciated by the population. However, *Infocentros* only provide access and not training or generation of contents. There were 243 *Infocentros* functioning in 2002 and the plans to increase their numbers were hindered by the political and economic crisis that affects the country (La Red, 2002b). In 2001, five percent of total users accessed the Internet through *Infocentros* (UNDP, 2002a).

But, even if the number of this type of public access centres may seem high, they do not always provide connection to large numbers of users, as a great number of them are a modest addition of computer terminals in schools, libraries, post offices or community centres. In some cases, as in Peru, the scarce resources have been only used to implement new access points in rural or isolated areas; the urban areas have been left in the hands of the market.

b) Internet use according to its function

Internet is a multifunctional technology which can be used for information, communication, education and training, entertainment, or as provider of services. The different Internet utilities appeal the users according to their own purposes and their own life situations, but obviously, this is influenced by different factors. The frequency of use and the level of experience play an important role in the type of online activities and behaviour, since frequent and experienced Internet users tend to use it in a multifunctional way (Chen at al., 2002).

The Internet as communication medium

As in most parts of the developing world, the Internet revolution in Latin America represents, basically, a communications revolution. The strong bias towards Internet's communication capabilities is linked to the low levels of communications that were common before the 1990s. If in the developed world, the Internet is complementing or slowly replacing other telecommunication media – such as the telegraph, the traditional post, the fax machine, and local or long-distance calls - in the developing world access to the Internet is providing access to communication to people that were previously unable to communicate over long distances due to the absence, scarcity, inefficiency or non-affordability of communication services. It is not that Internet has made communications easier; it is simply that it is making communications possible. Therefore, the introduction of the Internet in Latin America has meant the introduction of a powerful, rapid and relatively cheap communication medium that is transforming society and culture.

If the communication capabilities constitute the most popular application of the Internet for Latin American users, this is especially true for its younger users. Indeed, the Internet's applications with capacities for socialisation, as email, chat rooms, instant messaging, and even talking by Internet phone (Voice over IP) constitute an important motive for Internet use in Latin America, which becomes clear when consulting surveys on the use of Internet. In a survey by NetValue in 2000 measuring the use of different Internet applications, the results pointed out that Mexico led France, the UK, Germany and the US in terms of audio/video usage, chat and instant messaging (NetValue, 2000). Nielsen NetRatings survey comparing Internet activities in users older than sixteen years from Australia, Hong Kong, Brazil and a group European countries, Brazil ranked the highest in participation in chat rooms, use of instant messaging and using the radio via Internet (Nielsen NetRatings, 2002). Emails, chat rooms and instant messaging rank high in surveys about Internet use in the different Latin American countries, while voice over IP is also present in surveys on cybercafés.

Internet in Latin America is acknowledged by its users as a powerful, rapid and relatively cheap communication medium. Seven out of ten Latin American Internet users recognise that Internet allows them to be in closer contact with friends and family in their intimate circle, and also with those outside it (El Universal, 2002). Indeed, Internet has opened up doors to be in contact with relatives and friends living in far away places and these have been among the first to acknowledge the benefits of the Internet allowing them to be in touch with their loved ones. This has been especially noticeable in those countries with a large number of migrants abroad such as Mexico and Ecuador. Chen et al. (2002) point out the potential of the Internet for linking kin wherever they may live. For the migrants, the Internet is 'the best thing that could happen to us'. They found a way to be present in the lives of their families, sending remittances and canalising resources to help them get out of poverty; and participating actively in the political life of their home towns (González, 2002b) The Latin American diaspora has become a new and important commercial niche for online entrepreneurs who understand the need of the migrants to help their families. Box 6.2 provides more details of international migration in Latin America.

Another area of communication that deserves attention is that of communities of interest. Even if the development of this type of communities is not so advanced compared to developed countries. However, some networks begin to be observed more clearly than others. Professional associations, commercial associations, religious associations, alumni associations, etc. are slowly beginning to have a presence in the Latin American cyberspace and to communicate between each other with this medium. The most significant changes can be seen in the academic field. Thanks to the more frequent academic and scientific communication, e-mail and discussion lists are profoundly changing the relationships among researchers, promoting international collaboration and a better spreading of research results. An important part of the

Box 6.2. International migration and remittances in Latin America

Latin America is a region of migrants. Now that most countries are largely urbanised and rural-urban migration streams inside the region have become less significant, the volume of long-distance international migration has been expanding rapidly during the last decade. There are only gross estimations of the regional migration in both the recipient countries or in the origins of emigration in Latin America. Most migrants from the north (Mexico, Central America, and Colombia) move to the US, while Argentina and Chile used to attract migrants from Peru, Bolivia and Paraguay. Increasingly, Andean migrants are being scattered over the US, Europe and even Japan.

Thanks to improvements in telecommunications, migrants are now profiting from being in closer contact with kin and their homelands, which in turn, is apparently contributing to the increase in remittances into the source countries. In the same way, the possibility of reading the news and being informed of what happens in their home country has promoted a closer and more active involvement of migrants in the political life of their countries of origin.

Latin America is now the region that receives the largest amount of remittances in the world, which have become more important sources of finance than private lending, according to the 2003 Global Development Finance report of the World Bank. The flows of remittances migrants send to their families in their home towns have been increasing at a higher pace than the flow of people that emigrates from the region. It has quadrupled over the past decade. From the 100 billion dollars of remittances in the whole world, 32 billion went to the region in 2002 (see Table 6.10). Economies of countries as El Salvador and Ecuador depend greatly upon the remittances that the migrants send regularly. Mexico has been traditionally the main recipient, but the economic crisis of the region has also placed in the 2002 ranking countries as Argentina and Venezuela, who were previously receiving immigrants from other Latin American countries.

	Remittances in 2002 in millions US$	**Percentage of growth in the 2001-2002 period**
Caribbean countries	5 380	20.7%
Andean countries	5 410	19.8%
Central American countries	5 430	18.5%
Mexico	10 500	18%
Brazil	4 600	10%

Table 6.10. Remittances to Latin America in 2002 (Source: IADB, 2002a).

communication between teachers and students is also developing online. However, it becomes evident that some fields of knowledge have been more open than others to the new technologies. In general, the scientific fields and those linked with development have been much more eager to use the new technologies than the humanities (Diocaretz, 2002).

In using the Internet, Latin Americans show a strong preference for synchronous communication: chat rooms and instant messaging are among the most used applications. Online chat became highly popular at global level not long after the introduction of the Internet. People became fascinated with the new way of communication, which provided them with feelings of power due to its capacity to communicate with the whole world in a playful way. The predilection of Latin

Americans for this form of online communication can be observed when compared with the use of chat and instant messaging in developed countries.

Chat rooms in Latin America are generally functioning at regional level and including Spain and Hispanics living in the US. They have been so popular that it is not unusual to have friends or acquaintances that have met their partners in chat rooms. Online chat can be random, participation in chat rooms with a certain topic or motive, or chat among friends that see each other frequently. The preference for random chat is easily observable when entering cybercafés, where adolescents and youth are the main clients. In Lima, different surveys in *cabinas* have documented the popularity of this online activity (Fernandez-Maldonado, 2001), the same as in surveys in cybercafés in Quito and Mexico. In Bogotá 40.3% of the total users participate in chat rooms (DANE, 2002), while in Lima this increases to 71% (Apoyo, 2002a). The popularity of chat activities is common to most countries of the region, but obviously varies according the age of users. In Lima, chat activities correlate negatively with income level (Apoyo, 2002a:20), probably because the lower income users are younger than higher income users.

Internet chat generally is often considered as an unproductive and futile activity. However, the great popularity of chat gives an indication of its significance beyond adolescents. Online chat is, as face-to-face chat, useful as source of inter-personal support, of intellectual stimulation and play. For teenagers, it is highly attractive because it provides a more 'informal' space for (intimate) relationships. More importantly, online chat allows building close relationships between people of different places, spreading values and ways of life. In this way, online chat has placed Latin American young people closer to each other than they were in the past and is promoting the rapid spread and exchange of habits[19] and values.

The Internet for instrumental purposes

The search for information, be it for work, academic, school or personal purposes, is another main use observed in Latin American cities. The figures leave no doubt about the importance of this type of use. 75% of users in Bogotá (Dane, 2002), 67% of users in Lima (Apoyo, 2001) and 77.9% of Venezuelan users (UNDP, 2002a) declare this is a frequent use for them.

Computers and Internet connection are becoming indispensable tools to find information to prepare homework and academic work, from school level up to higher-level education, a fact that compels students to come into close contact with ICTs. School teachers generally advocate the use of computers, even if they themselves are not so proficient in their use. The Quito survey among cybercafés users observed that "… *there exist great numbers of students from schools and universities… who require the use of a cybercafé to fulfil their academic activities*" (Ponton, 2002: 79). The use of Internet for school and university activities was also observed in Mexican cybercafés by Robinson (2002b) and in poor neighbourhoods of Lima (Fernandez-Maldonado, 2001). In Bogotá, 48.4% of users declare they use it for educational and training purposes (DANE, 2001). In Lima, 56% of users declared academic purposes in September 2001, a proportion that was decreasing according to both the socio-economic level and the age of the users (Apoyo, 2001).

Another common motive to use the Internet is for learning or improving computing skills to increase the individual chances in the job market. In the study of Proenza et al (2000) in Peruvian cybercafés, 11% of the sample population declared they attended the cybercafés to acquire computing and Internet skills. Most of the users of the same survey said that their computer abilities had improved remarkably since they began visiting the cybercafés.

Looking for a job via the Internet is becoming increasingly popular too. In Brazil, more than one millions users (approximately twenty percent of the total) entered a website that offered

employment or information about jobs during January 2003, almost double what was measured during December 2002 (Clarín, 2003). In Lima, job hunting and looking for business possibilities were also observed in users of cybercafés (Fernández-Maldonado, 2001). The proportion of users that declared using the web to find a job was twenty percent in 2001 (Apoyo, 2001).

Using Internet for acquiring information about government procedures and even to develop the procedures electronically is on the rise. For example, 18.3% of users in Bogotá declared that they make use of government pages (DANE, 2002). This has been recently favoured by the creation of government portals in the region which facilitate access to government related information, basic statistics, links with government institutions, and in some cases the possibility of initiating online transactions and procedures with government agencies. Besides, governments are increasingly modernising and integrating their register systems and delivering e-government services to citizens, although this is happening at very different speeds. A visit to the government portals in the region (websites in Table 6.11) provides a good view of the level of sophistication of the portals.

Argentina	http://www.info.gov.ar/
Bolivia	http://www.bolivia.gov.bo/
Brazil	http://www.redegoverno.gov.br/
Chile	http://www.gobiernodechile.cl/
Colombia	http://www.gobiernoenlinea.gov.co/
Costa Rica	http://www.go.cr/gobierno/digital
Ecuador	http://www.presidencia.gov.ec/
Mexico	http://www.presidencia.gob.mx/
Paraguay	http://www.paraguaygobierno.gov.py/
Peru	http://www.perugobierno.gob.pe/
Uruguay	http://www.presidencia.gub.uy/
Venezuela	http://www.gobiernoenlinea.ve/

Table 6.11. Government portals in Latin America.

Brazil and Chile stand out as the most developed countries in terms of e-government services to their citizens. Brazil's *Rede Governo* (Government Network) has 18 thousand links and 72% of the Federal government services are available their website. Five hundred different services of the state governments are also available to *Rede Governo* users. The website had thirty million monthly hits during 2001. The most successful implemented e-government activities have been online tax filing, the computerisation of the electoral process and the electronic floor and stock exchange for government purchases (e-procurement) (da Veiga, 2001). Chile is another excellent example as it has been ranked fifth in the Brown University's second annual study of e-government services in 2002, after Taiwan, South Korea, Canada and the US, and has been internationally praised for its e-procurement services.

Additionally, there is a wide availability of Internet commercial, media and financial services, which are mainly geared towards the tastes and ways of life of the elite. The latest UNCTAD study on e-commerce reports that the rhythm of evolution of e-commerce in the region is low: one percent of the total electronic transactions in the world, and much lower than, for example, the Asia/Pacific region (5.7%) (UNCTAD, 2002). Brazil has by far the leading e-commerce in the region because it has a large domestic market and an early start in ICT diffusion and development, but most other countries are rapidly developing their e-commerce markets. For example, supermarket chains have been popular in Argentina (DISCO) and Brazil. Brick-and-mortar large department stores have also been successful in implementing online stores in the large countries.

E-commerce surveys at regional level show that the main products commercialised online coincide with the global preferences: software, computer and electronic devices, books, music, holidays and travel, etc. However, the level of electronic retailing in the region is, on average, low due to two main reasons: unreliable logistics and delivery systems and especially, lack of users' confidence about online payments. There is wide evidence that many users consult the web to make decision about their offline purchases. For example, in Argentina 81% of Internet users declared using the web to shop, but only nineteen percent effectively carried out the online transactions in December 2001 (UOL, 2002).

Electronic banking has been one of the most successful examples of the adoption of tele-services throughout the region and is more popular than e-commerce. Most banks offer online transaction services to their clients as it implies less overhead expenditures. E-banking has been one of the first tele-services to become available in the region. With home banking, users can operate their accounts, pay for different services, taxes and credit cards. In Brazil, more than one third of Internet users make use of home banking through Internet. E-banking clients have an average of 7.45 visits per month (AHCIET, 2003).

In Argentina the levels of e-banking activities increased rapidly during the period of the financial '*corralito*', when citizens were impeded from withdrawing their savings from their accounts. Electronic banking was the only way to avoid paying with the scarce money that was circulating. From mid-2001 to February 2002 the number of e-banking users increased from six hundred thousand to one million, which was approximately thirty percent of the total users in Argentina (La Red, 2002). Even if electronic banking is on the increase, other countries show lower levels of e-banking transactions than Argentina and Brazil. In Bogotá, seventeen percent of users declared they use e-banking (DANE, 2002). Surveys in Lima sketch the profile of e-banking users (fourteen percent of total users): a high-income user that connects to the Internet from home with high frequency (Apoyo, 2001).

The link between mass media and Internet has been very clear, both in the commercial as in the cultural aspects. Regarding the first aspect, traditional media (radio, TV channels, magazines and mainly newspapers) have been among the first to enter the business of providing online services and content. The online versions of the largest newspapers have become the most visited websites of each country and they have developed as portals that canalise users to other e-services, chat rooms, forums, that sometimes provide free Internet service. A common feature of the online newspapers is to make the reader interact making it possible to react to the news, recommending them or sending them to others by email, opening up forums to debate main national or sometimes international issues, to make users participate in surveys, publishing the ranking of the most read articles, and more recently videos and audio news, etc. For example in Argentina, 26% of the users visited the page of the main newspaper, *Clarín*, during June 2001, to spend an average of eighteen minutes (Frascaroli, 2002). In Lima, 28% of users declared they visited the online version of *El Comercio*, the main newspaper during the last three months (Apoyo, 2002a), which was the most visited local website.

The Internet as entertainment medium

Entertainment uses have been acquiring greater significance for Latin American users. One of the most popular applications, online chatting, combines both entertainment and communication aspects. It is precisely the Internet properties towards multi-functionality, in this case, combining entertainment with other uses, which plays an important role in the use of Internet and the attraction of new (and especially young) users. After chat, online games are becoming increasingly fashionable, as it can be seen in cybercafés. Cybercafés that specialise in online games have appeared in most cities, with special equipment such as joysticks, faster

processors and video cards, etc., which is needed for playing online. In Bogotá 44.8% of users declared they have played online games (DANE, 2001). In Lima it was 25% during 2002, but only twelve percent played online games during the previous month of the survey, a percentage that decreased according to income level (Apoyo, 2002a). Other popular uses include visiting sports websites, downloading or listening to music, and more recently, Internet gambling and tracing family history and family trees (for older, high income users).

Adult entertainment (erotic and sex sites) is also widely popular, but difficult to trace due to its semi-hidden character. Most surveys simply do not state this use, but a simple visit to cybercafés reveals its popularity and not only with adults. Indeed, many cybercafés have adapted their distribution plan to place computer booths with doors for privacy. A survey that included the question about adult entertainment asserts that erotic websites are among the most visited on the web (D'Alessio and Pradas, 2002b). This survey whose samples come from three countries, pointed out that Brazilians are the most sexually inhibited, Argentineans show an average preference for them and Mexicans are the most traditional, who distrust content because of fear that their children would find pornographic material. A recent survey in cybercafés in Lima confirms this preference of users towards adult sites. Although few users admitted visiting these sites, the owners and administrators commented on their popularity (Colona, 2003).

Another significant feature about Internet entertainment in Latin America is its strong links with the traditional broadcasting media. Latin Americans are significant consumers of broadcasting media, but evidently not equally cultural producers, as different studies mention[20] (García Canclini, 1995; Hopenhayn, 2003). Access to radio and television became pervasive in Latin American cities during the 1980s, triggering important socio-cultural transformations in society, which in turn have produced modifications in consumption patterns and everyday life, especially in the large cities (García Canclini, 2002). Internet technology's interactive capacities complement broadcasting media as a vehicle of cultural consumption. It is, then, no surprise that young Internet users show a great preference toward sites related to show-business, local and international celebrities, *telenovelas*[21], rock groups, music and adult entertainment.

c) The 'effective use' issue

After reviewing the uses of Internet observed in Latin American cities, the issue of effective use has to be discussed. The notion of effective use needs some more attention in the context of developing countries. Michael Gurstein defines effective use as "*The capacity and opportunity to successfully integrate ICTs into the accomplishment of self or collaboratively identified goals*." (2003: 8). If effective use is a matter for the users, individually or collectively, it is they who have to decide if they are getting an 'effective use'.

Regarding 'individual goals', when users in developing countries, and especially younger groups, are consulted about the significance of Internet use in their lives, they all answer straightforwardly, enthusiastically and positively. The Internet is regarded as a new resource which implies an improvement in daily life, simply because of the absence, scarcity, inefficiency, or non-affordability of traditional communication services. Additionally, ICTs are considered both as a sign of status and a medium for upward social mobility.

This differs greatly with the situation in richer countries, where lack of access to the digital networks is not automatically a matter of lack of resources. Research in Great Britain carried out in May and June 2003 on non-users of the Internet (41% of the population older than fourteen) showed that 17% of them actively reject it, 17% do not mind being non-users, 44% are indifferent (could be proxy users, but choose not to be) and 22% are proxy users (occasionally get others to go online of their behalf) (The Economist, 2003a). Rather than a 'divide' between

users and non-users this suggests that in affluent environments access to the new technologies is a matter of personal choice, a lifestyle issue.

Regarding more collective goals, common sense tells us that access *per se* is not an end in itself. But, for the people in the global South, and especially for younger groups, access to Internet is making a big difference to their previous situation, a fact which is sometimes difficult to perceive for outsiders, or those who only measure economic impacts. In the developing world Internet is more a cultural than an economic phenomenon. Internet use is rapidly transforming communities of the developing world in unprecedented ways. "*The new informational offer is modifying many cultural habits and consumption strategies*" (Garcia Canclini, 1997:87).

However, since several surveys and observations point out that the use of Internet in cybercafés is highly linked to communication and entertainment purposes, while didactic and economic uses are not as popular, some authors give negative balances for the process. For example, based on his study on Mexican cybercafés Robinson (forthcoming) expresses his worries about the entertainment functions of Internet in cybercafés, as opposed to few incentives for learning. He points "*a digital consumption syndrome based on games, play, reinforcement of sports fetishism, and virtual sex that leaves the learning function far behind*" (Robinson, forthcoming: 10).

This has to be examined with the public that attends cybercafés, which is mostly young people and students, who enjoy the possibilities to communicate and chat with their peers. The example of the success of text messaging in countries of the North suggests that young people's strong 'communication need' is an age-related phenomenon. The preference of youth towards communication and entertainment is a worldwide phenomenon and not exclusively related to Internet use in cybercafés or in developing countries. Surveys in the US show that students spend more time with games and communication than with their homework, meanwhile they are gradually watching less TV. Similarly, the adult entertainment industry and online gambling are among the most successful online industries (Markillie, 2004), which suggests the growing importance of online entertainment at a global level.

Additionally, it becomes difficult to separate communication, work, entertainment and learning while using the Internet, because one of its singularities is precisely its multi-functionality. Further, almost no ethnographic studies have been yet carried out to examine the impact of cybercafés attendance on people's lives in Latin America. On the other hand, the great enthusiasm of young users towards the Internet as a window to the world and to expand their cognitive and social horizons is not taken into account. Asking the users, they generally express the importance they give to improving their computer skills and training to get more chances in the highly difficult employment market. The scepticism towards Internet use in cybercafés suggests the higher importance assigned to criteria of economic productivity than to the daily life concerns of the users.

6.3. Related urban transformations

The exploration carried out in the previous chapter has pointed out relevant transformations of the urban form and functioning of the cities, coming from the economic transformations linked to the introduction of ICTs, but those transformations linked to the social diffusion of ICTs are no less relevant. The present section describes the most visible trends, but it is not exhaustive. Most new trends are incipient and the extent and permanence of urban changes is still uncertain. The first sub-section refers to those transformations in urban functions and the second addresses new types of urban and social interactions among urban actors.

a) Transformations in urban functions

A new type of urban facility: cybercafés for local people

"C*abinas públicas* have invaded the city, taking spaces and transforming them" observes Colona (2003:9) referring to cybercafés in Lima, remarking that she refers to them as spaces that provide new urban services. In Latin America, Lima is the location where the highest proportion of Internet users connects from collective places. In the same way as in Lima, this new type of neighbourhood business and urban facility is becoming increasingly visible in many other Latin American cities, a fact that is bringing about spatial consequences in the city. This new type of cybercafé for local residents gives an answer to the demand for ICT connectivity of middle and lower-income groups that cannot get a home connection, and, as such, they fulfil a social role (Fernández-Maldonado, 2003). They are, however, merely commercial enterprises[22], but to keep their prices low, great number of them have to work under the rules of the informal sector, which evidently brings many inconveniences.

If in an initial stage, cybercafés charged an expensive tariff for renting computers for the hour and was targeted to tourists and business people, the new generation of cybercafés is addressed to people without a home computer or home Internet connection. For this new type of clientele cybercafés have reduced their tariffs to prices affordable by local people. There are public Internet access centres of multiple types and with multiple features. These can be independent businesses located in commercial areas, family-run businesses established in one of the rooms of the family house located in the neighbourhoods, or an extension of other small-scale businesses located in central places. Surveys and observations in cybercafés point out similar physical features. Due to their limited spatial consumption (ten computers on average, but sometimes fewer), and no special design requirements, they have not produced a salient new urban form. On the contrary, most of the time the cybercafés have adapted their spatial and functional needs and requirements to existing spaces in residential or commercial buildings, sometimes even sharing the space where they provide services with other commercial functions.

Since these facilities are mostly geared towards the non-affluent demand, they are generally located in commercial or middle/low income neighbourhoods. For example in Lima, cybercafés have been incorporated in different types of public spaces at different scales in the city: from the ones located at the middle of the street, to the neighbourhood corner, the (smaller) neighbourhood commercial centre and the larger shopping mall (Colona, 2003). Specialised types of cybercafés have also been observed, that are addressed to a public that is interested in a specific use, which in some cases demands specific hardware or peripherals. Examples of this are business-related usage, online games or cybercafés for adult entertainment (Fernandez-Maldonado, 2001; Colona, 2003). Another type of cybercafé is the so-called *al paso* (walk-in) located in areas of high commercial activity, which are more visible, open, and addressed to a public that does not stay long in front of the computer.

Online services for sub-standard neighbourhoods

The urban landscape of the large Latin American cities is strongly marked by the divide between the formal and the informal city, between rich and poor neighbourhoods, between the 'haves' and the 'have nots' and their distinct ways of life. If, for the privileged minorities there is wide choice of alternatives of services inside the city, the socio-spatial exclusion of the poor determines that their informal neighbourhoods are not reached by urban amenities that are standard in other neighbourhoods.

In this problematical context, the gradual emergence of cybercafés to provide collective access to those without possibilities to afford home access constitutes a relevant phenomenon. They are providing essential urban amenities that have been absent in these neighbourhoods. They should be considered as a new service that the local entrepreneurs are providing as an answer to the telecommunications demands of these groups, which these entrepreneurs have identified as members of the same local community. Libraries, recreation facilities, training centres, post offices, study places, youth centres, etc., that have been lacking in poor neighbourhoods are now present and combined in the multiple services offered in the inexpensive commercial cybercafés.

If the availability of new services provided by commercial cybercafés has developed until now practically unnoticed by local or national governments, it has been adequately acknowledged by the local population and especially by the youth, their main users, which repeatedly declare their enthusiasm with the new medium. Learning to use computers or improving their computing skills is cited among the top priorities of the students, but communication and entertainment are also highly popular online services.

'Virtual cities'[23]: *online information and services*

E- governance is an increasingly important theme for development and information society initiatives. National and local governments from all over the world have initiated programs and policies in order to profit from the potential of the electronic delivery of information and services. The scope and depth of ICT policies differs widely. While some countries have only established a minimal online presence, some others have gone beyond, linking their national development strategies to their countries' transition to the information society. In the region, national governments have been performing relatively well at global level and are considered to have a medium e-government capacity. This is especially valid for South American countries, which in 2001 had an average e-government index over the world average and only slightly smaller than North America and Europe (see Table 6.12).

Region	Average E-government Index in 2001
North America	2.60
Europe	2.01
South America	1.79
Middle East	1.76
Asia	1.38
The Caribbean	1.34
Central America	1.28
Africa	0.84
Global average	1.62

Table 6.12. Average e-government Index across regions in 2001 (Ronaghan, 2002).

Within this context, the implementation of virtual or digital cities and web portals constitutes an important vehicle for information dissemination, communication and transparency. They have been one of the most used ICT tools for interacting with local citizens and prospective visitors or investors. Local governments of the developing world at all levels are implementing them with the goal of interacting with citizens, a trend that is clearly visible in Latin America, the developing region with the highest percentage of people living in cities.

In some cases, the initiative to establish virtual cities and provide e-government services at local level has been organised centrally and linked to the modernisation of the state and

public administration. The Inter American Development Bank (IADB) has been funding this type of activities in the region. In other cases, central governments have given a deadline to local governments and public agencies to establish virtual cities, but without providing the resources for implementing them. Although it is obvious that the transfer information processes to cyberspace, and the maintenance of the virtual cities requires financial and human capital resources, which are generally in short supply in poorer contexts.

There have recently appeared some studies on e-government in the region (Finquelievich et al., 2003; Araya and Porrúa 2004), but virtual cities have not yet been object of organised evaluations about their main features, usability or effectiveness of the delivered services, as it has been the case in virtual cities in Europe or developed economies (Fernández-Maldonado, forthcoming).

However, since May 2001 there is a network of digital cities acting in the region, Iberomunicipios (http://www.iberomunicipios.org), created by AHCIET (Asociación Hispanoamericana de Centros de Investigación y Empresas de Telecomunicaciones). The network is open to all municipalities in Latin America (plus Spain and Portugal), which have a virtual city or want to implement one, and gives an annual prize to the best digital city. The 2004 prize in the category of metropolitan city was won by Bogotá, while São Paulo received a special prize for e-inclusion, because its Accesa São Paulo programme. Although not comprehensive, a visit to the website of Iberomunicipios gives an idea of the advances of digital cities phenomenon in the different countries of the region, and shows how most metropolises are well represented. It also becomes clear that local governments of poorer areas are highly under-represented.

b) New types of urban and social interactions

The Latin American city is spreading itself to the world

Studies, observations and interviews in the Latin American urban context support the claim that Internet is increasingly contributing to broaden the cognitive and experienced personal world of (especially young) users, expanding it from its local environment towards larger realities, and helping the users understand their own reality in the context of a globalised world. In short, the ICTs are increasingly providing the material basis for the encountering other individuals and communities that are not living on the same locality. Two closely related trends linked to the emergence of cyberspace in the region and with clear implications for the city development are increasingly visible: the emergence of a Latin American online community and the online presence of migrants.

Thanks to the capabilities of cyberspace, it is the first time that individuals and institutions of the region can effectively communicate, debate, read newspapers, inform themselves, carry on business or research activities with easiness, at affordable prices, on a daily basis and in considerable numbers. The existence of a(n almost) common language[24], with its undeniable cultural consequences has obviously contributed to the intensification of communication at regional level. The emergence of a Latin American cyberspace becomes a concrete indication of how the Internet is promoting the transcending of national borders in Latin America.

With Internet, the previously poorly communicating Latin American communities have found a convenient way to engage in conversation with one another within and across countries. Chat rooms at Latin American scale are enormously popular among the youth. The Hispanic community living in the United States has emerged as a significant community with a strong presence in the Spanish-language cyberspace. Additionally, since the advent of Internet, Spain has become closer than before for Latin Americans, while the economic and cultural ties between them have become renewed.

Professional and academic online networks are also flourishing and for these ICT availability has meant the broadening and internationalisation of the scientific debate. There is a wide scope of new trends and activities that are developing in the Spanish-speaking cyberspace that were not possible to realise before the advent of Internet. The changes are more significant when they affect poorer communities, who previously did not have means to communicate with others, and for whom Internet constitutes an easy and cheap way to connect to other spaces and realities.

The second relevant trend refers to the intensification of social and exchange networks between migrant communities living abroad and their national communities leading to transnationalism. The growth of transnational communities is related to the use of Internet by migrants who communicate with kin and friends in their hometowns, a trend that has become visible at global level (Fernandez-Maldonado, 2003). The ICT revolution is considered as a factor stimulating increased migration as it makes it easier to move and keep contact with one's home community. Thanks to ICTs international migrants can now be virtually present in their home countries, keeping in touch with their loved ones at home for far longer and more easily than in the past. Being in closer contact reinforces social networks that produce future migration, as well as the prolonged sending of remittances to parents, siblings and relatives.

Although the Latin American migrant community is not the largest in the world, it is clearly the one which contributes the most to the livelihood of its kin and other community members by sending their savings as remittances. More than thirty billion US dollars were sent to Latin American countries during 2002 as remittances, an amount that is much higher than the total amount of money received through international cooperation received during the same year. Not only remittances are increasing, but also migrants' participation in their countries' political lives and, in some cases, by raising funds for community projects in their hometowns. This constitutes a direct answer to the question of how can the development of virtual communities support the development of physical communities. This new type of 'self-help' activities, obviously related to the capabilities of Internet to surmount distance barriers, is increasingly becoming the focus of attention of international agencies and social scientists.

Expanding the presence of national communities beyond the traditional national borders and gathering Latin American communities in a new space for communication and action at individual or institutional level hold unquestionable consequences in the changing perception of the city by its residents and users.

The social and cultural gap between the elite and other sectors is broadening

While some local groups are expanding their horizons for the first time, the further cosmopolitanisation of the elite is exacerbating social contradictions. Latin America is a socially-divided region, the most unequal in the world. In most countries, the elite are separated from the broad mass of the population, not only in socio-economic terms, but also ethnically. In general terms, the elite are of European descent while the poor are of indigenous and/or African descent. The low sense of shared citizenship and social solidarity among the elite and other sectors has been linked to this fact, which in turn might explain the historical high levels of inequality.

However, the elite that developed as an industrial bourgeoisie during the 1950s and 1960s have been considered as more socially inclusive than the previous elite (linked to land-ownership), due to their interest in developing an internal market. The new economic elite resulting from the recently changed economic context (linked to the export of mineral and agricultural goods, large-scale retailing, import distribution, urban real estate and narcotics-related activities) does not exhibit a socially inclusive attitude (Nickson, 2002). While the new elite are increasingly living

their lives in fortified neighbourhoods that 'protect' and isolate them from the rest of society[25], they are increasingly spending long holidays outside their home-country. Further, their children are attending private English schools and increasingly following their university studies abroad. This way of life not only suggests that Latin American elites are already conducting their lives in a highly cosmopolitan way (Nickson, 2002), but also that the possibilities that the elite develop a more socially inclusive stance towards the rest of society are evidently decreasing. In this way the social and cultural gap between the elite and other sectors is broadening. As Castells (1996) has remarked: in the network age, more than ever, elites are cosmopolitan, people are local.

In his research into the global culture industries, Scott Lash found that "… *the elite in Sao Paulo of journalists, television hosts, curators, architects, film distributors, pay-TV producers, advertising, pop music sector, etc. have a lot more in common with their counterparts in Tokyo, New York, Paris, Milan, and L.A., than they do with their own compatriots in Brazil. Their identification tends to be outward…Now, to self-include and self-identify in the context of the 'global' information and communication flows is to self-exclude and dis-identify from the 'national' flows.* " (Lash, 2001:238).

In this way, ICTs are helping to reinforce the process of cosmopolitanisation of the elite and their withdrawal from the city in different ways. ICTs are then underpinning and facilitating these economic and cultural processes that are producing a more 'detached' elite. More concretely, ICTs are also helping to materialise the wishes of urban safety and spatial separation from other sectors of the city. García Canclini's (1995) study in Mexico City registered a process of 'de-urbanisation', characterised by the decline of the recreational use of public spaces, which he attributed to insecurity feelings, but also to the trend toward home-centeredness allowed by the diffusion of ICTs. Similar trends have been mentioned in the case of Buenos Aires. People are deciding to stay at home and get recreation through electronic media, rather than to attend movies, theatre and live spectacles. [26] ICTs are helping the privileged groups to choose the way they develop their lives, managing both space and time schedules to exclude 'undesirable' sights, events or encounters at local level, and in that way they are undermining 'the conscious of the eye'.[27]

New ways to engage in collective action at urban level

The collective power of text messaging, mobile phones, blogging[28], instant messaging, and/or email across millions of users is increasingly acknowledged as a new and important urban trend. A recent example of the power of spontaneous collective action occurred after the events of March 11th in Madrid. Howard Rheingold[29] (2002) has studied this phenomenon - the increasing importance of what he calls 'smart mobs'- at global level. This represents the convergence between ICT technology and social activism in urban settings. When people get together fast and respond quickly to anti-popular regimes, policies or measures, a new form of 'emergent democracy' materialises from the bottom-up, which differs radically from the traditional participative democracy. There are several examples of this type of process in Latin American cities.

Although most of the countries of the region now enjoy democratic regimes, Latin America can still be considered as politically unstable, as the events in Argentina, Peru, Colombia, Bolivia and Venezuela have shown in recent years. Different authors concur with Castells (1999) in claiming that the Internet is making it possible for grass roots and street protests to thrive, catching the established political regimes off-guard. Thanks to Internet capabilities, political groups can now easily and safely come into contact with each other to defend their interests in case of need. This trend is empirically supported with examples of the empowerment of

political and activist communities that have become active in different countries. Open chat communities and discussion lists, sometimes promoted by online media, or semi-clandestine online communities have been playing an important role to ventilate ideas and issues that are not easily debated or expressed in the official media as happened, for example, in Peru during the dictatorial regime of Fujimori (Herzog et al, 2002).

Not only Internet, but also new electronic devices are coming to the forefront of political activism. Urban resistance groups have recently discovered the usefulness of ICT devices as a tool to engage in common action in times of political Good examples of this urban trend are the use of wireless electronic devices during the uprisings in Caracas in 2001 and Buenos Aires in December 2001 and 2002 in which Internet, mobile phones, pagers, PDAs and hand-held computers were used to coordinate revolts and large demonstrations daily. Finquelievich (2002a) has documented this in the case of Buenos Aires, where Internet and mobile phones were used for coordination of the riots and gatherings, before and after the fall of the regime.

The fact that using ICT devices for collective action produces massive mobilisations that happen very quickly and are not easily predictable, grants to them unusual capabilities for empowering social movements to achieve their demands. The highly contested Latin American cities constitute a fertile ground for these types of mobilisations, and it is very likely that they will become more frequent in the future.

Cyberspace as a communication space between citizens and local institutions

While public central and local administrations are gradually publishing information and making possible the development of online transactions, payments, procedures and consultations, the traditional ways of interaction of public agencies, educational institutions, tax and custom offices, civil registers, statistical offices, regulatory bodies, and many other private or public institutions that have to deal with large amount of persons are drastically changing. The changes are not homogeneous in pace or depth in the different metropolises, but the trend to modernise and make private and public administration more efficient by using online information and transactions is gradually consolidating.

This gradual consolidation of cyberspace as a new space between citizens and local institutions has run parallel to advances in the modernisation of public administration, and with trends towards democratisation in several countries. On the one hand, national and local governments are increasing their efforts to become more efficient, while citizens make claims for more transparency and local firms demand a more conducive business environment, while the civil society demands a higher level of information and participation in public matters (Araya and Porrúa, 2004).

In this frame, ICTs and Internet are playing a very important role and becoming a familiar way to develop activities as to get government information, to pay fines, to file income tax declarations, to pay taxes, to search libraries, to get school grades and announcements, to get documents and certificates, to follow-up procedures, etc., providing advantages to both citizens and institutions. But, even if these new possibilities are offered to all citizens, the elite and the 'modern' side of the society and urban economy are those who profit the most, because of the differences in access and skills. In some cases, it has become mandatory to develop some of these public procedures online. When online procedures become the only way to realise these activities in contexts of high inequality, ICTs may promote social exclusion rather than improving communication with the citizens.

6.4. Conclusions

This chapter completes the empirical exploration of the first three levels of ICT networks, providing the picture of what is happening regarding the situation of the diffusion of ICTs in the population of the Latin American metropolises. ICTs are widely accessed and used by the elites and increasingly by middle-class sectors, where its use is gradually spreading through lines of income and education, but the pace of the diffusion process is greatly hindered by the high costs of telecommunications services in the region.

On the other hand, collective places to access the Internet are gradually spreading in the cities, contributing to provide ICT connectivity to lower income groups, and especially to youth and students. However, there is still a long way to go to provide adequate levels of ICT access to the masses, which will ultimately lead to a more equal distribution of urban opportunities. This is especially valid for the very poor, because collective access is mostly provided by commercial cybercafés, which charge for their services. The commercial character of the telecommunications sector leaves the very poor people without communication services.

Despite these 'digital differences' it becomes clear that most urban residents are eager to connect to the digital networks, but constrained by the high prices, as the relatively high per-income availability of telecommunication services indicate. People from almost all sectors of society address a relatively high proportion of their income to communications. Latin Americans have a high affinity with ICTs and there are no reports of rejection of the new technologies. On the contrary, the remarkable affinity of Latin Americans towards broadcasting technologies has been extended to ICTs, which are broadly considered as a symbol of modernity and progress.

After examining the three levels of ICT networks in Latin American metropolises, it becomes clear that their significance is more related to the socio-cultural situation than to economic change. As scholars of urban culture have pointed out, globally and regionally produced cultural flows spread and distributed by ICTs networks have been rapidly modifying life-styles, cultural habits and consumption patterns in the Latin American metropolises. The Internet's capabilities for interactivity are making these flows more widespread, promoting the development of important transnational communities and intra-regional processes of cultural integration.

These significant socio-cultural changes are producing contradictory urban trends. On the one hand, they promote homogenising trends toward a 'global-way-of-life', characterised by a certain quality of life linked to consumption patterns highly influenced by marketing strategies of global corporations. On the other hand, they allow the intensification of cultural diversity to new thresholds, which in turn is producing a more chaotic and fragmented urban landscape, which has been labelled as the 'video-clip city' (García Canclini, 1995).

This chapter's exploration has identified great differences in the use and the significance of ICTs in everyday life for the different population groups. The most visible transformations are those that are adapting the life of the elites towards a more cosmopolitan, exclusive, globally oriented and highly networked everyday life. Middle income groups are also enthusiastically embracing ICTs as a means for improving the comfort, security and autonomy of their everyday life, using them for recreation purposes, for rapid communication, coordination and the individual management of their activities in space and time. ICTs are helping elite groups to withdraw from the 'troubles' associated with the city: crime, congestion, pollution, and to build 'islands' of comfort and security in the outer periphery or inside their walled homes.

The opposite is occurring when ICT diffusion reaches the masses. Since affordable access for most urban residents is only possible through collective places, the use of these new neighbourhood facilities is intensifying the use of public space. The transformation of the everyday life of the lower-income people, although less spectacular, is not less significant for these population groups, who constitute most part of urban residents. Thanks to its versatility, ICT connectivity is providing a series of basic services and functions that generally lack in the deprived and informal neighbourhoods of the Latin American cities, such as post offices, libraries, recreation facilities, study places, youth centres, information centres, and cultural facilities. For the vulnerable and deprived groups, the access to ICT networks constitutes then a crucial asset for improving their standard of living, both material and symbolic. So far, this growing 'popular' Internet culture is centred in young people and students, but this will probably expand in the future.

The introduction of ICTs has produced an added vitality in the already lively and contested Latin American cities. Significant transformations are occurring in the inter-play of electronic spaces and real places. Internet centres are emerging in the neighbourhoods, which are offering new online services and functions, while digital cities are opening up new ways of local engagement and democracy. ICTs are also producing new types of urban and social interactions, as new ways to engage in collective action, while the expansion of the city's reach to the networked world is connecting the general public with relatives and friends abroad, bringing them closer to their everyday life.

All these recent developments regarding new urban functions and new types and ways of social interactions are definitely transforming the urban landscape and the urban scene in the Latin American metropolises in ways that are not direct, homogeneous, planned or foreseen. The recent ICT-related socio-cultural developments are contradictory and complex and the same is valid considering the trends toward agglomeration or dispersion. While the use of Internet and the mobile phone are considered to reinforce the 'buzz' of central districts and to make them more attractive for the young, the more active and the creative people, they also make suburbanisation more manageable and attractive for the ones escaping from the city's troubles.

By allowing the elites to build 'fortified enclaves' in the outer periphery, ICTs are also helping to materialise anti-urban and undemocratic trends in urban development, deepening of the type of urban development at two speeds that has historically characterised Latin American cities. On the other hand, when ICTs are accessed by low-income residents, they are effectively delivering urban services that were previously absent in informal or spontaneous neighbourhoods and districts. These last developments suggest that in poor urban environments, Internet is bringing more digital opportunities than divides, and slowly contributing to a more balanced and sustainable type of urban development, by improving the standards of life or low-income groups.

The bottom line regarding ICT diffusion in the Latin American metropolises is the intensification of the urban contradictions: regarding the socio-cultural context, regarding the use of ICTs in everyday life, regarding the urban form, and regarding their general urban development. The next two chapters, presenting the cases of Lima and Buenos Aires, will show how these contradictory trends and opposing ICT-related urban developments are currently happening at a closer view.

Notes

[1] Recently, some authors have criticised this type of top-down programmes as a waste of resources (Fink and Kenny, 2003). "*ICTs are mainly imposed from without, and not adopted from within. Even when the ICTs are requested 'from within' it is almost always in response to offer 'from without', or a request for proposals that has been originated from a donor agency*." (Lanfranco, 2004).

[2] Susana Finquelievich and her team of the Faculty of Social Sciences of the University of Buenos Aires, which maintain a research program on the Information Society, is one of these exceptions.

[3] Over the whole text, when I talk about the elite(s) I am referring to the economic elite(s).

[4] Each marketing firm gives different percentages of Internet ready population groups, which vary from 12% to 20% (Cohen, 2000)

[5] The survey from IBOPE provides figures of percentage of population with Internet access, without specification of what kind of access it is.

[6] Unluckily I found no data on this issue for the same year, which would increase the validity of the comparison.

[7] The region's population has tripled between 1950 and 2000.

[8] http://www.pewinternet.org/trends/DemographicsofInternetUsers.htm

[9] Most of the related discussion is about the extent and significance of the digital divide.

[10] Even after the traumatic devaluation of the peso in Argentina, Internet use increased by 14% (between December 2001 and October 2002) (Clarín, 2002c)

[11] García Canclini (2002) explains that the advancements of electronic media in the megacities have produced a restructuring of the articulation between public and private spheres, which in turn result in changes in consumption patterns and everyday life.

[12] 'Out-of-home' here evidently includes Internet access from work and other locations.

[13] There are studies on users and uses of cybercafés from the point of view of communication studies, anthropology, and urban studies.

[14] Each country has coined a different name for this new type of businesses. They are known as *cabinas públicas* in Peru, *cafés Internet* in Mexico, *cybercafés* in Quito, etc.

[15] *Locutorios* are places with telephones to rent, very popular in Argentina and Spain.

[16] 50% of the C3 segment and 82% of the D segment (the lower-middle class) were connecting from *locutorios* in Argentina in 2003 (Rueda, 2003)

[17] *Fundación Chasquinet* (2002), a NGO that coordinates most of the telecentres movement in the region, reports 106 NGOs and private telecentres registered in the region in 2002.

[18] National and regional conferences are held, and different discussion lists are working at regional levels. See http://www.telecentros.org

[19] An example of this can be seen in the wedding celebrations of the Latin American high and middle-class, which tends to homogenise among the different countries.

[20] At the beginning of the 1990s there were significantly more hours of television broadcast in Latin America than in Europe (Garcia Canclini, 1995). A high proportion of the programmes were of foreign origin, mainly from the US, but Brazil and Mexico also had a significant share, especially in children's programmes and *telenovelas.*

[21] The local term for soap-operas.

[22] There is a debate going on about the 'social role' of commercial cybercafés in the Latin American community informatics sector.

[23] By virtual cities we understand the initiatives of local governments, activists and/or associations of in civil society to deliver information and or online services in a certain locality. They are considered as a complex urban space and not only the digital configuration that appears on the computer screen.

[24] The close similarities between (written) Spanish and Portuguese, is an advantage in expanding the action space of the Latin American cyberspace to include the Brazilian population.

[25] Caldeira (2000) has studied the causes of these processes in Sao Paulo, comparing it with similar processes in Los Angeles, and argues that these anti-democratic tendencies toward privatisation of urban space generally coincide with periods of democratisation and/or great social change.

[26] Comparing with other world regions, however, Latin American home-centeredness is rather low.

[27] Here I refer to Richard Sennet's *The Concious of the Eye*. For Sennet, in the ancient city, people's eyes were used to observe the complexities of life, which led to caring about what one sees, and in turn, to the desire to engage in action.

[28] Blogging is popular web-based application that allows discussing events, online publications and news, etc. promoting peer awareness of global, national and/or local issues.

[29] Rheingold foresaw the impact of computers in the 1980s and of Internet in the 1990s. For him, the social impact of mobile communications will produce the next social revolution (Rheingold, 2002).

Part IV.

Case-studies

Chapter 7.
ICTs in Lima as a case-study

This chapter presents ICTs-related transformations in Lima, the capital of Peru. Peru is a large Andean country, located in the middle of South America and facing the Pacific Ocean, which has a rich history of highly developed pre-Columbian cultures that include the Inca Empire. It was precisely the tales of the Inca's gold which attracted the Spanish conquerors to South America. After the latter took possession of the Incan territory in the early 16th century, the Viceroyalty of Peru became the place where the *conquistadores* achieved their dreams of gold. Peru became a synonym of gold in the Spanish world, which is still expressed in the phrase '*Vale un Peru*' (meaning 'It is worth gold'). Current Peru is, however, affected by structural problems of poverty, inequality and exclusion, especially touching the indigenous population, which constitutes 47% of its total population [1] (UNDP, 2004). The relative socio-economic position of Peru within the Latin American region is illustrated in Table 7.1.

	Position in the HDI world ranking	Country	HDI 2002	GDP per capita 2002 in US$
High Human Development Index	34	Argentina	0.853	10,880
	43	Chile	0.839	9,820
	46	Uruguay	0.833	7,830
	53	Mexico	0.802	8,970
Medium Human Development Index	68	Venezuela	0.778	5,380
	72	Brazil	0.775	7,770
	73	Colombia	0.773	6,370
	85	Peru	0.752	5,010
	89	Paraguay	0.751	4,610
	100	Ecuador	0.735	3,580
	114	Bolivia	0.681	2,460

Table 7.1. Human Development and GDP per capita in Latin American countries in 2002 (Source: UNDP, 2004).

Demographic processes and rural poverty have obliged people to migrate massively to the cities, and especially to Lima. In 2000, 62% of the heads of households in Metropolitan Lima were born outside the capital (El Comercio and Apoyo, 2001). Within the Latin American region, Lima is now the metropolis fifth in size, with approximately eight million inhabitants in 2004. Lima is interesting because it constitutes an example of the development of ICT applications in an urban context characterised by high levels of poverty. Informal economic activities are in Lima widespread and more frequent than in other Latin American metropolises. But, despite its economic difficulties, the processes in Lima provide useful insights in what is at stake with the introduction of ICT in cities.

The objective of this case-study is to examine the peculiarities of the ICT-related transformations in the context of Lima, relating them to the results of the previous part. The chapter begins with a description of the urban and socio-cultural setting of the case-study, with emphasis in the recent trends. An analysis of the recent transformations in the field of telecommunications and the ICT sector follows. The focus on the next section is on Internet diffusion and how it affects the different sectors of the city. The last section relates the findings to transformations in Lima's urban functioning and urban form.

7.1. Urban development of Lima

Lima is a city of high primacy: it houses approximately thirty percent of the population of the country and keeps growing with a high annual rate, as it concentrates more than fifty percent of the economic activity of Peru. Since its Spanish foundation in 1535, Lima has been two cities in one, the city of the Spanish rulers and colonists, currently known as *Lima cuadrada* and the city of the autochthonous population, called *El Cercado* (the walled site). Figure 7.1 shows the first map of Lima, in 1613, with a clear illustration of the location of its two cities.

Figure 7.1. Lima and its two cities in 1613 (Source: Driant, 1991, taken from Bromley and Barbagelata).

Until the last decades of the nineteenth century, Lima grew at a very stable and slow pace. In the 1880s, the walls that surrounded the city were demolished and replaced by broad avenues and boulevards, according to the principles of French urbanism. However, the real transformation of Lima occurred during the 1920s, in the context of the changes originated by the introduction of North American capital into the national economy, which gradually modified the productive structure of the country after the beginning of the twentieth century. [2] This produced the expansion of the middle class, the emergence of the workers' movement, and a significant change in collective mentalities *"…all the transformations that the slow but irreversible process of capitalist development generates, made possible that the national problem was collectively*

raised, that Peru was thought of as a totality…" (Burga and Flores Galindo, 1979:8). For local thinkers, to be a modern nation Peru had to re-indentify with its Andean people and history (Renique, 2003). The modernisation of the country, and the centralisation and expansion of the state became the main policy of the Leguía administration (1919-1930), while Lima's population growth accelerated due to an initial migration stream coming from the provinces. [3]

The spatial transformation of Lima was outstanding during this period. The city began to expand itself rapidly along two avenues, the so-called '*avenidas urbanizadoras',* which connected the centre with the sea. The high income sectors moved towards the new residential areas in Miraflores and San Isidro, followed by middle-income sectors. Land speculation on a large scale developed during this period, linked to the dealings in rural land for urban purposes. [4] The urban landscape in the city centre rapidly transformed due to the modernisation of construction technologies and the introduction of new building typologies.[5] During the following decades, Lima's spatial expansion, addressed to high and middle income sectors, was structured along the axes of the *avenidas urbanizadoras* and the space between them (see Figure 7.2). The poor remained in the city centre, inhabiting the increasingly sub-divided, crowded and run-down former residences of the elite.

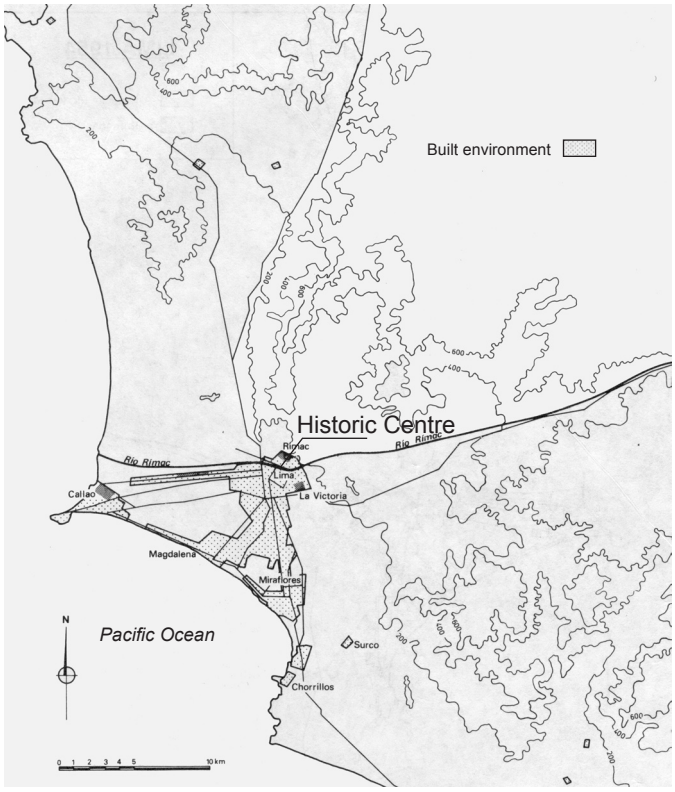


Figure 7.2. Lima in 1940 (Source: Driant, 1991).

Since the 1940s, a demographic transition process began to affect Peru, producing a drastic reduction in mortality and accelerating population growth. A second migration stream headed to Lima, this time coming from rural areas. Unlike the first migration wave, the Andean migrants

were unable to find a place in the job market. The first *barriadas* began to form in the nearby hills or in dangerous places along the river, generally close to the centre. Matos Mar (1977) estimated that in 1956, 9.5% of Lima's population (of 1.2 million people) was living in *barriadas*.

Since that time, the urban growth of Lima has been highly skewed and characterised by two different spatial dynamics, not mutually exclusive, but rather, highly inter-related. One the one hand, Lima has been growing according to a process led by the capitalist real estate market, in which the urban regulations have been easily over-ridden whenever it was judged convenient. On the other hand, most of Lima's urban growth during these fifty years has been the result of an 'informal' process of urbanisation of the periphery, shaped by the collective action of the poor, which has been permitted and sometimes organised by the state and/or local governments. The drivers of these processes, the financial sector (as the real estate sector is dominated by the financial sector in Lima) and the urban poor, have been the two main urban actors in the urban scene, which have effectively produced the built environment of the current Lima. Lima, is then, a city characterised by the strong presence of its *barriadas,* considered as the only housing alternative for the poor.

a) Lima as the city of *barriadas*

Lima has a place in the urban studies precisely because of the singularity of its *barriadas.* [6] In Lima the *barriadas* process has been more extensive, more organised and in some ways, more thought-provoking than in other cities of the region which have also undergone similar processes of rapid urbanisation. Three singular elements have contributed to the outstanding reproduction of informal settlements in Lima since the 1950s (Driant, 1991):

- The easy availability of land, due to the existence of large extensions of land owned by the state in the periphery of the city;
- the mild climate of the city, with almost non-existent rain, and low variation of temperature during the year, which has favoured land occupation without large initial investments;
- a very flexible housing policy, which allowed and later promoted the organised invasion of land by the poor.

While the precarious neighbourhoods were mushrooming in the hills of the north and south periphery, progressive legislation, the so-called *Ley de Barriadas*, opened the possibility of granting municipal authorisation to the informal settlements, despite their marginality in respect to legal ownership (Driant, 1991). This represented a radical shift for that time (1961), and later proved to be decisive for the formation and expansion of *barriadas*, and for the generalisation of the view of the *barriadas* as 'the' housing solution for the poor in Peru.

After working in *barriadas* of Arequipa and Lima during the late 1950s and early 1960s, the situation John Turner observed there inspired him to develop an unorthodox approach for providing housing for the poor. Before Turner, conventional academic wisdom considered that the rapidly growing informal neighbourhoods in Third World cities were, by definition, slums: places of delinquency and social breakdown (Hall, 1988). With the help of anthropologist William Mangin, Turner (1967) showed the world that in the *barriadas* of Lima it was the reverse. He claimed that the *barriadas* were highly auspicious, as the fruit of a high level of organisation of the 'land invaders' and the individual effort of their residents to gradually build their neighbourhoods and their own dwellings.[7] "*That the mass of the urban poor in cities like Lima are able to seek and find improvement through home ownership (or* de facto*-possession) when they are still very poor by modern standards is certainly the main reason for their optimism. If they were trapped in the inner cities, like so many of the North American poor, they too would be burning instead of building*" (Turner, 1968:360).

Lima grew explosively during the 1960s and 1970s, mainly according to the *barriada* model. Lima's spatial expansion was structured along two axes, which played the role of the '*avenidas urbanizadoras'* of the 1920s: the road to Canta towards the north, and to Atocongo towards the south. This process was the origin of the North and South Cones, respectively, which gradually became important parts of the city's structure. Since then, Metropolitan Lima is usually divided into a central area, which corresponds to the traditional or 'formal' Lima, and the so-called Cones, the peripheral areas which correspond to the expansions in the form of *barriadas* and other (semi-) informal settlements (see Figure 7.3).

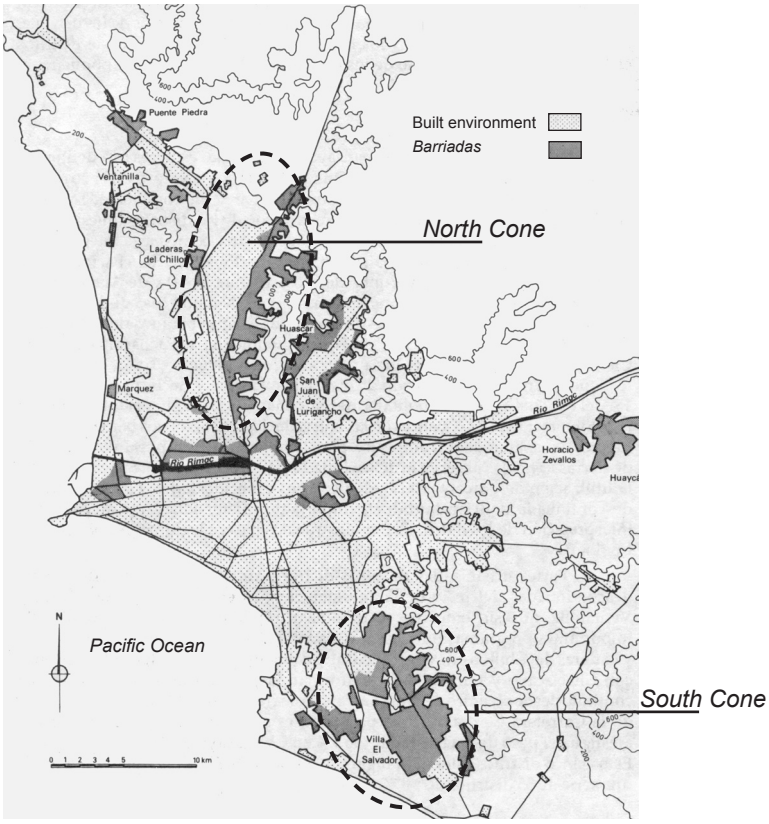


Figure 7.3. Lima and its barriadas in 1986 (Source: Driant, 1991).

Serious evaluations of the *barriadas* have made unenthusiastic conclusions about their physical qualities (Riofrío and Driant 1987, Driant, 1991), but these conclusions have been balanced with the positive elements coming from the anthropological and political interpretations of this process.[8] In *barriadas* the construction and improvement of the neighbourhood is a collective enterprise. To build their neighbourhoods the residents have organised in territorial and functional organisations, addressing local concerns and demanding the solution to their basic needs.

The 1970s were also characterised by the rapid expansion of leftist social movements, promoted by years of 'political work' of students and young intellectuals in *barriadas*. Local thinkers considered that the massive arrival of Andean migrants in the cities was producing a dynamic

popular culture, which was gradually changing the traditional ways of politics and social relations and forging a more democratic society. *Barriadas* were considered the urban environment in which the origins of an alternative modernity, based on culturally endogenous practices, was better appreciated. [9] This auspicious 'new kind of development' would combine reciprocity, individual freedom, equity and solidarity practices as essential elements (Geisse and Sabatini, 1998).

The optimistic view of the development of the *barriadas* was fuelled by the success of Villa El Salvador, a highly organised *barriada* at the South of Lima, whose development triggered a positive regard about the future of the *barriadas* in the minds of *barriadas'* residents and urban professionals. [10] *Barriadas,* therefore, have two contradictory sides: economic deprivation - but with great social strengths to help their residents to improve their own living standards.

At the end of the 1970s the demographic trends crossed a threshold that changed the face of Lima forever. The 1981 census figures showed that 31.7% of Lima's population was living in *barriadas*. At the same time, from 1972 to 1981, Lima was not growing any more due to rural migration, but due to its own natural growth. A second generation of migrants was making visible advances in most aspects of the local economy, society and culture. The widespread presence of Andean migrants and their children in the urban scene was vividly described in *Desborde popular y crisis del Estado* (Popular overflow and crisis of the State) by Matos Mar (1984), who expressed both the worries and hopes of local researchers faced with the rapid transformations. He described how the new strategies and parallel mechanisms of the popular sectors were altering the conventional social, political, economic and cultural 'rules of the game'.

If the urban situation of Lima at the end of the 1970s was complicated due to the increased presence of the *barriadas* and of the spreading of urban poverty, these would seem to be 'the golden years' in comparison with what would happen in the next decade. The optimism and social strengths of the poor would be put on trial during the difficult 1980s.

b) The 1980s: informality as a way of life

The 1980s were an extremely difficult period for Lima, which suffered from deep political and economic instability and great social changes. During that so-called 'lost decade of Latin America', the Peruvian economy collapsed after decades of industrially oriented growth. Figure 7.4, showing the average annual inflation rates during the 1980s in the country is illustrative of the depth of the economic problems, taking into account that 100% of inflation means a doubling of the prices of goods and services. Between 1980 and 1990, the average increase in prices was 10 million percent, while income levels reduced to 16% of their levels in 1980 (Ugarteche, 1994).

This profound economic crisis, combined with demographic, social and political trends obviously produced huge transformations in the city functioning and its urban landscape. The dramatic shrinking of employment and income levels meant a radical reduction in consumption habits for the middle income sectors. For the poor, survival concerns increased to critical levels. Households were forced to mobilise all resources and sent women and children to work. An exceptional growth of informal (street and home-based) economic activities was the result. The streets of Lima, and especially of the historic centre, became open markets, where the poor presented goods for sale to passers-by. Land uses substantially changed, especially in the main avenues surrounding Lima. As a result of this process the centre lost great part of the financial and formal commercial functions and began itself to deteriorate physically. Under the appropriation of larger public spaces of the city by the migrants, people began to talk of Lima as unmanageable and out of control.

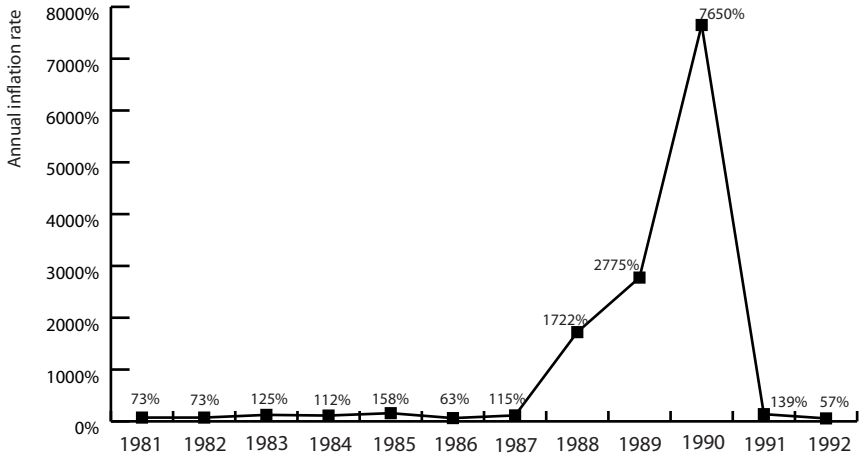


Figure 7.4. Evolution of the average annual inflation rate in Peru during the 1981-1992 period (Source: El Comercio and Apoyo, 2002).

Meanwhile*, barriadas* were gradually transforming from mere dormitory areas into sites for informal production and commerce. The oldest *barriadas*, Comas, in the North Cone, and San Juan de Miraflores in the South Cone, developed their own commercial centres and became important centres of informal economic activities. [11] At the same time, the Andean migrants slowly introduced new ways of life and behaviour, merging beliefs and values coming from their Andean culture and Lima's urban culture. This had two main effects: the manifestation of a new urban culture and the flourishing of new associative practices in *barriadas*. New cultural expressions emerged, constituting what has been called the *chicha*[12] culture. Its more visible products have been a singular kind of music[13] (a mix of Andean with tropical music using electronic instruments), editorial production (observed in sensationalistic tabloid newspapers, the so-called yellow press) with its related verbal expressions (partly taken from the criminal circuit), architectural style (observed in houses in *barriadas*), and ways of eating (mixing traditional food in unexpected ways) (Gargurevich, 2002).

During this difficult decade the *barriadas* experienced the flourishing of grassroots associations, survival mechanisms, reciprocity networks, and new associative and organisational practices. Residents had to shift their housing and neighbourhood concerns of the previous decades to survival issues. The dense networks of bottom-up associations were mainly addressed to food- and health-related matters. [14] *Barriadas* became one of the most organised sectors in the city. Within their organisations, women's associations played a significant role which served to recognise women as the most dynamic social actors to face of the crisis (Ugarteche, 1994).

These social and economic changes occurred under the most intense, extensive and prolonged internal armed conflict in Peru's history, according to the Truth Commission (2003) that investigated the conflict. The process of political violence that affected Peru since the early 1980s escalated as insurgent political groups[15] took control of larger areas of the national territory, inflicting huge damages against infrastructure, property and human lives. The conflict, which eventually produced 70 thousand deaths, caused the notorious weakening of the country's productive capacity. During a long period, the state was unable to guarantee public order and security. The conflict also exposed the strong social divide inside Peru: while political violence was happening in the rural areas or isolated villages "*it was neither felt nor taken on as*

its own by the rest of the country" (Truth Commission, 2003). It is estimated that 600 thousand people left their home towns and emigrated to the cities, especially to Lima.

Between the end of 1989 and mid-1992, Lima became the main scene of the political struggle. While subversive groups consolidated a significant presence in popular sectors - especially within youth groups - a huge increase of subversive and terrorist acts, some of them of extreme violence and cruelty, traumatised the population. A climate of insecurity and terror took possession of Lima (Truth Commission, 2003). *Barriadas* were among most affected locations, where Shining Path killed leaders grassroots organisations who opposed to their political goals. "*At the beginning of the 1990s Lima seemed like a dramatic replica of a permanently bombed Latin American Beirut*" (Ludeña, 2001:15). Bombings, political assassinations and electricity black outs became part of daily life. Beside the enormous material damage this process caused[16], the fear and insecurity of citizens resulted in a city with low levels of economic activities, and without public or private investments.

c) The 1990s: a new Lima emerges

The defeat of Mario Vargas Llosa in the presidential elections of 1990 which made Fujimori president of Peru represents a landmark in Peru's recent history. The new political class exhibited features and ways which made people aware of a changed socio-cultural context, with radically different political actors. Not long after, Ugarteche (1994: 210) referred to it: "*The world of white people finished and with it, their life style, their way of driving politics and the economy; but especially a way of social interaction*". This process of social and cultural change was seen on the one hand, as the crisis of the Creole identity[17], and on the other hand, as the '*cholification*'[18] of the society. The most optimistic perspectives considered it as a process of cultural fusion and integration that suggested the birth of a new nation (Méndez, 1996).

What emerged from this cultural opening, however, was not broadly democratic, but highly contradictory. On the one hand, widespread poverty and the fear of terrorism seemed to have unified the society, affecting not only the poor but also middle- and high-income groups. On the other hand, authoritarianism and hierarchical attitudes subsisted (Ugarteche, 1994). Expressions of the popular '*chicha'* culture became increasingly broadcasted by the mass media - radio, television and the yellow press. The *chicha* entertainment industry[19] that flourished during this period had visible links with the new political class.

At the time of his investiture as president in 1990, Fujimori applied a 'shock therapy' to the economy which eventually succeeded in stop the hyperinflation rates thus stabilising and re-structuring the macro economy. Processes of privatisation and deregulation were launched soon after and the largest public enterprises were sold, mainly to foreign corporations, mainly of European, and especially of Spanish origin. People began to talk about Spain's 'second conquest of America'.

In 1992 the government succeeded in fighting the insurgent groups and public order was rapidly restored. The end of hyperinflation and of political violence after a decade of generalised sufferings produced a national euphoria, which was more pronounced in Lima. Since then, large local and foreign capital began to be invested in the city and the country[20], in a period which coincided with the wave of economic globalisation. Telecommunications was the destination of most of foreign direct investments during the 1993-2000 period in Peru, amounting for more than 2.6 billion dollars (INEI, 2002a).

Ludeña's analogy illustrates the situation during the 1990s, "*Lima was a feast…but with a funeral march as background music*" (Ludeña, 2001:19). Despite the optimism of the political class because of the macro economic indicators, the application of neo-liberal economic policies had tremendous social costs, so worsening the daily life of the average Peruvian.

Poverty increased and inequalities became more acute. The participation of the informal sector in the urban employment in Lima grew visibly during the 1990s. After a period of high economic growth and visible economic enthusiasm (1992-1997), the effects of the Asian crisis and the *El Niño* phenomenon produced a new recession period that began in 1998 [21], which deeply affected the economy until 2001.

The new cycle of economic recession changed the composition of socio-economic sectors in Lima, dramatically increasing the proportion of persons living in poverty. The evolution of the composition of socio-economic sectors in 1991 and 2003 (See Table 7.2) clearly reveals the pauperisation of society during the 1990s, despite the macro economic recovery. The middle-income (B) and low-income (C) sectors declined during this period, while the very-low income sector increased enormously.

	High-income sector (A)	Middle-income sector (B)	Low-income sector (C)	Very-low income sector (D)
1991	3.8%	21.0%	38.7%	36.5%
2003	3.6%	16.3%	26.6%	53.5%
Evolution	- 0.2	- 4.7	- 12.1	+ 17

Table 7.2. Evolution of socio-economic sectors of households in Lima 1991-2003 (Data source: Apoyo, 2003a).

Figure 7.5 illustrates the income distribution in Lima in 2003 according to socio-economic sectors, and the average monthly household income of each sector, showing that 19.9% of the population (A and B sectors) receives 58.6% of the total income. Since 2002 the income decreasing tendency that was observed since 1998 has been reversed slightly. The average household income increased to US$ 434 (the median to US$ 257) in 2003, what represented 4% more than in 2002 (Apoyo, 2003a).

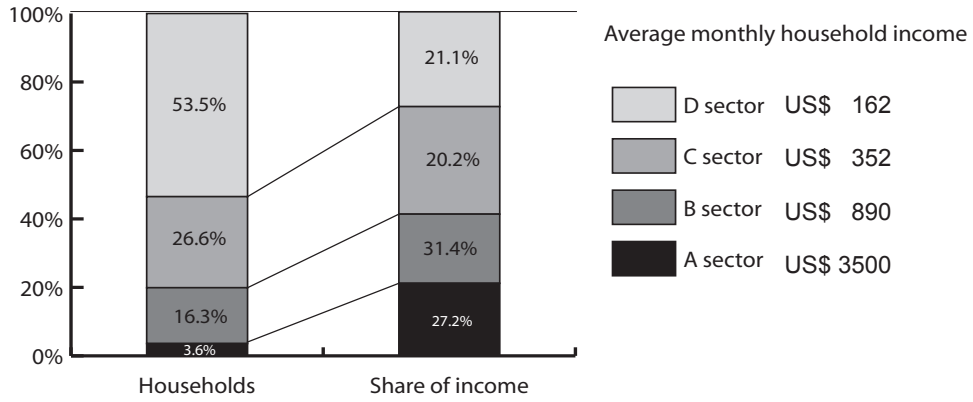


Figure 7.5. Distribution of income according to socio-economic sectors in Lima in 2003 (Own elaboration with data from Apoyo, 2003b).

Structural changes in the political economy as well were having profound effects in the city. The Fujimori administration left public transportation in the hands of 'the free market' since the early 1990s. The informal sector became in charge of public transportation in Lima, which is currently the only Latin American capital city that does not have an organised system for public transportation. Any person can use his car as a taxi or his van as a vehicle to transport people from one point of the city to another. This situation has increased urban chaos and congestion to very high levels.

Other important changes are associated with national and foreign real-estate investment groups, which have pumped huge capitals into new projects, in an order of magnitude that has no equivalent in the history of Lima, with the exception of the 1920s (Ludeña, 2001). Chion's (2002) study on the main changes in the metropolitan spatial organisation of Lima during the 1990s suggests that these changes affected four main groups of urban activities: (a) information-intensive functions, (b) industrial functions, (c) cultural and entertainment functions, and (d) commercial functions.

(a) The expansion of information-intensive activities in Lima was evidently linked to the growth of foreign direct investments as a result of the policies of privatisation and deregulation of the economy launched by the Fujimori administration. The sectors with the major growth were the financial and the telecommunications sectors. Lima stock market exchange grew by 15 times between 1991 and 1997, and Peru's international trade grew 86% in the same period (Chion, 2002). At the same time a new CBD began to take shape outside the city centre. In the district of San Isidro most local banks have built their new corporate office towers, and new exclusive hotels and 'executive office complexes' were built soon after (Ludeña, 2001). Among these, the tower of the International Bank is the more salient of the new bank headquarters, designed by architect Hans Hollein.

(b) In the industrial field, three new industrial clusters of metropolitan importance developed, which mainly operate in the informal side of the economy. The largest and most successful is a cluster in Gamarra, which concentrates 70% of the textile and clothes manufacturing industries of the whole country (Ludeña, 2001). Furniture manufacturing in the industrial park of Villa El Salvador, and shoe manufacturing in San Juan de Lurigancho are also of metropolitan importance. The newness of these developments is that they are located in areas previously considered as marginal and away from the traditional industrial areas. Gamarra, close to the historic centre, was known as a place of high crime and poverty, while San Juan de Lurigancho and Villa El Salvador are large districts of *barriadas* located in the periphery. Now they attract customers from the whole Lima.

Further, a cluster of ICT businesses located in the historic centre (the so-called Wilson) has been rapidly growing during the 1990s. It was originally intended to provide computer related services. But, with the advent of Internet and the growing demand, these services have further expanded to telecommunications. Currently they provide hardware, software and ICT services to most of the SMEs and households of Lima. [22]

(c) The 1990s have witnessed an enormous growth and diversification of cultural and entertainment activities. The regeneration of the historic centre, after almost two decades of decay, took place in 1997 (Ludeña, 2001). It consisted mainly in the eradication of informal activities from the streets of the historic centre, to give place to cultural, recreation and touristic functions and activities. Additionally, new centres have emerged in 'unexpected' places. For example, a huge entertainment and night-life centre with a multiplex cinema, discotheques and casinos has flourished in the districts of Comas and Los Olivos in the North Cone, which attracts a huge clientele from the whole city. A similar, but more modest spot has also emerged at km 90 of the Pan-American Highway to the South, which serves the entertainment demands of the high-income youth, as it is only accessible by car. Another impressive development is the so-called Little Las Vegas, a corridor of casinos, restaurants and motels along the La Marina Avenue on the route to the international airport (Chion, 2002).

(d) The economic recession and, since the late 1980s, terrorist activities heavily affected the normal commercial activities. In the traditional middle-class commercial area in Miraflores,

bomb explosions and fear of violence decreased the number of customers and visitors. Large department stores and small boutiques had to close their doors and the whole area decayed rapidly. With the restoration of public order and the injection of foreign capital several shopping malls emerged outside the traditional centres, along with hypermarkets, multiplex cinemas and fast food chains. The largest is located in the land close to the hippodrome (Jockey Plaza) and only accessible by car. Others have followed in different locations for different types of public, be it at the seaside in Miraflores (Larcomar), along the highway to the South, or in the North Cone (Mega Plaza and Royal Plaza) for residents of *barriadas* districts. Important landmarks within these new commercial centres are two large Chilean department stores chains, Saga Falabella and Ripley, which have succesfully opened stores in strategic commercial locations. A key of their success is that they provide credit to people without bank account. Saga Falabella's credit card, which only gives credit for purchases in their stores, is the most used credit card in Lima.

Unlike other Latin American metropolises, Lima has not experienced the growth of private neighbourhoods. Elite groups have not moved from their traditional quarters in Modern Lima, where 98.6% of them live [23] (El Comercio, 2004). Neighbourhoods with similar features have, however, developed as private beach resorts along the coastline at the South of Lima. These are not permanent, but secondary residences, used only during the summer months and sometimes, at weekends. They are located along the Pan-American toll Highway, from km 90 to the South of Lima onwards. They all have surrounding walls and gates with own security personnel, and they employ an army of helpers, gardeners, maids, etc. from the poor towns nearby. However, as temporary houses, they cannot be considered as 'fortified enclaves', but only recreational facilities.

In Lima's urban structure two main parts can be distinguished: the central part and the Cones. Lima's central part consists of Old Lima (the historic centre), Callao (the port) and Modern Lima (closer to the sea). There are three Cones: the North, South and East Cones, according to their geographical location. Table 7.3 shows the percentage of population living in these six zones in 2004, each of which has a larger population than any other Peruvian city (El Comercio, 2004). The formation of these three Cones and the emergence of their corresponding centres has not been the result of urban plans[24], but of the 'spontaneous' forces of agglomeration.

	Number of political districts	Percentage of the total population in 2004	Total population in 2004
1. Old Lima	5	11%	888,972
2. Callao	6	11.8	952,030
3. Modern Lima	12	15.1%	1,215,164
Total Central Lima:	23	37.9%	3,056,166
4. North	6	26%	2,095,025
5. East	4	19.5%	1,573,028
6. South	4	16.6%	1,336,142
Total Cones:	14	62.1%	5,004,195

Table 7.3. percentage of population living in the different areas of Lima (Source: El Comercio, 2004).

The pattern of multiple centres that was observed in Lima already during the 1980s, has been further reinforced in the 1990s, producing a more dispersed and decentralised urban structure that extends itself towards the Cones (see Figure 7.6).

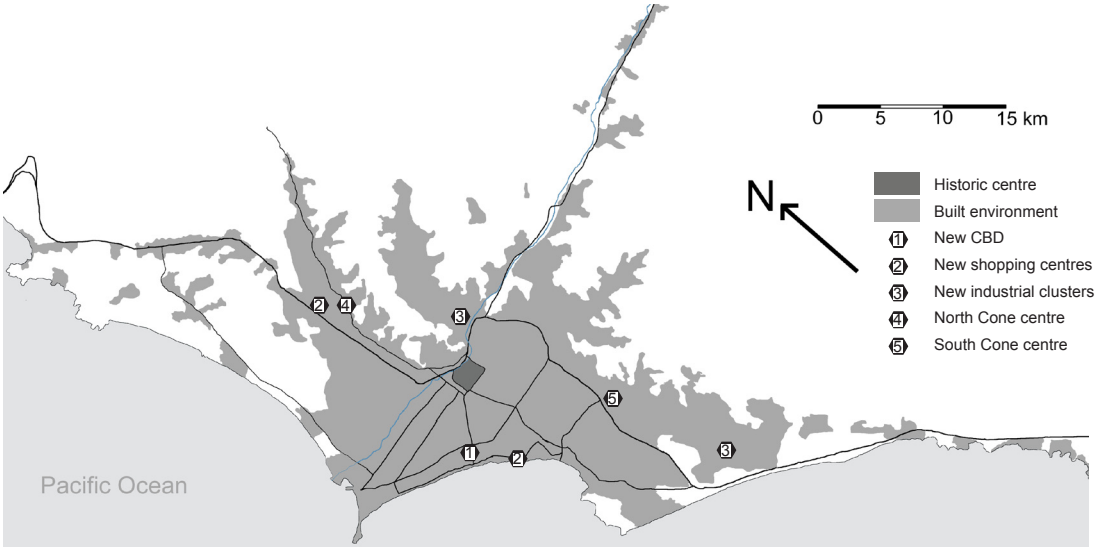


Figure 7.6 Lima and its multiple centres in 2000.

The great commercial success of Mega Plaza and Royal Plaza, the large commercial centres located in the North Cone, is 'the new urban issue' in Lima. This process has promoted reflection about the incorporation of part of these seemingly poor sectors to global consumption dynamics. Local researchers argue that a new middle class is emerging in the Cones, which highly differs from the traditional middle class developed during Lima's post-war industrialisation process living inside Modern Lima (DESCO, 2003). Recent figures confirm this argument. Only 52.9% of the B sector (middle-income) lives in Modern Lima, the rest are dispersed in the other five zones. Four peripheral districts are increasingly becoming the living quarters of the new middle-class[25] (El Comercio, 2004).

Not only large commercial malls are flourishing in the Cones, but also large supermarkets, discotheques, multiplex cinemas, fitness centres, specialised stores, private universities and clinics. The demand for this type of facilities, which were previously only located in middle and high income areas (Modern Lima), suggests the significant increase of global consumption patterns in the popular sectors. Only the information-intensive sectors have not experienced such a move towards the Cones, except for bank offices, which are notably present in the new developments.

The 'new Lima' is more complex and contradictory than ever before. The dichotomy between the formal/informal or rich/poor sides of the city is, by far, inadequate to describe Lima's multiple contradictions. Ludeña (2001:17) describes the changes as a "*contradictory process of democratisation and social exclusion in the use and development of the urban space.*" [26] Lima's urban development presents typical features associated to 'global' processes observed in other Latin American metropolises, with 'islands of modernity' emerging in different places of the city addressing the demands of the elite, while the traditional local commercial, financial and real-estate groups have been weakened and replaced by foreign firms and economic groups.[27] However, Lima presents exceptional features that are not easily seen elsewhere. The elite have not moved from their traditional quarters and Lima has not developed 'fortified enclaves', while an important share of the new urban facilities has been located outside the traditional prestigious locations to attend the demand of the 'new' consumers living in the Cones.

It is in this context that the telecommunications revolution has affected the city, where a real Internet boom has been experienced in an incredibly short period. "*Lima emerges in the year 2000 plagued with cabinas públicas, cybercafés and cybershops*" (El Comercio and Apoyo, 2002: 214). To understand the introduction of ICTs in Lima, the following sections address the three main layers of networks operating in Lima. The analyses show huge differences and contradictions between the three layers and inside them, mirroring the urban contradictions observed in Lima.

7.2. Lima's local and international ICT connectivity

As a result of the privatisation of the former monopoly, the two public companies were sold to the Spanish company Telefónica in 1994, who agreed to invest to expand and improve the networks with the condition of a period of five years of 'restricted competition', a legal monopoly which eventually lasted only four. When the two companies were joined in one, Telefónica became the main company in the country, the one with the greater assets and higher revenues. Since that year the telecommunications sector has been the target of most of the direct foreign investment in Peru. In 2002 it represented 27% of the total FDI, which reached 11.03 billion dollars, most of which comes from Spain (El Comercio and Apoyo, 2003:173).

The modernisation and expansion of the networks have also resulted in the increase of telephony prices. Telephonic diffusion has greatly improved since privatisation up to 1997, but since then fixed lines show very little increase. On the other hand, mobile telephony shows a sustained growth and has greatly contributed to the increase of the total teledensity. The evolution of the sector can be divided into three main phases: public monopoly, restricted competition and free competition. They coincide with periods of no growth in telecommunications; the expansion of fixed telephony (from 1994 to 1998); and the expansion of mobile telephony, respectively (see Figure 7.7).

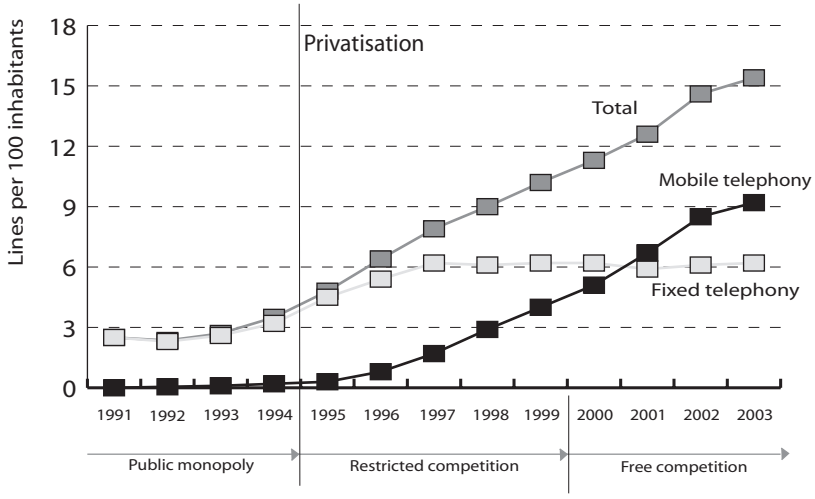


Figure 7.7. Evolution of telephonic density (lines per 100 inhabitants) in Peru 1991-2003. (Own elaboration with data from OSIPTEL, 2004).

The current telecommunications sector in Peru is characterised by its low levels of competition and the strong domination of Telefónica in most segments. The regulatory frame has been

ineffective in promoting competition, for differing reasons. On the one hand, the decision to sell the two telephone companies to one firm, which eventually grouped the two original companies in one, was not wise for the sake of competition. Additionally, if Telefónica International initially owned 35% of the shares of Telefónica del Peru, an aggressive financial operation executed in 2000 (*operación Verónica*) increased its participation to 97.1%, by buying shares in the New York and Lima stock markets (Rozas, 2003).

On the other hand, as in other countries where Telefónica has bought the former monopolies, the firm has taken advantage of its initial monopolist position to diversify its operations into new business ICT-related areas. This has promoted "*a process of entrepreneurial concentration – by means of fusions, acquisitions and strategic alliances – without precedent, given its magnitude and nature*" (Rozas, 2003:92) in the region, which is highly visible in Peru. The Telefónica group has in Peru twenty one enterprises, including commercial services, publicity, editorial services, digital services, data services, technical services, global communications, financial services, message services, international backbone service (Emergia), and call centres (Atento). In all of them Telefónica had a 100% participation, with the exception of Telefónica de Peru and Telefónica Data Peru, with 97.1% of participation (Rozas, 2003).

The presence and dominance of the Telefónica group in Peru is higher than in other countries of the region. [28] It not only has a strong dominance in fixed and mobile telephony (see Table 7.4), but also in other important segments: Internet service provision in *cabinas públicas* (60% of the market in December 2002); ISP for dial-up access (35% in the same date); renting of local, national and international backbone circuits (85.2%, 87.41% and 57.74% in 2001, respectively); and cable TV (77% of the market in June 2003) (OSIPTEL, 2003). An example of the benefits of Telefónica's dominant position: the rent of a E1 link inside Peru's national territory (with Telefónica) costs approximately double of what the same type of link between Lima and the US costs with one of the three submarine cable operators (IADB/FAO, 2003).

Fixed telephony		**Mobile telephony**	
Telefónica	99.04%	Telefónica	52.3%
AT&T	0.80%	Bell South	23.4%
Bell South	0.16%	TIM	18.7%
Americatel (Telecom Italy)	0.01%	Nextel	5.6%

Table 7.4. Participation of Telefónica in the fixed telephony market in Lima and mobile telephony market in Peru during June 2003 (Source:OSIPTEL, 2003).

Despite the lesser importance of the Peruvian market, Lima has become a bastion of Telefónica, and an important node in its networks. Due to its advantaged location, in the central part of the continent and next to the sea, Lima constitutes an important node in the Latin American backbone rings that surround the continent: Global Crossing and Emergia, owned by Telefónica. The Lurín station in Lima constitutes the main Network Operation Centre of the Emergia fibre-optic network of 45,000 Km, from where the provision of bandwidth services in other nodes of the network is monitored and managed (Emergia, 2003). Thanks to this potentially unlimited backbone capacity[29], Lima counts with several data centres, call centres, several digital backbone networks (Telefonica, AT&T, Bell South, Diveo, Impsat) and a local NAP[30], all of which favour Lima's local connectivity. According to Telegeography (2003b), Lima ranks fourth in the Latin American cities' international connectivity, after Sao Paulo, Santiago and Buenos Aires.

All this gives evidence that the construction and management of the infrastructure required for the information society in Peru up to now basically responds to the commercial interests

of Telefónica and other (minor) players in the telecommunications sector. At international level Lima enjoys good connectivity. The privileged geographic position of Lima has favoured its good connection to the global Internet backbones, and guarantees it in the future.

Regarding local Internet connectivity, basic telephony and Internet services coverage are ensured in the city, but its effective access is constrained by the high relative prices. The main way of connecting for home connection is dial-up, with services provided by Terra (Telefónica), RCP, Qnet, EC-Red and ViaBCP (Apoyo, 2003c). There are also broadband services by cable modem, ADSL and wireless options, but they are not available in all districts of the city. The business sector has evidently much more technological options for Internet connection. Firms offering premium networks and services obviously favour areas of high demand and expected profitability: the central districts of the city. This implies that high-speed connectivity is in the central districts of Lima only a matter of affordability, while in the peripheral and lower-income districts it is also a matter of the presence and coverage of the networks.

7.3. ICT industries and businesses in Lima

If the examination of the first layer networks gives clear and concrete results, the examination of the second layer networks is more difficult to carry out, since there are no official indicators of the magnitude and position of the ICT industries in the formal and even less in the informal economy. One makes a distinction among the supply side: the suppliers of ICT networks and hardware products, the suppliers of software goods and services and the suppliers of content; and the demand side: the businesses and industries making use of ICTs for their activities.

a) ICT production networks

Hardware industries

A large part of the ICT industries are transnational corporations as IBM, Microsoft, Apple, etc. providing software, hardware and related services. Some other local companies have emerged, or have been created, as new branches of large firms established in construction or other sectors. However, the most important provider of ICT products in Lima, both for the institutional and for the domestic market is the informal sector.

Peru's cities are among the most studied locations for studies of the informal sector[31], which provides employment for a high proportion of the total economically active population, approximately 60% (El Comercio and Apoyo, 2003:110). Informal economic activities are those not registered in the public institutions, and which do not pay taxes regularly. Being off-the-books and outside the law, they are generally semi-hidden and out of sight. Studies on the informal sector have identified its strong linkages with the formal sector of the economy, its role in generating jobs; the family employment strategies, and other features (Ward, 1993).

The informal sector is not, however, an undifferentiated whole. There is a more 'modern', dynamic and productive component and a traditional, more stagnant component. This first sub-sector tends to use skilled workers and it has strong links with the formal sector, as they depend greatly on the demand of that sector (Ranis and Stewart, 1997). In Lima, it is likely that this sub-sector has a large proportion, given the large numbers of professionals in the city, many of whom cannot find a job in the formal market. It is this modern side which began to develop activities in the ICT business during the late 1980s.

A remarkable feature of the informal sector in Peru is its decisive role within the ICT sector (Herzog et al., 2002). The informal sector began to address its activities to technology-related businesses long before the emergence of the Internet, when the ICT sector was still the IT

(computer and informatics) sector. This was partly due to the presence of many jobless IT professionals, which not long after were joined by thousands of young people trained in the computing institutes that flourished in Lima during the 1980s and 1990s.

Retailing in IT-related products, renting computers and peripherals, and providing informal computer services were part of the initial trade. Through the years, and, thanks to more affordable prices, the informal sector became the most important hardware provider in the city. The capacities of the informal sector for assembling hardware have made Peru a singular case in Latin America (Araoz and van Ginhoven, 2001). Due to the high prices of branded PCs, most hardware in Peru has been assembled from parts that are imported from China, Taiwan and Korea, in a process that is called cloning (*clonación*) (INEI, 2002b), and that is developed mainly by informal small businesses. Thanks to the convenient prices, the number of households in Lima with a home computer in 2000 increased to 11.2%, which practically doubled the figure for the previous year (5.9%) (INEI, 2000a).

Software products and services

The import of software products is in Peru relatively low due to the existence of a relatively large national industry (Herzog et al., 2002), part of which is also in the hands of the informal sector. The National Institute of Statistics (INEI, 2002b) reports that the software sector has problems related to the high levels of software piracy and generalised use of non-authorised copies, which is distributed by informal sector. However, the association of software producers (APESOFT) states that, during recent years the formal software industry has grown substantially, both in employment and in revenues, becoming the tenth non-traditional export product in the country (APESOFT, 2003).

Also, the Peruvian government has been, with Brazil, at the front line of the adoption of open source software (OSS) for its offices and agencies. OSS is non-proprietary software[32], whose most known programme is the LINUX operative system. Due to its advantages of cost and reliability, more than 10% of public offices used OSS in 2002 and the trend is increasing (INEI, 2002a). There is a project for a legislation to make it mandatory for all public offices, which is presently being discussed in the parliament.

The informal sector is also indispensable in the provision of less sophisticated ICT services in Lima. Informal technicians currently install hardware, software, networks, give courses, make homepages and develop many different types of services when they are required by businesses, institutions or individuals. The informal sector has also enthusiastically entered the electronic commerce business since 1997, constituting a prominent case in the Latin American context (Herzog et al., 2002). Informal businesses make use of the Internet to market their products, with lists of millions of Peruvian email addresses provided by other informal businesses.

Content industries

The usual way to analyse the dimension and location of the content industries is inadequate to analyse it in Lima. This is because great numbers of local domains are registered in US servers, since hosting services in the US are less expensive than in Lima (Telefónica, 2002). That is one of the reasons why the density of hosts, 0.5 hosts per thousand people is very much under the host density in Latin America in 2002. The same situation is observed regarding the (low) density of servers (Telefónica, 2002).

The largest traditional newspapers, magazines and television stations are among the most visited local web pages in Lima (Apoyo, 2002a). Some have been online almost since the beginning of the commercial Internet in Lima, and new ones have joined recently. They also receive a great number of hits from abroad, from the large numbers of Peruvians living outside

their country who want to stay in touch with it. Other highly visited sites are (Latin American) portals and search engines as Google, Yahoo, Terra, etc. Most people surf in the Spanish language cyberspace, since they are only fluent in Spanish.

b) ICT consumption networks

The general economic context in which the ICTs were introduced has to be taken into account in order to understand the low levels of demand for the new technologies. The present structural conditions of the economy in Peru represent a clear constraint to the establishment of a model of economic development based on ICTs (Herzog et al., 2002). The use of ICTs in the local economy is obviously very limited, a fact related to the large portion of the informal sector within the whole urban economy.

The globally oriented side of the economy

The globally oriented side of the economy and large companies are important demanders for ICTs' services and applications. Lima performs poorly in that regard, as it is not included in the group of Latin American cities with participation in the global financial markets, the global circuits of accumulation, nor it is an important location for corporate services. According to world city research (Beaverstock et al., 1999), Lima would only be a minor global centre in global advertising and global banking services, thus it does not qualify as a minor world city, as Buenos Aires, Santiago, Bogotá, Caracas and Rio de Janeiro do.

The local economy

The conclusions of a study on ICTs (INEI, 2000) made in August 2000 on Peruvian enterprises revealed that although 90% of (formal) enterprises used computers for their activities, most did not have adequate computing infrastructure, since investment levels in ICTs were very low. Further, the number of workers that used computers for the development of their work was low, and the ones with connection to the Internet were very few. These results might have improved since 2001, since the economy has been growing and computer penetration indicators have visibly increased. But the improvements do not drastically change the overall picture.

With regard to e-commerce there are several economic, social, logistic and legal barriers for its development, so it remains at very low levels of activity. However, 9% of households in Lima carried out some kind of online economic transactions in 2001, including the payment for services or purchase of products, but they were almost exclusively from the high-income sector (Telefónica, 2002). There were many initiatives and ideas for new businesses in B2B or B2C enterprises in Lima, there have been almost no (foreign) venture capital investments to fund them (Toledo, 2001), as was the case in the other large Latin American cities.

On the other hand, there have been decades of minimal public investments in technology development in Peru, whose expenditures in science and technology during the 1990s has been 0.2% of the GDP[33] (Verástegui and Seminario, 2003). The Research and Development (R&D) sector is one of the most depressed sectors in Peru, with many financial and structural problems (Herzog et al., 2002). The absence of policies to promote science, technology and innovation has produced a low performance of research in general, which can be observed in the reduced number of patents, international publications, post-graduate students, etc. There are no traces of the presence local innovative milieus or technological clusters, where business firms, territorial authorities and research centers work together to promote technological innovation. Under the initiative of the Inter American Development Bank (IADB), the National Council of Science and Technology (CONCYTEC) has recently developed a programme to surmount the technology limitations and to link the scientific and business communities (Verástegui and Seminario,

2003). Other initiatives are an existing enterprises incubator sponsored by the ITU and housed by INICTEL, not exclusively focused on high-technology or technology firms, and a project from the private software sector, for the establishment of a Technological Entrepreneurial Centre, 'The City of Software' (INEI, 2002b). However, these initiatives are all still on paper.

The only current clustering of ICT related activities has been the result of the work of thousands of informal entrepreneurs: the so-called Wilson, which gradually emerged in Lima's centre. First, the informal entrepreneurs began to establish small businesses in different strategic areas of the city, close to the high-demand spots. Finally, they converged into a cluster[34] of businesses located at the edge of the city centre, on one of the main roads of access to it. As in some industrial clusters, which also tend to foster social networks that help sustain the information exchange, the Wilson cluster works synergistically. In this way, the production and exchange of new ideas and skills for the business is guaranteed, working in favour of the economic sustainability of these small-scale enterprises. For instance, expensive equipment is purchased between a large number of businesses for common use. The training of young people is also developed informally inside the cluster. Manrique (1999) has observed how young people without training begin to work as '*jaladores*' (attracting street customers to the kiosks inside the passages) and gradually learn ICT skills to end up opening their own kiosks (in Wilson or other locations) once they know the ICT business.

Figure 7.8. Kiosks inside the Wilson cluster (Own archive, 1999).

The dimensions of the Wilson cluster are difficult to perceive from the street level. It consists in several passages scattered in four blocks, most of them on different levels, with kiosks of few square metres where the small businesses rent a place to offer their goods or services. Each passage is more a less specialised in a certain service. Figure 7.7 (at the left) shows a typical kiosk inside a large commercial centre in Wilson's central block, which sells software, manuals, gives courses, and provides installation and repair services; but on demand, they can also be intermediaries for other related ICT services. The figure at the right side shows a kiosk for hardware repair and upgrading.

Apart from this large mix of informal businesses, kiosks and booths located in Wilson, there are also smaller groups performing similar activities that have emerged in other places where the demand for ICT services is high: close to universities, academic institutions, to computer training centres, and other institutes offering computer or Internet courses. These small groups have strong links with the main cluster in Wilson.

ICTs and the government

The Fujimori administration (1990-2000) was characterised by a strong indifference towards research and technology in general (Flit, 1994) and the new technologies in particular. Unlike other governments in the region, the Peruvian government was not involved in the introduction of Internet in the country. The only initiatives were to distribute school computers and to train public school teachers. After Fujimori's resignation the Internet became a more important topic for the government and policy-makers. However, there is still no clear overall strategy or national policy to guide the national development with ICTs as strategic tools, although a multi-sectoral commission (CODESI) has been created in June 2003 by the Presidency of the Ministers Council, with the objective of presenting an ICT plan in one year (Presidencia del Consejo de Ministros, 2003). At present there are only unarticulated efforts regarding rural access (FITEL), (a) education, (b) e-government and (c) e-procurement.

(a) A fund to provide resources for the use of ICT in education, FONDUNET, was created soon after the Toledo administration came into function in 2001, in order to implement the Huascarán Plan. This is a programme with the intention of implementing educational plans and linking five thousand public schools to Internet. 680 schools were connected in 2002, but donations to the fund only cover 20% of the US$ 260 millions that are needed to implement the five-year plan (El Comercio and Apoyo, 2003: 206). By August 2003, 1593 schools received services. Of these, the largest number is located in peripheral neighborhoods in Lima.

(b) Initiatives related to e-government are those with more visible effects in the city's life. The Government's sites have gradually increased their presence and the possibilities for offering information, data bases, services, and in some cases, the possibilities to make payments and online transactions. The establishment of a central government portal in 2001 has greatly helped to improve the awareness of, and the efficiency, to access online government resources. However, a deeper examination shows the several limitations and the long way ahead. The sites are not developed from the point of view of the citizens or their needs, but the information is presented according to the government's agencies views and organisation (IADB/FAO, 2003).

Despite the improvements regarding e-government only 59.6% of the total public agencies had connection to the Internet in December 2002 according to a survey of the INIE (2002). Only 20% of them had a website (Gómez, 2003). Local governments were the less connected public institutions, with only 20.9% of its agencies connected to the web (INIE, 2002). But, the actual percentage of connection to the Internet is much lower, with 35% of computer penetration, 10% of email penetration and 5% of Internet penetration in the Peruvian public administration (Gómez, 2003). However, these figures represent the situation at national level. The 'digital divide' inside the government is high, and favour institutions located in Lima (INEI, 2002c).

To accelerate the e-government process the government approved the 'Law of transparency and access to public information' in August 2002, which states that all central government agencies should have functioning Internet portals in July 2003, while local governments have a three years period to do the same. There is no indication about the origin of the funds to undertake these activities, which implies that they will have to be implemented with own resources. The low consideration given to ICTs by the metropolitan municipal authorities in Lima can be acknowledged by the fact that (in October 2003) the municipality of Metropolitan Lima,

the largest city in the country, does not have a homepage but only a page under construction. On the other hand, even if the municipal authorities do not provide any online information or services to Lima's citizens, the SAT (Taxes Administration Service) municipal office, in charge of collecting and administrating municipal taxes and fines, does have a first order portal with the possibility to make consultations and complete transactions and payments. With an average of three thousand visits in a week-day[35] this website is one of the most visited e-government sites in Peru.

Regarding the district municipalities of Metropolitan Lima, the situation is much better- off than in the case in the Metropolitan Municipality. Not all the district municipalities in Lima have working online portals in October 2003, but most of them count with one. From the 41 local governments in the province of Lima, there were 25 online in October 2003. Several of them have been implemented during 2003. Those that are not yet online are located in districts outside the city borders or in peripheral districts without enough financial resources.[36]

Despite their financial limitations, in great lines the current interfaces of the virtual cities in Lima have a professional design, are recently updated and provide great amounts of useful information for local residents, even if the level of sophistication for delivering online services can be enhanced. Thanks to their many possibilities for interaction, they project a democratic attitude, which favours public participation. This attitude is more clearly observed in the sites that belong to popular districts, which show more possibilities for interactivity than the rest. In general, they are doing a good job in building a bridge between local governments and their citizens and producing an increased participation of the public in urban issues at stake in their respective localities. This process is still developing at an initial stage, especially in the case of municipalities of poor and peripheral districts, which do not count with enough financial and technical resources. But, their outcomes are encouraging, and give indication of the willingness of local government authorities to make use of the power of Internet and the World Wide Web to deliver information and services to their citizens, despite of the lack of economic resources. [37]

(c) Other public initiatives that are worth mentioning are the ones organised by Prompyme, the agency in charge of the promotion of small and micro enterprises. These refer to e-procurement and the establishment of a network of *cabinas*, Cabipymes, whose administrators have been trained to promote the use of Internet for business purposes by small and micro entrepreneurs. In October 2003, Prompyme's portal received more than 76 thousand visitors to get information about business opportunities with the state (e-procurement) (Prompyme, 2003), constituting the one of the most visited e-government sites.

Proenza (2003) has reported on the auspicious results of this process of e-procurement in Lima. Small and micro entrepreneurs (less than 40 employees firms) now make effective use of the Internet to inform themselves about public tenders and purchases. Since 2001, the Law for Tenders and Acquisitions, provides a 'positive discrimination' for these small businesses, which constitute the most part of the urban economy. Every public institution must inform Prompyme of small or larger tenders, which then immediately announces the tenders by radio and its Internet site. The process is gaining effectiveness and the initial results are encouraging: the proportion of government purchases supplied by small enterprises rose from 23% in 2001 to 33% in 2002. Proenza (2003) adds that *cabinas'* widespread presence play an important role in the success of the experience.

7.4. Users and uses of ICTs in Lima

The diffusion of ICTs in Lima shows similar patterns as the urban situation of the city and is characterised by a puzzling combination of digital exclusions and democratisation trends. On the one hand, despite the improvement of its telecommunications networks since 1994, access

to basic telecommunications remains very limited compared to the well-connected countries of the North, and low compared to other countries in Latin America. In 2001, 70.8% of Peru's population had no telecommunications services at all. The proportion increased to 93.8% for rural population and decreased to 57.5% for urban residents (INEI, 2001). Fixed lines tele-density was in Peru 6.92 in March 2004 (OSIPTEL, 2004), while the Latin American average was 17 in 2002 (Minges, 2003). Total teledensity (fixed and mobile) was 18.37 the same date, compared to 33.4 in Latin America in 2002 (Minges, 2003).

Further, telephone diffusion is highly biased towards the capital city, which holds 65.8% of fixed lines and 70.7% of mobile subscriptions (OSIPTEL, 2004). In 2003, 44% of households in Lima had a fixed telephone, 27% a mobile phone, 26% cable TV, and 7% Internet at home, while radio and television were present in 90% and 96% of households, respectively (Apoyo, 2003b). Figure 7.9 illustrates the evolution of these main indicators of ICT diffusion during the last ten years, showing the huge growth during the 1993-1999 period.

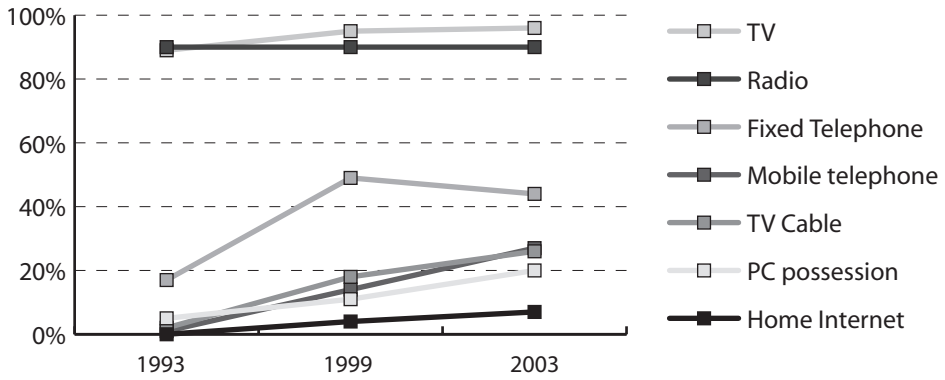


Figure 7.9. ICT diffusion in households of Metropolitan Lima. Evolution 1993-2003 (Own elaboration with data from Apoyo, 2003b).

But, except for radio and TV, there are clear differences between income sectors. Table 7.5 shows the home diffusion of ICTs according to socio-economic sectors in 2003 in Lima, and the evolution since the year 2000. The table reveals the high degree of 'digital polarisation': high- and middle-income sectors (A and B) are in general well served, but low-income sectors (C and D), representing 80.1% of households of Lima, are clearly deprived.

	High-income sector (A)		Middle-income sector (B)		Low-income sector (C)		Very-low income sector (D)	
	2000	**2003**	**2000**	**2003**	**2000**	**2003**	**2000**	**2003**
Telephone	100%	100%	95%	85%	62%	59%	18%	25%
Mobile phone	78%	88%	53%	55%	22%	26%	8.5%	16.5%
Cable TV	95%	93%	68%	60%	23%	30%	4%	11.5%
Home PC	75%	85%	49%	54%	8%	15.5%	0.7%	1%
Home Internet	53%	73%	21%	21%	0%	2 %	0%	0%

Table 7.5. Home diffusion of ICTs in households of Metropolitan Lima 2000-2003, according to income sectors (Source: Apoyo, 2000b; Apoyo, 2003b).

Table 7.5 also shows the many contradictions in ICT diffusion. Fixed telephone diffusion has stagnated and even decreased in middle (B) and low-income (C) sectors. The rise of mobile phones in these sectors cannot explain the loss of fixed lines; mobile phones have increased the most in high (A) and very low-income (D) sectors. Cable TV has decreased in the A and B sectors and increased in the lower C and D segments. PC possession has improved in A, B and C sectors, but shows little change in the very-low income sector. The situation concerning home Internet connection is the most striking: only the high-income sector has improved in the last four years, in the others it has remained the same or shows a negligible increase.

The stagnation of telephone and home Internet diffusion are fundamentally linked to the high prices of telecommunication services. Telephone subscription with only 60 minutes of connection is charged $17 per month, while a 20-hours-use of Internet through a dial-up connection represents $42 per month. Cable-modem connection (of 128 Kbps), available only for those who have cable TV connection (whose basic connection is $18 per month) and live in the districts of central Lima, costs $35.3 per month. The basic connection of the recently newly introduced ADSL (128/64 Kbps) costs $47.6 per month. These charges for home connection[38] are obviously out of reach of households with low and very low incomes.

Price is, therefore, the most significant barrier against the further development of ICT diffusion. Even if most households spent a higher percentage of their budget on transportation and telecommunications in 2002 (12.4%) than they did in 1995 (8.5%) (El Comercio and Apoyo, 2003:112), telephone and Internet services are too expensive for most. Both fixed and mobile telephone charges are among the most expensive in the world, if weighed against GDP. [39] It is, then, no surprise that Peru has a low tele-density in comparison with the rest of Latin American countries.

This deep exclusion from home connection to telephone and Internet is compensated by out-of-the-house forms of access. Regarding telephone services, there a dense network of public telephones in Lima. [40] Regarding Internet connection, thousands of public places to connect to ICTs have been established since 1998 by private initiative. A simple visit to Lima is useful to observe the popularity of these places, *cabinas públicas*, which have become a common amenity in neighbourhoods of central and peripheral Lima. Home surveys[41] measuring Internet use have confirmed the huge popularity of *cabinas* to access the Internet. 89% of the Internet users connected to the Internet in these places, although not exclusively, in 2002 (Apoyo, 2002a) (see Figure 7.10).

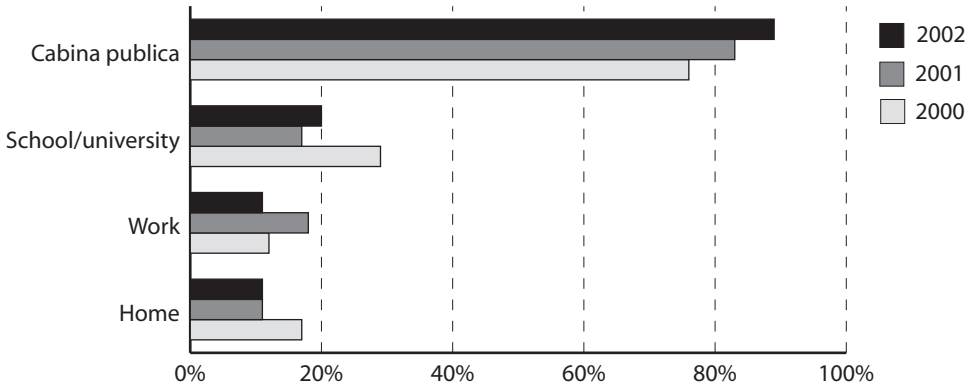


Figure 7.10. Place of access to Internet in Metropolitan Lima, in 2000, 2001 and 2002 (Own elaboration with data from Apoyo, 2000a; Apoyo, 2001; Apoyo, 2002a).

Thanks to the availability of *cabinas*, 2.6 million people, representing 33% of the total population, were regular Internet users in Metropolitan Lima in 2003. Counting the occasional users, the percentage increased to 52%, which meant an increase in 160% in number of total users from 2000 (Apoyo, 2003a). This outstanding increase coincided with the proliferation of *cabinas* in the neighbourhoods of Lima. Evidence of the importance of *cabinas* was already observed during 2000. The National Institute of Statistics and Informatics (INEI) carried out a survey in August 2000 designed to explore ICT use by households of Metropolitan Lima, which showed that the levels of PC skills were surprisingly high in comparison with PC possession (see Table 7.6). These results suggested that a great proportion of people were using ICTs outside their home.

	PC skills	PC possession
I quintile (20% poorer)	37.8%	0.2%
II quintile	55.1%	4.2%
III quintile	65.6%	6.8%
IV quintile	64.8%	11.3%
V quintile	77.0%	32.8%

Table 7.6. PC skills and PC possession in households of Metropolitan Lima according to income quintile in 2000 (Source: INEI, 2000).

Figure 7.11 illustrates the traditional polarisation between high and middle income users (A and B sectors) and low and very low income users (C and D sectors) when referring to home connection to Internet. Taking into account the percentage of people actually using the Internet, however, it gives evidence of a different situation. Even if the differences subsist, they are less dramatic. The poorer sectors (C and D) show a high level of penetration when comparing with poor sectors living in cities of other Latin American countries.

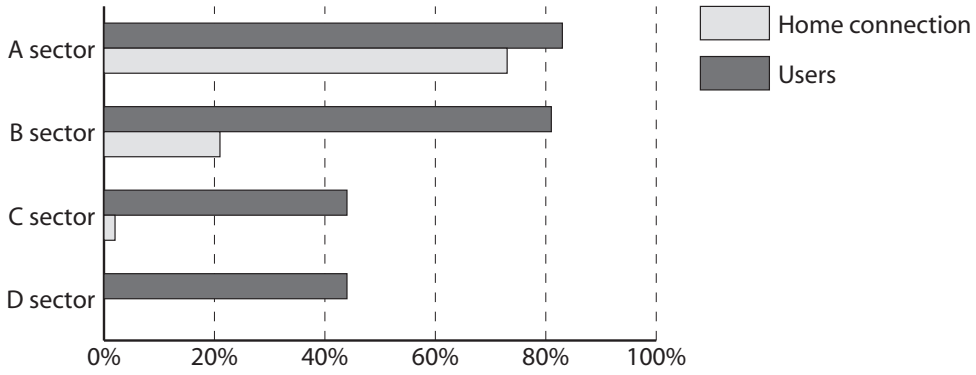


Figure 7.11. Internet penetration (users and home connection) in Metropolitan Lima, according to socio-economic sector (Own elaboration with data from Apoyo, 2003c).

The second important feature of Internet use in Lima is the young age of most users. Figure 7.12 shows the clear generational gap: approximately 64% of users were younger than 24 years old in 2002 (Apoyo 2002b).[42] Young users not only have a higher affinity with ICTs due to their better skills, they also find them attractive due to the image they project. In her survey on Internet users[43] in 2002 Colona (2003) included specific questions about the meaning of Internet for its users. She argues that (young) users think that accessing the Internet they are partly appropriating a 'global lifestyle', synonymous of progress and modernity. Similar strong

links between Internet and modernity[44] were also clearly expressed when she interviewed *cabineros.* These results constitute no surprise, since most people in Peru have the notion that using computers is a modern and forward-looking attitude (Ugarteche, 1994; Flint, 1994).

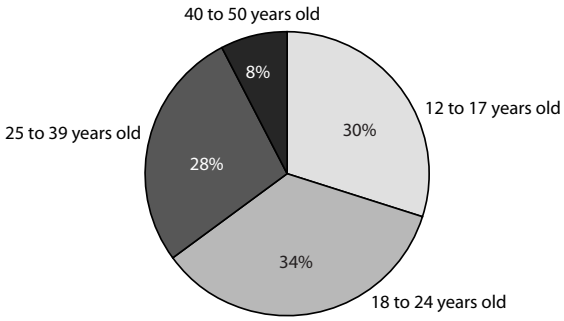


Figure 7.12. Age of Internet users in Metropolitan Lima in 2002 (Own elaboration with data from Apoyo, 2002a).

The age of the users and the expectations they have of ICTs have great consequences for the main types of use. Surveys and observations show that these are entertainment, communication and school/academic use. Table 7.7 gives a list of the main activities that users declared searching the web for, according to their popularity.

Most popular activities		Other frequent activities		Other activities	
school or academic information	76%	to read the news	54%	to surf the web	35%
emailing	75%	to listen or download music	49%	to search for a job	33%
chatting	71%	cultural/entertainment information	49%	to download games	31%
downloading text information	70%			to call abroad by Voice over IP	27%
				to play online games	25%
				travel and tourism information	24%
				to download videos	22%
				information about a certain product	20%

Table 7.7. Main declared activities of Internet users in Lima in 2002 [45] (Source: Apoyo, 2002b).

These types of activities - global communication, global entertainment, and global information - confirm the significance of Internet as a vehicle of global exchange and global consumption in the lives of users, and especially young people. Colona (2003) argues that the integration of ICTs into daily life is developing intuitively, in an unplanned way. She adds, critically, that the uses she observed in *cabinas* are mainly linked to consumption (youth communication habits and entertainment activities) and not directly linked to the production of contents and knowledge.

Communication uses are always highly attractive for most Internet users, and Lima is no exception. Simple and cheap applications such as e-mail, Web mail, instant messaging, chat-rooms, and other peer-to-peer applications are highly popular with the youth. Internet is also actively used in tertiary education for communication between students, teachers and students, and administration personnel with students. Similarly, Internet is rapidly replacing telephone

communication between people, especially when groups are involved. People with relatives in foreign countries use Internet to communicate regularly with them. Partly, as a result of the improved communication, the remittances that Peruvians abroad sent to Peru in 2002 increased by 24% from the previous year, up to 1.2 billion dollars (El Comercio, 2003). This shows the power of the Internet to maintain social networks and improve the life conditions of vulnerable people.

Users mention school and academic motives as important in most surveys conducted since the rise of the Internet in Lima (Nagaro, 1999; Fernandez-Maldonado, 2000; Proenza et al., 2000; Apoyo, 2000c). John Zabalú (2000), owner of a *cabina* in Villa El Salvador, states that business improves significantly when classes (in school and university) begin after the summer or mid-winter break. The connection between Internet and education seems very strong, which is related to the connotation that the use of technology, and especially information technology has in the Peruvian society as highly commendable. Computer skills were considered as important to find a place in the job market, even before the commercial Internet in 1994 (Flint, 1994). Currently they are considered indispensable, since most jobs request experience with computers, and sometimes even for unqualified jobs that have no direct exposure to them. It has become a mandatory skill to develop to get a job in the highly difficult employment market, and as such, the use of computers and Internet is justified as training.

A survey carried out by the Foundation of the National Council of Public Schools points out that thanks to Internet use, 40% of public school students[46] between 9 and 17 years old have improved their results in their studies. According to the study, 50% of public school students would be using the WWW for their homework activities (Araoz and van Ginhoven, 2001). These students are obviously using *cabinas*, as only 0.8% of public schools in Peru have Internet connection (INEI, 2002b), and when they have, its use is highly restricted as the school has to pay for the expensive dial-up connection. The availability of *cabinas* for secondary school students was also pointed out as one of the local factors of the great success of the World Link for Development (WorLD) programme in Peru[47] (SRI International, 1999). In the follow-up WorLD report, the level of use of Internet for complex tasks observed in Peruvian students was the highest. Their score regarding that particular benchmark exceeded those of Latin America as a region, and, of the WorLD programme overall (SRI International, 2000).

The present examination suggests that the high levels of Internet use in Lima are strongly linked to cultural factors. The values that people endorse for technology as a vehicle for education, economic progress and modernity seem to be one the main drivers for the high demand for ICTs. A related element is the attractiveness Internet has for youth as an instrument of (global) cultural consumption. Colona (2003) also identified that for some users Internet represents a space of freedom, a source of endless information, which gives possibilities to intervene globally and in this way it empowers the users. Users, especially the youth and the lower-income sectors, express that Internet use is effectively improving their daily lives.

a) Internet use in low-income sectors

What makes Lima so special regarding ICTs is that Internet is very popular in low-income sectors. Most Internet users now belong to the low-income sectors. In 2003, their percentage was 62% (Apoyo, 2003c), but the proportion of low-income users has been increasing over the years. Successive surveys have shown that the users with less than one year of experience mainly belonged to the poorest socio-economic groups. Figure 7.13 shows the distribution of population and Internet users according to income groups in Lima in 2003. The high percentage of people using Internet in the low income sector (C), 44%, and the D sector (very low-income), 26%, reflects that Internet has become part of daily life of popular[48] sectors. Internet use has

become a familiar feature of the popular culture in Lima. Newspapers write that even shoe-shine and street boys are frequent customers to *cabinas*, having shifted their recreation activities from pinball and street-football to the Internet (Jáuregui, 2003).

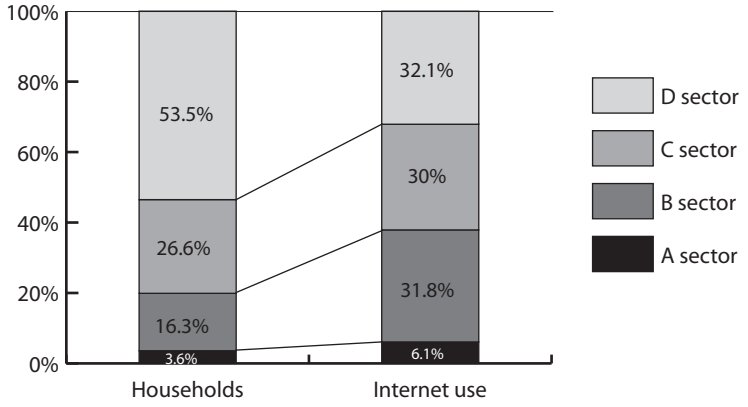


Figure 7.13. Distribution of population and Internet users according to income groups in Lima in 2003 (Own elaboration with data from Apoyo, 2003c).

In July 2000, A y G Asociados conducted 1005 interviews (474 from the C sector and 531 from the D sector) for the purpose of understanding better the users and uses of Internet in low-income sectors of Metropolitan Lima. The survey focused on the central areas of three Cones, the city centre, and the port area. From the whole sample, 22.5% said they were actively using the Internet, but evidently many more users belonged to the C sector.

The findings regarding age groups showed that the higher percentages of users were among the group between 15 and 24 years old of the C sector, where 61.1% of men and 56.8% of women were using Internet. The lowest percentage was found in the group of 40-59 year olds from the very-low income sector (D), with 1.2% and 1.75% using the Internet, respectively. Figure 7.14 illustrates the age differences, according to gender, showing a clear generational gap in both sectors.

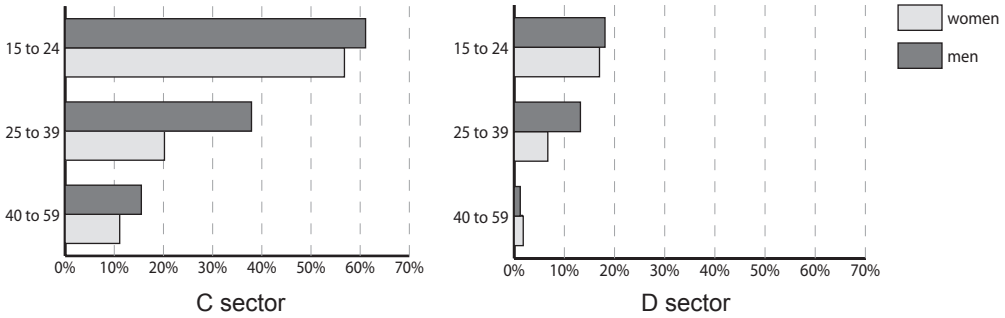


Figure 7.14. Internet use by age group and gender in popular sectors in Lima in 2000 (Own elaboration with data from A y G Asociados, 2000).

Another remarkable result of the survey is differences in the proportion between men and women according to age groups. This was not so large in the younger and older age groups, but in the middle aged (25-39 year olds), the proportion of men was almost double in both

sectors. This confirms the trend observed by practitioners (Kerrigan, 2001), stating that (poor) young women (working in women's associations) cannot spend time using the Internet, as they have a triple function (working, taking care of their children and households, and working for the neighbourhood), which allows little free time. Only after their reproductive years, do they have the time to invest in the new technologies.

Regarding job categories - among the users the most users, by far, in the low-income sectors were students, not such a surprise if the largest age group is that from 15 to 24 years in a society where education is highly priced. [49] This percentage is even higher in the very-low income sector. Another interesting feature is the percentage of retailers using the Internet in both C and D sectors. Figure 7.15 shows the overall picture.

The most popular applications in the C and D sectors were email, surfing the Web, and chat groups, in that order, with a slightly higher preference in the D sector for chatting. When asked about their main motives for accessing the Internet, users mentioned work and study, followed by communication (e-mail and chat) as the second most popular motive. There were no big differences between the low and very low-income users, though work-related purposes scored higher in the C sector, while chatting scored higher in the D sector.

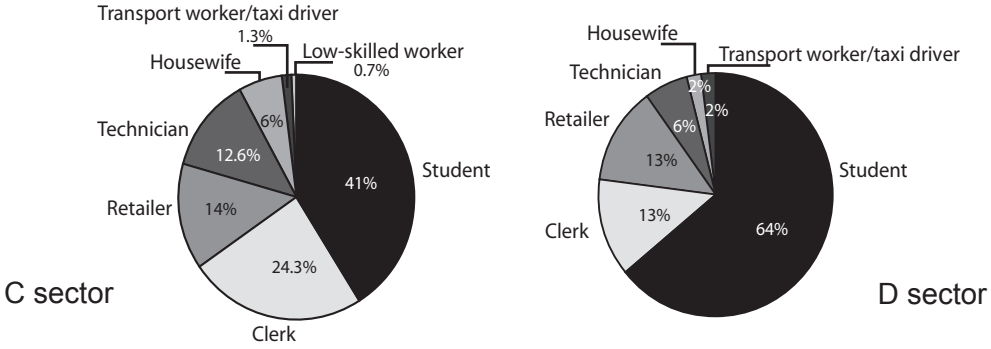


Figure 7.15. Job categories among Internet users in C and D sectors (Own elaboration with data from A y G Asociados, 2000).

The surveys and empirical data show that Internet use in popular sectors is basically an activity of young people and students. Since most young people are regular users, youth associations use the Internet to communicate among members, but so far there are few signs that grassroots or other types of associations are using the Internet actively for their own purposes, which shows the profound generational gap in the familiarity and skills to manage ICTs. Even if members of women's associations, for example, are eager to learn the new technologies, it is not so simple for them as for their children, who already have these skills or can learn fast (Kerrigan, 2001).

b) *Cabinas'* role in the city

The success of *cabinas* has attracted the attention of the world, since they are the best practice example of collective access, regarded as the key to provide universal access in developing countries (UNDP, 1999). World Bank officials talk about the 'Peruvian model of access to ICTs', celebrated as the most viable model for extending access in poor areas. The general enthusiasm for *cabinas* triggered several studies to explore their main features and that of their users (Nagaro, 1999; Fernandez-Maldonado, 2000; Proenza et al., 2000). Holmes (2001) studied their social impact, concluding that despite the difficulties in measuring the value of information for its beneficiaries, *cabinas* are providing effective access to lower income population groups.

Later, Colona (2003) has studied the preferences of *cabinas* users and *cabineros*, as well as the meaning of Internet in their everyday life.

Cabinas emerged as a novel and profitable ICT business, helped by the informal sector experience in and support from hardware and software trades and services. The successful marriage of information technologies and informal sector entrepreneurship was already visible during the early 1990s. Describing the ambiguous circumstances of technology development in this period, characterised by the total indifference of the State to research and technology, Flit (1994) stated that "*Computers and their handling have become a cult for the majority of the Peruvian society, in which the hopes for a better technological life or the possibility to find a way out to the labyrinth of unemployment are placed*" (Flint, 1994: 162). This widespread notion in combination with the massive presence of unemployed youth resulted in the proliferation of computing training institutes, most of them located in the city centre, and many of them working in the informal sector. These schools and institutes played an important role in instructing the future *cabineros*.

Cabinas do not differ much from Internet cafes in other cities: they are places where computers connected to the Internet are rented for a fixed price per hour. The prices are suited to the local demand: lower prices in lower-income neighbourhoods. There are a great number of them, distributed throughout the city and serving local residents. They do not respond to a centralised administration or organisation; they are, rather, the fruit of thousands of commercial initiatives of small informal entrepreneurs (see Figures 7.16 and 7.17).

Figure 7.16. *Cabinas* in low-income neighbourhoods in Lima, in January 2000 (Own archive).

Figure 7.17. *Cabinas* in middle-income neighbourhoods in Lima, in January 2000 (Own archive).

Cabinas' computers are connected to the Internet by means of a dedicated line with a monthly subscription to an Internet service provider (ISP). *Cabinas* are characterised by their low prices and relatively efficient connectivity: the connection with a dedicated line is much quicker and less problematic than through a phone line, as is the case in domestic connections. *Cabinas* are also multi-functional. They began by offering traditional Internet services such as e-mail and access to the Web, but they have subsequently diversified their business according to the local demand. Currently most *cabinas* offer office services such as faxing, scanning, printing, photocopying, text editing and CD-writing; they also offer long-distance calls and video-conferencing; some sell sweets and drinks; some *cabinas* offer totally private modules so that clients can enjoy privacy. A supplementary feature of *cabinas* is their ease of use: unskilled users can rent a computer and they will be generally assisted in operating computer programs and basic applications.

Cabinas originally operated only in the centre of the city or in middle-income districts, but since 1998, they have spread into the rest of the city, including the Cones. The percentage of Internet users that go to *cabinas* in the three Cones and the city centre is higher than in the better-off districts. Most people (75%) visit *cabinas* that are within walking distance of their house. Only 10% of those surveyed users visited *cabinas* outside their districts (Apoyo 2002a).

The effects of the presence of *cabinas* and the services they provide are visible in the city. *Cabinas* have become a familiar urban facility at neighbourhood level. They are places to gather informally; they are the new public plazas where youth meet. In one study, 44% of users surveyed reported being accompanied to a *cabina* by a friend or relative. Peruvians have changed their recreation habits and since 2002 the visit to the *cabina* has become the main recreation activity. Besides, people are much better in communication with their relatives abroad than before, a fact which has increased the level of foreign remittances to the country during the last years. At city level, *cabinas* are offering different urban services, which have been systematically denied to poor neighbourhoods. Libraries, post offices, recreation facilities, study places, youth centres, training centres, etc., that have been always lacking in the poor neighbourhoods are now present and combined in the multiple services offered in the *cabinas* (see Figure 7.18).

Figure 7.18. Young people attending a *cabina* in Villa El Salvador (Own archive).

Since late 2001, public and private institutions have become aware of the enormous possibilities of the presence of *cabinas* as providers of ICT connectivity to reach the general public. Several institutions have started different initiatives to profit from their role as a bridge between them and the general public. For example, the National Office of Tax Administration (SUNAT) has implemented a network of registered *cabinas* where citizens can carry out transactions, download forms, file procedures and consultations through its website, Virtual SUNAT. Further, SUNAT currently requires the public to file income tax declarations (and other important taxes) with software (PDT) that should be downloaded from Virtual SUNAT. This shows the availability of Internet access in the country[50], and the high level of familiarity of the people with it.

Different networks of *cabinas* are currently promoting e-government activities, payment of taxes and traffic fines, and facilitating the use of Internet by SMEs. Another example is the Prompyme initiative, Cabipymes, to facilitate provision of services to young and micro entrepreneurs. In the same spirit, the municipal Taxes Administration Service (SAT), has implemented a program, CabiSat, to promote the electronic payment of local taxes through another network of *cabinas*. Gradually, public institutions are providing online services based on the availability of *cabinas*. Government officials are now divulging the advantages of the *cabinas* model in international forums and congresses. A successful online forum on *Internet Cabinas: opportunities for all* was organised in December 2002 by the National Council of Science and Technology (CONCYTEC) with the purpose of discussing with *cabinas* owners, administrators, users and other stakeholders the main problems and possibilities of the *cabinas*.[51]

Private firms have also seen business possibilities in the *cabinas*. Traditional and online newspapers and portals pay close attention to their development and publish lists of where people can find them. Some of them (*El Comercio*, *Adonde*, *Terra Networks*, *RCP*, etc.) have also established networks of *cabinas* with different purposes. There are also new firms that were established to serve the needs of *cabina* owners. The *Revista Info Cab*, a specialised magazine, was distributed to 2500 *cabinas* in Metropolitan Lima in 2003. Other firms have organised meetings, congresses and fairs on *cabinas*.

The government recently approved a new legislation to regulate the functioning of *cabinas*. According to this legislation, all *cabinas* should have at least two computers suitable for children. And all computers should have filters to avoid children being exposed to adult content. Some *cabinas* have been closed by local authorities for not complying with the new regulations.

7.5 Conclusions

This chapter began by providing a brief historical account of the main features of Lima's singular type of urban development. Lima's urban personality is highly conditioned by the presence and development of *barriadas* and the initiatives of their residents. The crisis and economic changes in the urban context during the 1980s have made the informal economy widespread in the city. The transformations in the 1990s, linked to the restructuring of the political-economy have introduced foreign capital and changed the traditional urban actors. This has also produced great spatial transformations. At the same time, economic restructuring has completely changed the situation of the telecommunications sector, triggering processes of privatisation, deregulation and modernisation of the networks.

The analyses of the three levels of ICT networks in Lima illustrated the peculiar development of ICTs in Lima, characterised by its multiple contradictions. Lima's first steps towards the information society rests basically on thousands of bottom-up initiatives to take advantage of the new ICT potentials. Lima's structural conditions of high levels of poverty and economic informality are not conducive to the easy integration of ICTs in the local economy. Further, the local and national governments have shown a very low level of involvement in the guidance, development or promotion of ICT development. But, the emergence of *cabinas públicas* that provide collective access to ICTs has brought about interesting transformations in Lima's social and cultural life, providing ICT access to groups that would be out of reach under the national socio-economic conditions.

The examination of the position of Lima in the regional telecommunications infrastructure showed that Lima is an important node of the network, not primarily because its importance as an ICT market, but because of its strategic location at the coast and central part of the South American continent. The analysis of the situation at metropolitan level shows a good basic coverage with the existence of premium spaces in Modern Lima. On the other hand, the situation in telecommunications is far from equitable. The processes of privatisation of telecommunications and withdrawal of the state from the sector were developed for the sake of the free market and free competition. However, the result has been a change from a public towards a situation where the market position of the incumbent carrier - Telefónica - is so dominant in the different segments of the telecommunication sector that it is experienced as a private monopoly. In this context, Telefónica's tariff policy constitutes the first barrier for the further diffusion of ICTs in Lima.

Regarding the production and consumption of ICTs, Lima has an unfavourable position due to its high levels of poverty, the low levels of integration of the local economy into the global economy and the strong presence of the informal sector in the urban economy. The government has been unresponsive to these concerns. Peru does not have a policy for the promotion of scientific and technological development. The few institutions for the generation of knowledge and promotion of innovation have been closed or weakened during the 1990s. The informal sector has, however, entered the ICT business with relative success, and currently provides ICT hardware, software and services to a large percentage of institutions and businesses of the formal sector of the economy, as well as individual users. In the formal side of the local economy, ICTs have become the most usual tool for communication purposes, and increasingly for informative purposes.

It is in the third layer of networks, the use of ICTs in everyday life, where Lima stands out as a case to study: it has achieved a high average level of ICT diffusion at Latin American level, it shows a very high proportion of people connecting from collective facilities, while a high proportion of the total Internet users belong to low-income sectors. Informal entrepreneurs have

established businesses to cater for the large demand for ICT services that cannot be fulfilled according to the conventional model of home connections through telephone and computer hardware and software. *Cabinas* are already consolidated as a neighbourhood facility in most neighbourhoods of Lima, and have promoted the familiarity with computers and the Internet for the general public, especially young people, even those from low-income groups. The widespread availability of ICT access in Lima is a great asset that few cities of the developing world have.

These results illustrate the great contradictions in which the development of ICTs evolves in Lima, with a mix of exclusion and democratisation trends in similar fashion to that observed in Lima's urban development. On the one hand, the withdrawal of the state from the telecommunications sector has led to a situation in which a single and powerful telecommunications firm, Telefónica, dominates the whole sector in its different segments. Additionally, the state has done surprisingly little to promote technological innovation, the generation of knowledge, the universal access to ICTs, and to develop a vision to guide Peru's transition to the Information Society, in comparison to most other countries of Latin America. The local economy, dominated by informal practices and small and micro-enterprises is characterised by low levels of financial and human resources. Despite these huge shortcomings, the effects of the combination of local economic practices, cultural values and infrastructural advantages have resulted in the democratisation of access to ICTs.

Consequences for urban development

The first section of this chapter described the main trends of urban development in Lima at the turn of the century. Lima's urban situation is characterised by inter-related global and endogenous urban trends, which are developing in both formal and informal sides of the city. Some of these processes seem anti-democratic, since they privilege the demands, tastes and ways of life of the elite and the profits of global corporations. Some others, however, exhibit intriguing features that seem to counteract the latter. In this context, the development of ICTs seems to be reinforcing both global and local developments with their democratic and anti-democratic trends. ICTs are making Lima's urban development more complex than ever before.

Transformations linked to 'globalising' trends are also commonly observed in other large Latin American cities. In Lima's new urban context, telecommunications and 'advanced' economic sectors, many of them in foreign hands, have become important new urban agents. New nodes and centralities have emerged in different points of the city while the CBD has moved from its original location in the city centre to San Isidro, a high income area well-connected with the city centre. Shopping malls, private complexes and recreational facilities for the higher income groups have been recently built taking the form of 'islands of modernity' close to road infrastructures. These consumption and entertainment centres have not been limited to the districts of modern Lima, but also been built in popular peripheral districts, in a trend that suggests the desire of the masses to participate as consumers in the 'global way of life'. [52]

These spatial processes are not the direct consequence of the development of ICTs in the urban territory, but rather the outcome of structural transformations in the political-economic scene, in which ICTs are a powerful means for global firms and capital to extend their operations. They are also the product of the modification of cultural habits and consumption strategies promoted by electronic media, in which powerful economic groups have an important role. Global ICT-related trends in the economic and cultural life of the city are therefore strongly inter-related and feeding each other.

Global trends have evidently produced changes in Lima's urban form, but their extent and depth have not been as deep as in other cities of Latin America. The segregation trends have not been so strong as to produce 'fortified enclaves' extending the urban limits, as in São Paulo or Buenos Aires. With the exception of few towers for bank headquarters, there has not been a strong change of urban landscape or image of the city due to the construction of 'intelligent buildings' or corporate towers.

Globalising trends have not radically changed Lima's main way of urban development neither. On the contrary, the examination shows that an important part of the development of ICTs, its diffusion to the masses, takes place under the same dynamics that characterise Lima's urban development during the last fifty years: the indifference of the state from social concerns and the initiative of the population to find an 'informal' solution to their needs. This 'implicit agreement' between the state and the poor, is functioning in Lima since the emergence of peripheral *barriadas* in the late 1950s. As a result of decades of urban *laissez-faire,* only the informal sector is able to provide some of the services residents need at affordable prices.

The informal sector has then taken the initiative one more time: collective points to access the Internet are consolidated as the main way for ICT connectivity in Lima. *Cabinas* have become an important element of Lima's urban features. Through them, ICTs are currently providing multiple services that have been always absent in poor areas of the city. As during the 1970s and 1980s, the 'self-help' model inspired in the *barriadas* was advocated and instituted by international agencies as the most viable solution for housing the poor; the *cabinas* model is now widely celebrated as the most viable model for providing universal access in developing countries. The *cabinas* model certainly has several limitations linked to the 'informal' culture where it develops, but it is effective in providing ICT access without any cost for the state.

An urban economy that relies heavily on the informal sector, family businesses and cash transactions obviously faces huge difficulties to make the leap into the network economy, even if access to computers and Internet is widely available. Without proper leadership, support and funding such an economic leap cannot be made by people who are living day-by-day.

If the effects of the broad access to computers and the Internet have not yet been remarkable for the improvement of the local economy, they are highly significant regarding the local social and cultural life. The diffusion of ICTs is adding an extra impulse to the modification of cultural habits and consumption behaviours that begun in the 1990s. The success of the commercial and entertainment centres that have been recently built in *barriadas* districts gives an indication of the scope of this process. Children and youth of low-income sectors are learning to interact with ICTs in a 'spontaneous' and playful way and doing so they are improving their cognitive capacities to become future digital citizens. Access to computers and the Internet is also helping to improve skills, training and education and providing deprived population groups with possibilities to empower themselves. In such way, ICTs are helping to counterbalance the exclusion processes that traditionally operate in Lima.

For urban profesionals Lima's urban scene has become much more complex: three 'cities', with their own organisational principles - informal, formal and global - coexist in current Lima. This superimposition of economic logics and of urban dynamics is also reproduced at the level of the cultural life. The Andean migrants brought practices and values from their rural past. These have been mixed with the habits and values of the urban residents producing a new popular culture. The latter is, in turn, being rearranged by the influence of the global flows of goods and symbols that the access to mass media and ICT networks promote and provide. The combination of popular Andean traditions, modern ways of life and post-modern attitudes are adding an extra complexity to the understanding of the city's functioning.

What makes Lima singular is the central role of the informal sector in providing the means for the access to the global flows, considered by people as modern and therefore highly valuable. This drive towards modernisation is therefore not coming from the state, traditionally indifferent to social concerns, or the modern side of the economy, which do not consider the poor as their target markets, but precisely from sectors considered as non-modern.

At the same time, the results of this case-study refute the traditional correlation between Internet diffusion and the socio-economic position of a country. Despite highly difficult local conditions, access to ICTs in Lima is not restricted to the affluent and educated but is also widely available to the low-income population through *cabinas*. This provides a powerful confirmation of the singular ways in which the process of diffusion and appropriation of new technologies develop within a particular society. These results verify an important assumption of the research, by contradicting the positions that see and analyse cities exclusively as global economic engines. They show the powers of local socio-cultural dynamics to establish singular ways of urban development.

The widespread availability of ICTs for all population sectors is a great asset for Lima's urban development. Evidently, the broad availability of ICT access is not a positive condition per se, but the familiarity with ICTs that this is bringing to the general public and especially the youth, opens many possibilities and hopes for future local development and the provision of online services to deprived groups. This has been happening so far in an unorganised and spontaneous way, but may improve in the future if appropriate social initiatives take advantage of this great asset to achieve their objectives.

Notes

[1] Peru has slightly more than 27 million inhabitants (in 2004), which includes the largest indigenous population of Latin America, 27% of the total. At national level, only Bolivia and Guatemala have a largest percentage of indigenous groups (UNDP, 2004).

[2] This was mainly US American capital addressed to the mining, oil, sugar cane agriculture and industries. At the end of the 1920s, copper and oil were the main export products (Burga and Flores Galindo, 1979)

[3] This first wave of migration was coming from middle income sectors of provincial cities. These migrants were rapidly and easily integrated to the social and work environment in Lima.

[4] Few families linked to financial capital, as Brescia and Prado, rapidly increased their fortunes during this period (Burga and Flores Galindo, 1979).

[5] A North American firm, the Foundation Company, introduced concrete and iron techniques, which made possible the construction of buildings of several levels.

[6] '*Turner goes to Peru*', was the topic of a section in Peter Hall's *Cities of tomorrow; an intellectual history of urban planning and design in the twentieth century* (1998).

[7] Turner's 'self-help' approach for housing the poor was later embraced by most international agencies involved with urban issues. He advocated supporting and legalising the existing informal process developed by the poor to have access to urban land and housing, rather than jeopardising it (Turner, 1967; 1972). His vision promoted a shift from central housing provision to local 'enablement' policy recommendations. Poor residents in Third World cities were stimulated to build their own shelters progressively. Community participation in neighbourhood-upgrading programs was strongly promoted.

[8] The best known anthropological studies, *Conquistadores de un Nuevo Mundo. De invasores a ciudadanos en San Martin de Porres* (1986) by C.I. Degregori, C. Blondet and N. Lynch and *Los caballos de Troya de los invasores: estrategias campesinas en la conquista de la gran Lima* **(**1984) by J. Golte and N. Adams, emphasised the 'conquest' of Lima by the migrants.

[9] This type of arguments was typical among local intellectuals during this period, when most of them strived for a socialist revolution, in which the Andean utopia was considered as the basis of national regeneration.

[10] Villa El Salvador's success transcended the national borders. In *Empowerment: The Politics of Alternative Development* (1992), John Friedman used Villa El Salvador to illustrate the importance of 'the local' in implementing an alternative development, in which the households integrate their own life-space in a network of social relations of production and empowerment.

[11] The dimension and significance of informal economic activities in Lima inspired De Soto (1986) in a 'pragmatic approach' for the urban economy, in a similar fashion as Turner's approach for social housing. De Soto highlighted the capacities of the poor for generating new urban jobs, praising their individual effort and entrepreneurial spirit as essential values. The informal sector was advocated as the 'other path' for economic development, as an alternative to the Shining Path.

[12] *Chicha* is a typical alcoholic drink made from corn.

[13] Broadcast by many AM and some FM radio stations *chicha* music became a national phenomenon. The concerts of the main groups were massive and the most known figures were popular idols.

[14] In 1990 there were 4610 self-managed soup kitchens providing food for 503 thousand people in Lima (Joseph, 1999), run by women's associations of the *barriadas*. The leftist local government of Metropolitan Lima established in 1982 a programme (*Vaso de Leche*) to provide milk to children in poor neighbourhoods, which in 1997 had 12 861 committees, also run by women's associations, which provided milk to approx. 1.2 million children in Lima (Joseph, 1999).

[15] Shining Path's main followers were identified as young people from the lower middle-class, whose aspirations of social mobility and economic progress were frustrated.

[16] It is estimated that the conflict produced a US$ 26 billion loss in material damages.

[17] Creoles (*criollos*) are Peruvians of European descent.

[18] Coming from c*holo,* a person of mixed or exclusively Indian descent.

[19] *Chicha* entertainment industry is not only consumed through mass media. Live mega-events for the masses have proliferated in the Cones since then. A popular radio, Radio Inka, advertises *chicha* cultural events, as concerts, fairs and '*polladas*' (popular parties with the purpose to get funds for a specific goal), which are massively attended by people from popular sectors.

[20] Among the highest growing sectors in the 1994-98 period in Lima were the construction sector, with an average annual growth rate of 14.4%, the real-estate sector with 23.6% and hotels and restaurants, with 23.5% (INEI, 1999)

[21] In 1998, 1999, 2000 and 2001 the GDP growth rate was – 0.53%, 0.95%, 3.13, and 0.2% respectively (El Comercio and Apoyo, 2003:134).

[22] 95% of the public sector would be consuming the informal goods and services provided in this cluster.

[23] More specifically in five districts of Modern Lima: Surco, La Molina, San Isidro, San Borja and Miraflores.

[24] Since the 1960s, most urban plans of Lima have proposed the development of new alternative centres (Ludeña, 2001).

[25] These are San Juan de Lurigancho, San Juan de Miraflores, Los Olivos and Ate-Vitarte.

[26] Similar opposing democratisation and segregation trends have been also observed in large cities of both the North and the South (Caldeira, 2000). She argues that democratisation; economic crisis and re-structuring processes have produced the development of 'fortified enclaves' in São Paulo.

[27] "*In the last years, some of the large national economic groups have disappeared and others survive in front of the new emergent groups*" (El Comercio and Apoyo, 2003: 114).

[28] The participation of Telefónica in the total telecommunications market has decreased from 88% in 1998 to 77% in 2003, a fact that is related to the reduction of the fixed telephony share and the corresponding increased importance of mobile telephony in the structure of the market (Apoyo, 2003c).

[29] The Emergia network has 40 Gbps of capacity, upgradeable to 1.92 Tbps (Terabits per second) (Emergia, 2003)

[30] The NAP members are BellSouth, Telefónica Data, Telefónica del Perú, AT&T, COMSAT, RCP-Infoductos, Diveo e IMPSAT (OSIPTEL, 2003).

[31] The conclusions of these studies range from the celebration of its achievements (De Soto, 1986) to the awareness that informality should be regarded in Peru as an historically and culturally rooted process that strongly interrelates with forces at local, national and global scales (Hays-Mitchell, 1993).

[32] OSS' code is available to everybody, so it can be constantly improved, modified, and tested, something not possible with proprietary software.

[33] The average in Latin America during the same period was 0.6% and in industrialised countries 2.9% (Verástegui and Seminario, 2003).

[34] If Wilson can be considered as a cluster or not in a strict economic sense (implying a stable feed-back relationship among two or more industrial branches coordinating between more than two enterprises) needs more detailed research.

[35] This information was taken from the site statistics at Nedstat: http://www.nedstat.com.

[36] When asked about the main obstacles for implementing e-government measures and websites in Peru, 74 % of respondents pointed to the lack of funds for the necessary investments (Gómez, 2003).

[37] Among the districts of Lima, Villa El Salvador stands out because of its innovativeness, openness and projection to the outside world, local features that can also be perceived in its website. This low-income district was the site of an early and interesting experience of tele-democracy that deserves attention (Fernández-Maldonado, forthcoming)

[38] All these services are provided by Telefónica. The tariffs shown here are the ones provided by Telefónica http://www.telefonica.com.pe/shtml (November 2003)

[39] According to the 2002 ITU database, Peru ranks fourth in the ranking of the most expensive countries regarding telephone subscription costs, and tenth regarding costs of off-peak local mobile calls, both weighed against GDP (World Economic Forum, 2003:304). In absolute prices Peruvian telephone subscription is the second more expensive after Mexico (El Comercio and Apoyo, 2003: 138; with data from CEPAL).

[40] Telefónica, which concentrates 94.2% of this segment, receives high profits from this business. In 2003 it received US$212.2 million of profits from public telephony, almost half of its profits coming from fixed local telephony during the same year ($454 million) (Apoyo, 2003c).

[41] Since 2000, Apoyo, Opinion y Mercado has been conducting annual surveys on the use and habits of Internet in Lima (Apoyo, 2000a, 2001, 2002a).

[42] This survey was carried out with a sample of users between 12 and 50 years old, because older or younger users were considered minimal.

[43] Colona interviewed 109 users and 18 *cabineros* (*cabinas* administrators*)* in 33 cabinas located in 6 different districts of central Lima and the Cones. There were equal proportions of male and female respondents, and most of them were from 17 to 25 years old.

[44] Colona (2003:22) indicates that for the interviewees, the link between Internet and modernity refers to "..*the speed of exchanges, access to knowledge, efficient use of resources, access to novelties, automatisation of daily life activities, efficient use of free-time, and fundamentally, to the notion of participation in a universe that otherwise would be out of reach*".

[45] The great absence in these motives is adult entertainment, which is obviously present in the *cabinas.*

[46] Education is highly polarised in Lima. Students from middle and high-income households attend private schools. Public school students come almost exclusively from low-income sectors (El Comercio and Apoyo, 2003:113).

[47] WorLD is a programme of the World Bank Institute that was active in more than five hundred schools in fifteen developing countries. The 1999 report characterises the Peruvian programme as a case of success, thanks to "*the dedication, energy, enthusiasm and commitment of the teachers, administrators, lab technicians, parents and the students*." (SRI International, 1999:16).

[48] In Latin America, the adjective 'popular' refers not only to fashionable of well-liked, but also as belonging to *el pueblo*, the lower-income groups, or the masses.

[49] There was an average of 1.3 children at school per household in Lima in 2002 (El Comercio and Apoyo, 2003:113).

[50] There is an exception for areas of extreme poverty.

[51] The sessions, interventions and conclusions are posted at: http://socinfo.concytec.gob.pe/foro_cabinas/default.htm (accessed 17 October 2003).

[52] Nestor García Canclini has reflected about this issue in Latin America. In *Consumers and Citizens. Multicultural conflicts of globalization* (1995) he argues that (especially youth) identities are expressed in the private consumption of goods and mass and electronic media rather than in participation in political parties or unions.

Chapter 8.
ICTs in Buenos Aires as a case-study

"Argentina is, thus, not a 'developing country'. Uniquely, it achieved development and then lost it again. That is a haunting condition: it may help to explain why psycho-analysis and the nostalgia-ridden tango are so popular in Argentina. It is reflected, mockingly, in the fading Belle Epoque splendour of Buenos Aires."

Michael Reid, 2004.

This chapter presents the case of Buenos Aires, the capital of Argentina. Housing more than thirteen million inhabitants, Buenos Aires has been historically the engine of the Argentinean economy. Argentina's capital city concentrates most of the human, material and technological resources of the country, 35% of the country's total population and 53% of its GDP. At the beginning of the twentieth century, while Argentina was one the leading economies of the world, Buenos Aires was the second metropolis in America[1], after New York.

Buenos Aires used to have the richest, best-educated and most cultured society in Latin America. Its elite and broad middle-class enjoyed and sustained a level of cultural facilities comparable to those in European cities while the poor lived with less hardships than their equals anywhere else in the region. Since the 1970s, however, the country has been affected by a dramatic wave of political and economic crises, whose effects have produced the socio-economic polarisation of the society, especially in Buenos Aires metropolitan region (Ainstein, 1996). New forms of marginality and polarisation and a further deepening of social inequalities have become visible since the 1990s, parallel to the integration of part of Buenos Aires' economy to world markets (Cicolella, 1999).

In 1998, when Argentina entered into its last recession wave, its *per capita* income still doubled that of some other Latin American countries. But, since December 2001 the economy contracted enormously due to the devaluation of the peso. In 2003, more than half of Argentineans lived below the poverty line and one in five had no job. The high educational and cultural levels of Buenos Aires' inhabitants[2] subsist, but poverty has become a great urban problem.

The present chapter addresses the introduction and development of ICTs in the complex context of an educated society that is confronted with deep economic troubles and increased socio-economic inequalities. Its main objective is to go further into the particularities of the introduction of ICTs in Latin American metropolises, with attention to the processes in Buenos Aires. With that goal, this chapter explores how the inter-relations between the three main layers of networks work: ICT infrastructures, ICT services and the diffusion of ICTs in the society; and how they affect Buenos Aires' urban functioning and urban life.

8.1. Urban development of Buenos Aires

Historic Buenos Aires was founded twice by the Spanish colonists. The present city is based on its second foundation in 1580, which was done according to the spatial principles of the *Leyes de Indias*. During the colonial rule and thanks to its favourable location, Buenos Aires gradually increased its importance due to the rise of trade between the colonies and Spain, and later, to other European countries. The present Buenos Aires was formed on the basis of the articulation of the Argentinean territory with the world market during the second half of the nineteenth century, mainly through agricultural exports (Pírez, 2000).

Since that period, Buenos Aires has been considered a cosmopolitan city; a city of global significance which rapidly established itself as the first metropolis in Latin America. Since its population is largely of European descent[3], Buenos Aires has traditionally had strong ethnic, cultural, as well as business ties with Europe. Its broad middle class has always exhibited consumer habits and preferences that resembled more those of Europeans than those of its Latin America neighbours. The city's lively cultural life and high number of cultural facilities have not decreased during these crisis times.

a) Buenos Aires as the Paris of the South

From approximately 1885 onwards Buenos Aires grew enormously as a centre of trade and immigration. While New York was the gate for European immigration to North America, Buenos Aires was the corresponding gate in South America. Its immigration process at the beginning of the twentieth century was so strong that it made Buenos Aires grow at unforeseen rates for that period. A few years after the turn of the century, it reached one million inhabitants and continued growing at amazingly high rates. Its model of economic organisation, biased towards exports of the agricultural production to European countries, promoted a centralised spatial configuration linking the seaport with the fertile Argentinean *pampas*. This, in turn, promoted the concentration of several groups of people in Buenos Aires: the rural landlords, people working in the growing commercial sector and those working in the public sector, which combined with the European immigration made the middle class sectors, grow to unprecedented proportions.

At the turn of the century Buenos Aires' architecture and urban design did not differ from those of European cities. The city centre, characterised by boulevards, palaces, buildings, theatres and cafés, was also served by a dense network of trains since the mid-1880s, horse-drawn trams since 1876, electric trams since 1896, and a network of underground metro lines since 1913, which made the expansion of the city possible (GCBA, 2001). Also, the whole city was served by gas networks since 1910 and by electricity networks from 1907. There was a telephone network since 1878, and in 1905, 72.5% of the residents had access to water at home (Pírez, 2000).

Buenos Aires truly deserved the title of Paris of the South; it was an open, democratic and modern city with large parks for the entertainment of the masses, while its middle class had a social and cultural significance beyond any other in Latin America (Pírez, 2000). The openness of the city reflected the relative openness of the social system, in which besides the possibilities for social ascension allowed by the large economic growth, there was a liberal project to integrate the masses of migrants through public education (Sebreli, 2003).

The design of Buenos Aires showed this notion of a democratic city. In its recreational and cultural facilities, poor and rich mingled without conflict. There was a homogeneous distribution of public services across the different neighbourhoods, which promoted a neighbourhood culture centred in the local cultural facilities, which also promoted the socialisation between professionals and workers (Sebreli, 2003). Cafés became an institution in the city that gave

birth to the tango[4], a local popular music which eventually conquered Paris. In all these urban developments, Buenos Aires was way ahead of the rest of Latin American cities and close to the level of development of European cities.

The 1920s and 1930s were a crucial period in Buenos Aires, not only because of the spectacular physical transformations, but as a peak in its socio-cultural development, which made it the cultural capital of Latin America. The consolidation of its urban culture as a culture of 'mixing' produced a thriving intellectual life, not only seen in a rich artistic and literary production[5], but also in other important, sometimes contradictory, cultural processes and attitudes, typical of modern urban culture. Sarlo (1988) has defined this period as the 'peripheral modernity' (*modernidad periférica),* vividly describing how local intellectuals experimented with the huge transformations, and how they expressed them through (cultural) magazines, *avant-guard* aesthetic groups, radical political thinking, eroticism and feminine discourse, marginal discourses, pedagogic attitudes, etc. These cultural processes, in combination with the new technologies available in the city (radio, electricity, telephones) had a strong influence in shaping modern thinking and urban life. [6]

From 1910, Buenos Aires began to extend itself from the borders of the Federal Capital[7] - to what it is now known as Greater Buenos Aires, or the *conurbano*. The international economic crisis of 1930 caused the collapse of the agricultural export model of Argentina, but Buenos Aires' urban configuration was already consolidated by that time, with a population of 2,300,000 inhabitants. The model of development shifted into industrialisation. New industries producing non-durable goods attracted population from the provinces to Buenos Aires, which grew during the 1935-1945 period at an average annual rate of 3.2%. The data of the Municipal Census in 1936 showed the increasing importance of the Greater Buenos Aires (GCBA, 2001).

Large urban projects characterised this period: the opening of the *Costanera Norte*, of the 9 de Julio Avenue (the broadest avenue in the world), and the trace of new boulevards as metropolitan axes for regional access. At the same time, while the Federal Capital was being affected by a process of densification, the investments in roads, transportation and credit policies promoted the suburban growth for middle and popular sectors. The construction of the General Paz, the ring road surrounding the Capital Federal, in 1941 produced a double urban effect. On the one hand, it helped distributing the traffic between the Capital Federal and the suburbs, while on the other, it gave shape to the material barrier that divides them (GCBA, 2001).

Fuelled by its large domestic market, a process of industrial development by substitution of imports began to take place in Buenos Aires earlier than in other Latin American cities, whose benefits were distributed socially, especially up to the mid-1950s (Pírez, 2000). At the same time, the post-war period 1945-1955 (the Perón administrations) was characterised by strong social investments in the city, particularly in social housing, health and sport facilities and large urban parks (GCBA, 2001). The dynamic economy, the high agricultural productivity, a low rate of natural growth[8] and a good educational system all contributed to a good match between employment supply and demand, generating a high standard of living and the further expansion of the middle class.

In the mid-1970s, the labour market in Buenos Aires differed greatly from others in cities of the region, as it was more integrated, with a higher presence of salaried workers, the levels of under-employment were lower, the salaries were higher, and there were less income differences between sectors and qualifications. The percentage of poor households in Argentina in 1960 was estimated at five percent, while the Latin American average was fifty percent (Altimir and Beccaria, 1999).

In spatial terms, Buenos Aires was also more a European city than a Latin American one as it constituted the most integrated city model of the whole Latin American region. While in most other cities the elite had left the historic centres and gone to the suburbs to live in one-family houses, in Buenos Aires the requirements of accessibility and centrality of the elite were stronger and the Federal Capital retained its mixed population. Buenos Aires was growing in height, but at the same time became more beautiful, better served and more modern (Pírez, 2000). During the 1960s and 1970s, several sub-centres emerged in the metropolitan area, in districts with high demographic growth within five and twenty kms. from the Federal Capital (Cicolella, 1999).

On the other hand, political instability and violence were gradually becoming important features of urban life since the mid-1960s. In 1966 a military dictatorship took the power and carried out a repressive policy against union movements and left wing groups. The conflicts between the military and the left wing parties intensified gradually, and under the torture and executions of their members, different guerrilla groups began to operate in the city, answering violence with more violence. The country returned into democracy in 1973, when the legendary Juan Domingo Perón won the elections.

b) The 1975-1990 period: the crisis years

After Perón died in 1974, the social and political crisis reached unprecedented levels. Conflicts between right and left wing groups became more intense, while the government seemed unable to stop the crisis and the chaos. In March 1976, a new military dictatorship presided by Videla took power, initiating the one of most brutal periods in the history of Argentina. Videla carried out a 'Process of National Reorganisation' in order to ensure the country's security. [9] Near thirty thousand left-wing militants were kidnapped, murdered or disappeared, some of them with their families, during this traumatic period, the so-called 'dirty war' (*la guerra sucia*). A larger number of people were forced to emigrate to save their lives. The victims were mainly university students from middle-class origin; a great number of them from Buenos Aires. In 1983, after the defeat by the British army in the Falkland Islands war, the regime collapsed and democracy returned, but the emotional consequences of this violent period are still present in the local society.

Argentina's economic problems began to worsen from the beginning of Videla's regime. The high inflation rates experienced since the mid-1970s were temporarily stopped, but the financial crisis derived from the growing external debt made the economic troubles more acute not so long after that. This produced an escalation of inflation rates and the lowering of economic activity, a trend that was deepened since 1982. Hyperinflation rates stopped again in 1986, but the macro-economic context was not good enough to maintain them low, so 1989 and 1990 were also affected by hyperinflation rates (Altimir and Beccaria, 1999). As a consequence of this troubled economic context, this period was characterised by no public investments and economic concentration (GCBA, 2001).

In this context, the real salaries deteriorated enormously, producing a visible process of polarisation of the society and the visible pauperisation of the middle-class. Table 8.1 shows the dramatic variation in the distribution of income in the 1984-1989 period in the Buenos Aires metropolitan agglomeration showing the concentration of income of the fifth quintile, while all the others lost up to almost one third of their relative income. Income concentration trends were even easier to distinguish taking into account income distribution in deciles: from the two richest deciles, which together gained 13.2% in income, the tenth decile gained 54.2 % in income and the ninth decile lost 2.7% (Ainstein, 2000). In a short period, Buenos Aires had lost great part of its economic assets and was showing typical Latin American trends.

Income quintile	1984	1989	Evolution 1984/89
1	6.6%	4.7%	-28.8%
2	10.7%	7.3%	-31.7%
3	16.0%	11.6%	-27.5%
4	23.2%	18.7%	-19.4%
5	43.5%	57.7%	+13.2%

Table 8.1 Evolution of income distribution in the 1984-1989 period according to quintiles in the Buenos Aires metropolitan agglomeration (Source: Ainstein, 2000, with data from INDEC).

As a result of the economic crisis in the 1980s, the proportion of non-registered workers in Buenos Aires grew visibly. The figures suggest that formal employment growth rates remained stable and all the increase was in the informal economy (Altimir and Beccaria, 1999). At the same time, the salary gaps between people with different education level increased between 1974 and 1990. The salaries of workers with tertiary education improved, those with secondary education were maintained and those lower were decreased. The job market increased its levels of education and unemployment rates were not significantly changed (Altimir and Beccaria, 1999).

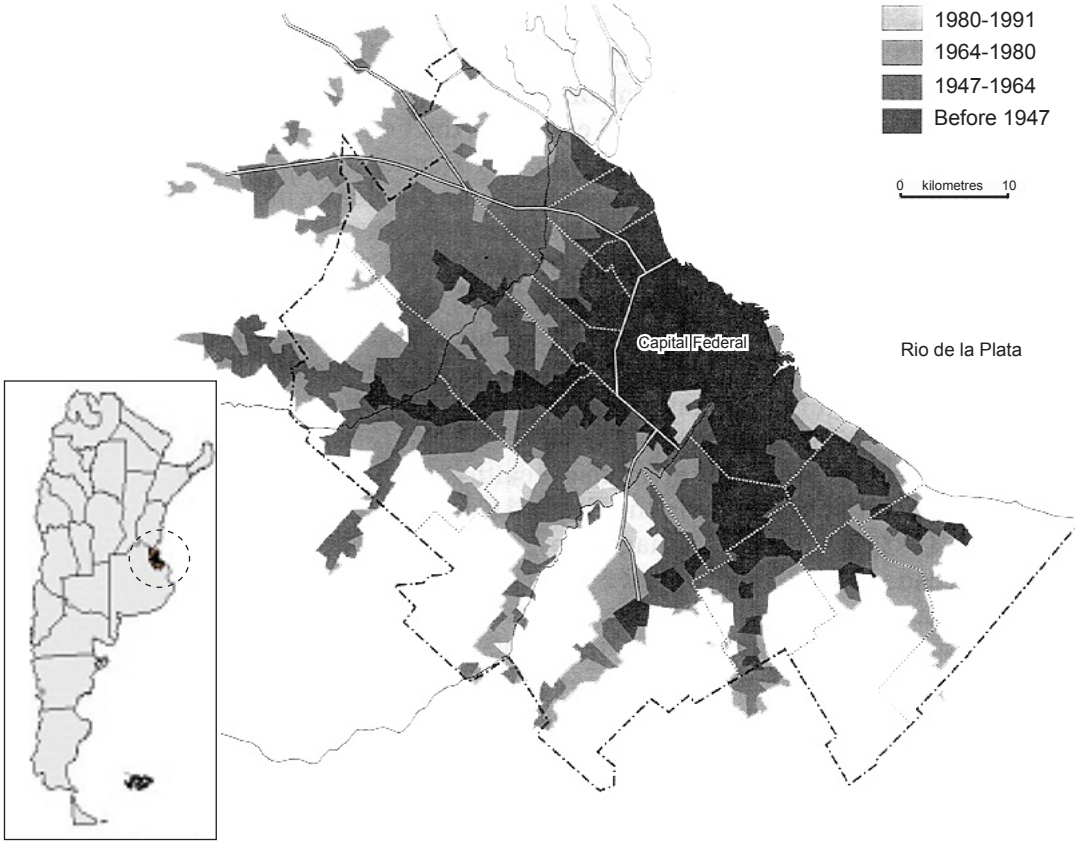


Figure 8.1. Spatial evolution of Buenos Aires until 1991 (Source: Torres, w/d).

The drop in income levels related to hyperinflation rates finally caused the so-called 'de-stabilisation of the economically stables' and the 'vulnerability of the masses' during the 1980s (Prévôt-Schapira, 2002). 1989 annual inflation reached about 5,000%. At the end of the decade, Buenos Aires had been affected by a process of 'Latin-americanisation', with increasing poverty levels, concentration of income, the first signs of informalisation of the economy, the increase of emergency *villas* and other typical Latin American urban trends.

The spatial differences between the central area (the Federal Capital) and the surrounding districts became more pronounced than ever before. While in the central area the water and sewage network gave universal service, in the surrounding districts 67% of dwellings had no water connection, according to the 2001 Census (Clarín, 2003b). This period of almost no urban investment had caused the deterioration of urban services, the decline of real estate property and the obsolescence of urban infrastructures (Prévôt-Schapira, 2002).

c) The 1990s: new rules of the game

In most Latin American metropolises, the 1990s have been characterised as a period of rapid transformations and great changes, triggered by processes of deregulation, privatisation of public enterprises and the establishment of the rules of the free market as the new model for economic organisation. In Argentina, the radical state reforms launched by Menem, who initiated his period in 1989, were developed faster and more drastically than in other countries. Besides the privatisation and deregulation processes, the lowering of import barriers and the Convertibility Law, which fixed the exchange rate of the peso and paired it with the US dollar, were the cornerstones of the Argentinean reforms. Other measures included cutting of federal meals programmes, reducing the national unemployment funds by eighty percent, sacking hundreds of thousand public employees and making strikes illegal (Klein, 2003). The reforms succeeded in stopping hyperinflation rates, and they brought about remarkable transformations in the urban scene.

On the one hand, Buenos Aires became a privileged place of the new globalised economy (Prévôt-Schapira, 2002). The opening-up of the economy attracted direct foreign investment into several economic sectors, especially financial (banking and insurances), real estate and urban services. The real estate sector acquired a new dynamic that promoted new processes of production of urban space in the city. A parallel process was the modernisation of the commercial sector that had suffered great losses in the previous decade. Twenty five 'shopping(-mall)s' and fifty five hypermarkets were opened in Buenos Aires during the 1990s (Cicolella, 1999). They were located outside the traditional spaces and close to road networks, evidently targeted at automobile users (Pírez, 2000). Table 8.2 shows the magnitude and destination of large investments and their origin during the period 1990-1998 in Buenos Aires. The uneven territorial distribution of these investments in the city is visible. As they were addressed to higher income sectors, between 75% and 80% of all investments have been located in the central area and the North Axis of the Metropolitan Region, particularly new real estate (private) projects, new business centres and international hotels (Cicolella, 1999).

While the public sector gradually lost its participation in urban control and urban interventions, private urban investments grew in volume and the new projects grew in size (GCBA, 2001). The local construction sector received a great impulse with this process of economic reactivation and the new urban projects. Within these, the most salient was the renovation of the old docks at Puerto Madero, at the very centre of Buenos Aires. This project was carried out by a public-private corporation which began to transform the docks in 1993. Huge capital was invested in this project, which now houses more than forty restaurants, a five-star hotel, a museum, a complex with eight movie theatres, a church, the Catholic University, many office buildings and

'intelligent' towers, exclusive housing complexes and a seven-million dollar pedestrian bridge designed by Santiago Calatrava.

Investment sector	Million US$	Origin of investment
Highways	2000	70% local
Business centres	2500	50% local
Shopping malls	1400	75% foreign
Hypermarkets	2250	75% foreign
Show business centres	150	75% local
Theme parks	130	50% local
Private neighbourhoods	4500	70% local
Vertical countries	8000	80% local
New industrial plants	6500	50% foreign
International hotels	1000	75% foreign
TOTAL	28430	50% local

Figure 8.2 Main urban investments during the 1990-1998 period in Buenos Aires Metropolitan Area (Source: Cicolella and Mignaqui, 2002).

The privatisation of public enterprises improved the levels of urban services, but at the same time increased the prices and represented a profound change in the ways of urban management. Telephone, gas provision, water and sewage, rail and underground transport systems networks went into private hands, as well as the seaport and airports operations. Other traditional municipal services such as garbage collection, street lighting and maintenance were also privatised.

The roads that give access to the central area of Buenos Aires transformed themselves into modern toll-highways, connecting the city with the far periphery in less than one hour. These new roads offered real estate investors the opportunity to launch a great number of projects aimed at high and middle income households. From the (approximately) four hundred projects observed in 2000, more than half were in the form of '*barrios cerrados*' (walled neighbourhoods) separated from their surroundings by walls and gates and characterised by the private production of urban services, high security levels and social homogeneity (Pírez, 2000).

The explosive growth of this type of residential project in Buenos Aires has produced abundant urban studies, describing the different typologies and their main features. Figure 8.2 shows the location of most of these private neighbourhoods in Buenos Aires in 2001 and their relationship with the road system, showing the preference for locations in the North Axis. In many cases, the new developments emerge close to precarious settlements and *villas*, whose residents provide cheap labour to the households of private neighbourhoods. The polarisation of the city became increasingly visible.

The development of the city during the 1990s was addressed towards the effective and enhanced demands of the most privileged sectors (Cicolella and Mignaqui, 2002). During this period, the upper and middle classes went on a remarkable consumerism spree – known locally as the years of the 'sweet money' (*la plata dulce*) - allowed by the Convertibility Law of 1991. Suddenly, imported goods were easily affordable by Argentineans, while Argentinean products became very expensive to foreigners. This obviously promoted the trips abroad by broad sectors of the middle-class. Between 1993 and 1998 the total household spending had increased by 42 billion dollars, while spending on imported goods doubled from $15 billion to $30 billion (Klein, 2003).

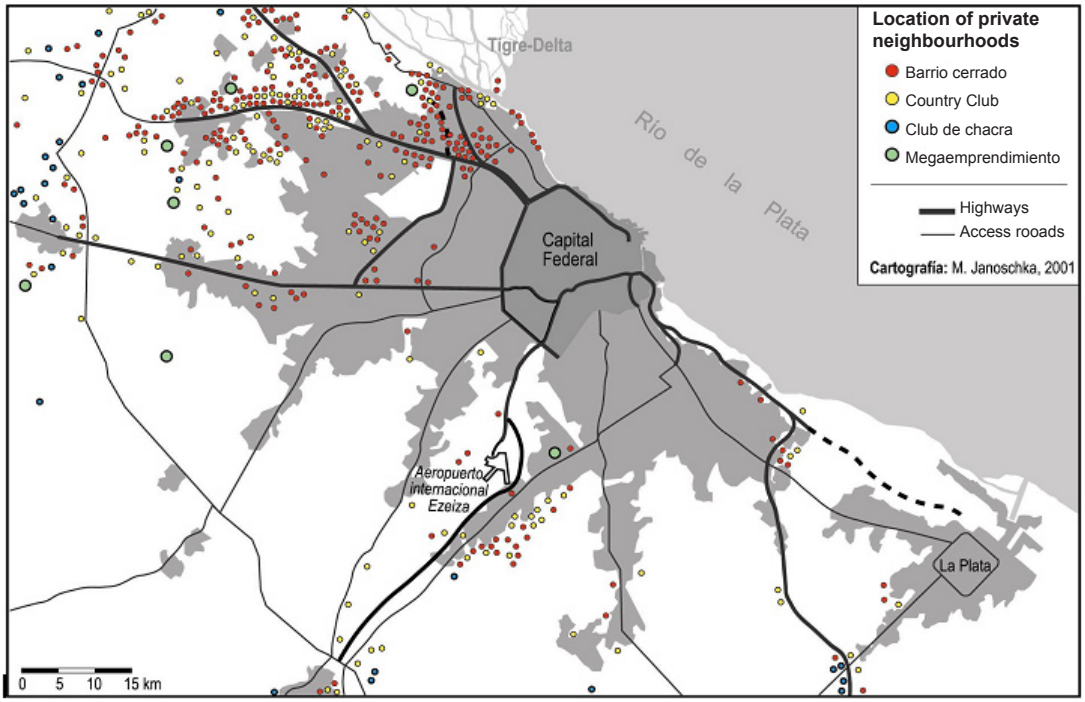


Figure 8.2 Location of different types of private neighbourhoods in Buenos Aires Metropolitan Area in 2001 (Source: Janoschka, 2002).

Most foreign capital went into the purchase of the former public companies, or to real estate or retailing sectors, but not to the productive advanced economic sectors. National capital became fused, subsidiary, associated or sub-contractor of the transnational corporations. At the same time, the economic opening devastated many less 'efficient' local sectors, but it did not replace them by new 'globally competitive' industries to the same extent.

But while the economy grew, inequality grew also. Business activities promoted by the '*plata dulce'* increased the rates of economic growth, but the benefits were not evenly distributed, since there was almost no process of 'trickling down' (see Table 8.3). On the contrary, the gradual withdrawal of social issues from the public plans, the increased income concentration and the restructuring of productive processes mainly affected the poorer sectors (GCBA, 2001). The trends toward the polarisation of the society and pauperisation of the middle-class that began in the previous decade intensified in the frame of the new economic model. The ratio of the percentage of incomes between the top and the bottom deciles increased from 15 to 1 to almost 24 to 1 from 1990 to 1999, which represents a 57% increase (Lozano and Manjovski, 2001).

Income quintile	Share of income in 1990	Share of income in 1998	Evolution 1990/98
1 (poorer)	5.7%	4.2%	-26.3%
2	9.1%	8.8%	-3.3%
3	14.0%	13.6%	-2.9%
4	20.9%	20.4%	-2.4%
5	50.7%	53.0%	+4.5%

Table 8.3. Income distribution in the period 1990-1998 in Buenos Aires Metropolitan Area (Source: Cicolella, 1999, with data from INDEC).

The main elements of the consequent transformation of the local job market have been (a) the creation of new jobs with high and low salaries, parallel to the destruction of a higher amount of jobs under skilled workers and commerce employees; (b) informalisation of significant percentages of the new and existing jobs; and (c) the decrease of income or real salaries of most workers (Cicolella, 1999).

Traditional economic indicators show the magnitude of these processes. On the one hand, the rates of unemployment soared to levels unseen before. Buenos Aires had an unemployment rate between six and seven percent during the 1980s, which increased during the mid-1990s up to between fifteen and twenty percent (Cicolella, 1999) and to even higher rates in the new century. Figure 8.3 shows the evolution of poverty and unemployment rates since 1990 in Buenos Aires. The figure shows how after few years of economic growth in the early 1990s, in which the IMF praised Argentina as an example country, external crises as the 'Tequila crisis' (the devaluation of the Mexican peso) in 1995 and the economic recession as a consequence of the Asian crisis in 1998 rapidly increased poverty and unemployment in Buenos Aires. On the other hand, informal employment increased their share in the total job market from 27% in 1990 up to 35% in 1998, while three quarters of new jobs generated in the same year were in the informal economy (Cicolella, 1999).

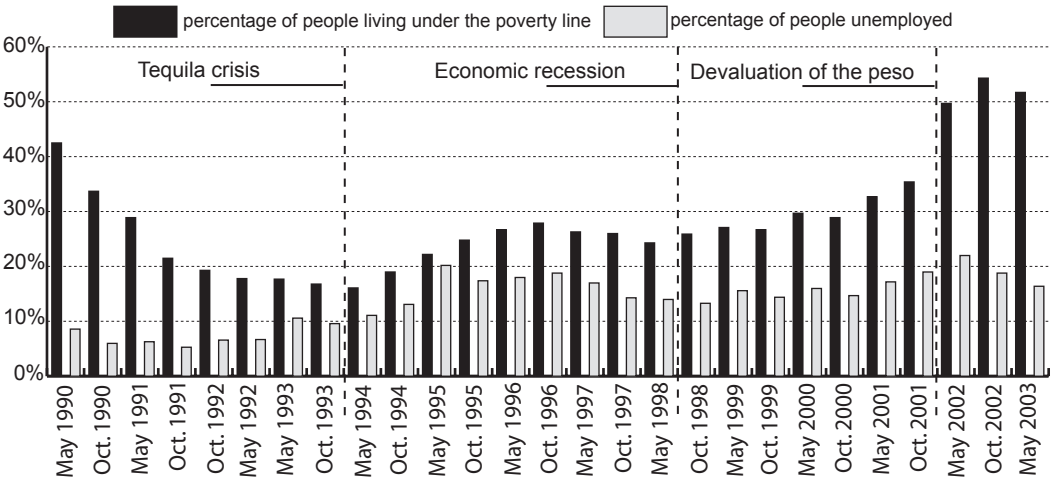


Figure 8.3 Evolution of poverty and unemployment since 1990 in Buenos Aires Metropolitan Area (Source: INDEC, 2003).

The increased economic problems of the poor caused the emergency *villas* to grow visibly during the 1990s. Data from INDEC and the City Government reveal that in the last ten years (1993-2003) the population living in *villas* increased by 100%. Inside them, 61% of adults do not have a job (Clarín, 2003a). Downward mobility made some sectors of the lower income middle class move to these precarious neighbourhoods. At the same time crowding and housing deterioration increased in the poorer neighbourhoods. Social problems proliferated and some locations began to present great incidence of AIDS, tuberculosis and children diseases. Drug addiction and drug dealing escalated, while a black market in guns flourished, in high demand by the criminal circuit, which grew enormously during this period. Petty crime and abductions became common, fueling up feelings of insecurity in most people. This contributed to the social fragmentation of Buenos Aires, which in turn reinforced the increasing spatial fragmentation trends. [10]

As a consequence of the increasing problems for the daily survival of poor residents during the late 1990s, local governments, NGOs, the Church and neighbourhood associations began to carry out social activities in the peripheral areas and poor neighbourhoods in the South of the city (Prévôt-Schapira, 2002). Despite these increasing economic troubles, Argentina was still ahead of the rest of the Latin American countries regarding income in 2001, with an average GDP per capita of US$ 11.320, against US$ 7050 of regional average in the same year (UNDP, 2002). In October 2000, Buenos Aires was better off than the rest of the country regarding the Human Development Index, with a score of 0.629 against 0.613, but the City of Buenos Aires had an index of 0.867 (UNDP, 2002), comparable to those of advanced economies.

However, the problems of poverty and unemployment in Buenos Aires have worsened dramatically since December 2001, when a strong devaluation of the peso almost collapsed the Argentinean economy, bringing about great political instability and especially affecting the poor and those living in the informal economy. Households' purchase power shrunk dramatically, while poverty increased to record levels of more than 50% of the total population. In 2002, 98% of Argentineans households declared they had economic troubles (D'Alessio IROL, 2003a).

The drastic and rapid pauperisation of society has obviously shaken the whole nation. As a reaction, new social actors and a new type of social movements have appeared since the mid-1990s and more visibly after 2001, which strive for 'day-by-day and from below' changes (Palomino and Pastrana, 2003). Table 8.4 shows the main social base and objectives of these new movements: *clubes de trueque*, neighbourhood assemblies, *piqueteros*, recuperated enterprises, and the CTA (unions of Argentinean Workers). From these, *clubes de trueque* and neighbourhood assemblies have been gradually losing power.

Movement type	Social base	Initial objectives	Adversary	Societal objectives
Trueque	Impoverished middle-income and popular sectors	Reciprocal exchange to satisfy needs that cannot be solved by the formal market	Exclusive neo-liberal economic model.	Solidarity economy
Recuperated enterprises	Formal workers	Recuperation of the work source	Financial rent neo-liberal economic model	Social economy
Piqueteros	Unemployed and precarious workers	Demand for subsidies for unemployment and food provision	Neo-liberal model. Capitalism	Social change, construction of a just and free society. Solidarity economy
CTA (Union of Argentinean Workers)	Public unions. Social and communal organisations. Informal workers and the unemployed	Defence of union and precarious workers. Social integration of the unemployed. Defence of human and social rights	Neo-liberal model.	Alternative socio-economic model through the reactivation of internal demand and employment
Neighbourhood assemblies	Middle-income and (in lesser extent) popular sectors	Participation in public decisions. Solution of survival needs and local issues.	Neo-liberal economic model. Forms of representation and corruption of the political class	Direct democracy

Table 8.4. New social movements in the Argentinean urban scene. (Source: Palomino and Pastrana, 2003).

Unforeseen new social actors in the new urban landscape are the *piqueteros* and *cartoneros*. The first are unemployed persons that frequently block access roads and streets demanding food and social benefits, while the second are people searching for reusable materials in the garbage. [11] *Piqueteros* have become very noticeable in the urban scene, because of their insurgent power to protest against local and national authorities. In February 2002 many thousands of *piqueteros* coming from the poor areas of Greater Buenos Aires marched into the Federal Capital demanding work and welfare plans. In April 2002 the government launched an urgent social plan targeting unemployed households heads, providing them (2.5 million persons) with 150 pesos per month to help people get out of extreme poverty[12] (Prévôt- Schapira, 2002). *Piqueteros* demonstrations have become a disturbing element of urban life in Buenos Aires.

According to INDEC's official data (2003) during May 2003, 51.7% of persons in Buenos Aires were living under the poverty line, and 25.2% in extreme poverty. Informal employment reached a new peak of 43.8%. Half of the new jobs created in the city are in SMEs working in the informal sector (Clarín, 2003b). However, 2003 has shown a positive recovery of the Argentinean economy. After three years of declining economy (-0.8% in 1999, -4.4% in 2000 and -10.9% in 2001 with respect to the previous year) 2003 represented a positive growth of 8.4% (Clarín, 2004, with data from INDEC).

Buenos Aires begins the twenty-first century as a fragmented city, with increasing contradictions and contrasts. This not only means many more '*countries*'[13] and gated neighbourhoods, but also many more people living in *villas*. The spatial features of the city have been drastically transformed since both the urban land and services have modified their configuration and function. The privatisation of urban space and the emergence of 'islands' excluded from each other represent a break in the traditional way of land development by a continual orthogonal grid (Pírez, 2000). These changes represent a serious regression from the open, democratic and modern character that Buenos Aires had and fostered. On the other hand, the privatisation of basic services has improved the quality and sometimes extended coverage, but they do not constitute any more an urban right for all, but a commodity for those able to pay for them.

A clear socio-economic polarisation between the formal/informal or rich/poor sides of the city has taken shape in a city that was unique in Latin America because of its broad, modern, educated and European oriented middle-class. Cicolella and Lucioni (2003) emphasise that the long-established local financial and real-estate capitalists have lost power to foreign commercial capital, increasingly constituting what they call a 'corporate city'. While the traditional central locations have lost part of their attractiveness, the low-income sectors have become increasingly present in the city life, some of them as a source of conflict and insecurity feelings. These processes have been accompanied by a dramatic pauperisation of most of the society. Buenos Aires has lost its prestige and shine, becoming more of an informal and polarised Latin American city, but it still shows many traces of its important position in the global circuits of capital. It is in this difficult context that ICTs have been introduced in Buenos Aires.

8.2. Buenos Aires' local and international ICT connectivity.

After reviewing Buenos Aires' urban context, the present section analyses the introduction of ICTs in the context of the three main layers of networks considered for this study.

Argentina was one of the first countries to privatise its telecommunications, after Chile. The Menem administration sold the state-owned telephone company, *ENTel*, in November 1990[14], providing the new incumbent operators a period of legal monopoly of ten years. The privatisation process divided Buenos Aires' (and Argentina's) basic telephony in two areas of operation: north and south. The Northern area was awarded to a consortium composed of *Telecom*, *Stet* (Italy) and *France Telecom*, now *Telecom Argentina*, whereas the Southern area was awarded to

Telefónica of Spain (now *Telefónica de Argentina*). The area of operations of the two incumbent carriers in Buenos Aires is shown in Figure 8.4.

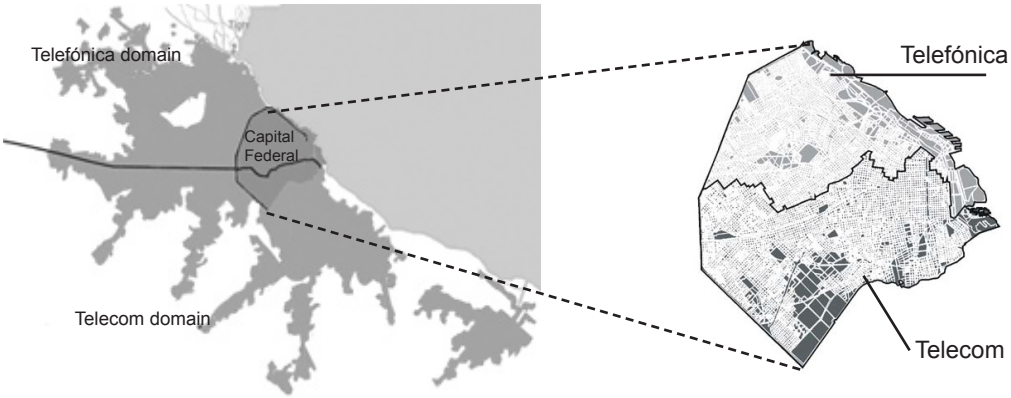


Figure 8.4 Area of operations of Telecom and Telefónica in Buenos Aires Metropolitan Area and the Capital Federal (Source: CIM, 2000).

A requirement for the privatisation was to invest at least US$ 600 million in the expansion and modernisation of the networks. To acquire the capital needed for this operation, Buenos Aires' telephone service became very expensive in a short period. Tariffs rose over 400% in the twelve months prior to the sale of *ENTel*, and again by 42% in the last days prior to the closing the privatisation deal (Petrazzini and Guerrero, 2000). The total price increase in the 1989-1999 period reached 1128.3%. Despite the increased prices, teledensity grew from 10.7 in 1990 to 20.27 main lines per 100 people in 1997, which represented a 115% growth. Digitisation went from 13% in 1990 to 100% in 1997 (Petrazzini and Guerrero, 2000)

Mobile telephony began to be offered to the public in 1988 by *Movicom*. There are now five wireless operators CTI, *Movicom* (*Bell South*), *Personal* (Telecom) and Unifón (Telefónica) and Nextel.

In the local context, very much criticism has been made of the way that the privatisation process was conducted, and of the public authorities regulating the telecommunications sector, the *Corporación Nacional de Comunicaciones* (CNC) and the Secretary of Communications, a dependence of the Ministry of Planning, Public Investments and Services. Critics maintain that it has lead to processes of concentration, increasing importance of transnational enterprises, and the establishment of an oligopoly that replaced the old public monopoly in telecommunications.

In November 2000 the period of no competition expired. Since then, new entrants have received licenses to operate in local, long distance and public telephony[15], but the levels of competition in the telecommunications sector in Argentina have improved only slightly. The 'precedence advantages' of Telefónica and Telecom Argentina acquired during the 1990-1999 period have given advantages in technological, commercial and financial capacities to these two incumbent operators at the expense of the new entrants (Castro and Petraglia, 2002). Therefore, basic and mobile telephony markets are still largely dominated by the former monopoly firms.

Internet charges were also influenced by the monopoly granted to Telecom Argentina and Telefónica until 2000. They established *Teleintar*, an enterprise that monopolised international telephony services. Initially, the very few firms which offered Internet to end users charged high

per-minute charges, since they had to purchase international backbone from the monopoly. In July 1995, the market for the end users was opened and many new ISPs began offering Internet. *Teleintar* charged ISPs a flat rate for an international connection. The connection had no traffic limit beyond the capacity of their link. The high initial prices dropped, but problems of congestion soon increased at both local and international levels, especially at peak hours (Drelichman, 2000).

Besides, the Argentinean market has three providers of satellite connection: *Impsat, Comsat* and *Nahuelsat*. *Impsat*, operating in Argentina, Brazil, Colombia, Ecuador, United States, Mexico and Venezuela, is controlled by the Argentinean group *Pescarmona*. *Impsat* has nine satellites, nineteen teleports and more than twelve hundred business clients. It also has an International Teleport in Buenos Aires (Castro and Petraglia, 2002). Table 8.4 shows the main firms operating in the Argentinean telecommunications sector from 1988 up to 1999. It illustrates how the sector changed in the three segments, from monopolies before 1990, to restricted competition with the central position of Telecom and Telefónica until 1999.

	1988	1999	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Landline networks	Entel		*Telefónica de Argentina* (South zone)									
			Telecom Argentina (North zone)									
												Movicom/ B.South
												GTE/ CTI
Wireless networks	*Movicom*											
						Miniphone (*Telecom* and *Telefónica*)						
							CTI					
									Personal (*Telecom*)			
									Unifon (*Telefónica*)			
Inter-national backbone networks	*Entel-Ciba*		*Teleintar (Telecom and Telefónica)*						*Teleintar Norte*			
									Teleintar Sur			
			Impsat									
				Comsat								
						Nahuelsat						

Table 8.4 Telecommunications network providers in Argentina in the 1988-1999 period (Adapted from Marc, 1999).

Since the end of the monopoly new firms have deployed different types of high-speed networks in business and privileged spots of Buenos Aires. Within them, fibre-optics and wireless local loop technologies are the most important. Obviously, the most wired area is Buenos Aires' CBD, where most financial institutions and large Argentinean enterprises have their headquarters. The existence of a large number of fully and partially 'intelligent' corporate buildings, especially in the Catalinas Norte area of the CBD, gives an idea of the high local demand for these new high-speed networks.

Besides the *Telecom* and *Telefonica's* existing networks, the new networks offered to the corporate sector include *Netizen* (cablemodem, ADSL and wireless local networks), *Impsat* (satellite national and international networks), *Comsat* (land and wireless networks), *MetroRed* (fibre-optic networks in Buenos Aires' CBD), *Velocom* (wireless broadband connection in the centre of Buenos Aires, and the Recoleta, Barrio Norte, Palermo, Belgrano and Nuñez neighbourhoods), *AT&T Argentina* (Fifteen thousand kms. of fibre optics, mainly in the micro-centre of Buenos Aires), *iPlan* Networks (fibre-optic networks) and *PSInet* (a backbone Internet service provider which went into bankruptcy in 2001). [16]

Regarding the international backbone connectivity, Buenos Aires was, after São Paulo, the best connected Latin American city in 2003 (Telegeography, 2003b). Its coastal location and its large telecommunications market, both business and residential make it a node of great importance in the Latin American Internet backbone network. Besides its good connectivity, Buenos Aires is the Latin American city with the highest number of direct links to other cities, competing with São Paulo as the main Latin American hub city. Buenos Aires' Network Access Point, created by CABASE in 1998, has more than thirty ISPs and carriers associated with it. Almost all domestic Internet traffic is exchanged in this NAP, while the international traffic is routed directly by the ISPs using submarine cables or, to a lesser extent, satellite connections. Besides this neutral NAP, Buenos Aires has different private hubs for Internet exchange. These belong to the main carriers *Telefónica de Argentina and Telecom Argentina,* and the ISPs and network providers *Impsat, Comsat*, *Netizen* (the former *Diveo* data centre), *iPlan, MetroRed* and *Velocom*.

Summarising, the increased socio-economic polarisation of Buenos Aires' society during the 1990s is also reflected in the telecommunications sector. On the one hand, Buenos Aires' local and international telecommunications networks have experienced a great improvement since the beginning of the 1990s. The modernisation, expansion and availability of different types of networks for the corporate sector and elite residential market have been visible. On the other hand, despite the opening of the telecommunications sector to competition in 2000, the large incumbent carriers *Telecom* and especially *Telefónica*[17], dominate most segments of the telecommunications market. Besides, basic telephony is stagnating since the devaluation of the peso in December 2001, as the high prices for this basic service have become unaffordable for the poorer households of Buenos Aires.

8.3. Buenos Aires' ICT industries and businesses

This second layer of networks in Buenos Aires refers to the networks of production and consumption: the supply side and the demand side of ICTs. For the first one looks for the suppliers of ICT networks and hardware products, the suppliers of software products and services, the suppliers of content; for the second attention is given to the business and industries making use of ICTs for their activities. As in the whole economy, the devaluation of the peso in December 2001 and its financial aftermath has had profound consequences in the size and features of these three levels of networks. It can be distinguished between *before* and *after* the peso devaluation.

a) ICT production networks

Argentina is the third largest ICT market in Latin America, after Brazil and Mexico. This fact constitutes an advantage for the ICT production industries.

Hardware industries

Large foreign suppliers of telecommunications and networking equipment (as Siemens, Ericsson, Alcatel and Nec) have been working in Buenos Aires for long before the ICT convergence. The new players include Cisco, 3Com, Bay Networks, Sun Microsystems, Northern Telecom, Motorola, Lucent Technologies, Nortel Networks, and the local Eastel. Half of the country's telecommunications equipment needs are supplied by local manufacturers (U.S.Department of Commerce, 2000). This sector suffered a great setback after the 2001 devaluation of the peso, since several telecommunications firms stopped their expansion plans. Providers of telecommunications and networking equipment formed the most damaged segment. Firms such as Siemens, Alcatel, Ericsson, Lucent and Nortel experienced an almost complete suspension of operations (La Nacion Line, 2002).

Regarding the hardware computer market, Argentina has no local manufacturers as in Brazil or Mexico. The largest hardware suppliers of the corporate sector are IBM, Hewlett-Packard and NCR. As well these large suppliers there are also smaller foreign and local firms that participate actively in the hardware market. Computer sales fell by more than ninety percent during the first quarter of 2002, because the prices went up three times due to the devaluation of the peso During the first two quarters of 2002, more than 7000 jobs were lost in the whole ICT sector (La Nacion Line, 2002).

Software products and services

Argentina has clear advantages to become an important player in the software industry at a regional level, since software is an industry based on skills and knowledge, where Argentina has an important position in the region. It has with a good number of highly-skilled professionals, relatively high ICT penetration in the public sector, a population with a high cultural level in the Latin American context, and a large internal market. Studies have identified certain promising market niches in the country such as entertainment, applications for health care systems, industrial automation, public administration and agricultural production (Chudnovsky and López, 2002). Furthermore, the lack of language barriers with other countries of the region, combined with Argentina's cultural influence in the Spanish-speaking world may also be an advantage for exporting software products and services.

Research has shown that despite these good initial conditions, local software industries do not develop really innovative activities (Novick, 2002). A survey made by Chudnovsky and López (2002) in 2000 with a sample of a hundred software firms was useful in pointing out the structure of the sector. It is dominated by large foreign firms, which sell foreign software products and usually provide software services. These include Microsoft, Oracle, Informix, InterSoft, Sap, Stradivarius, Application Software and Maxim Software. On the other hand, there are several small and young local firms that develop software products and provide services. Networking between them is weak, there are almost no R&D activities and there are few innovation possibilities. These small local firms have great problems with access to investment and capital to finance their expansion (Chudnovsky and López, 2002).

The software industry is very much veered toward the accountancy and management segments. Its main customers are large firms and the government, which buy software exclusively from the large foreign firms. These account for two thirds of the total turnover of the software and services sector. The main clients of the smaller software firms are SMEs, which constitute a type of demand without enough sophistication, and with low demanding clients (Novick, 2002).

Among the successes of software produced in Argentina is Ututo, a simplified version of Linux free software, which has been installed in the network of schools of Buenos Aires of the REPORTE (Red *Porteña Telemática)* programme. Other successful local firms in this segment are InterSoft, Buenos Aires Software, Arquinec, Computec and Megadisk, which have received venture capital or have associated with foreign firms to expand their businesses (Carullo, 2002). Additionally, pirate software is also a common practice in Argentina, which had a piracy rate of 62% in 1998, which represented losses estimated in US$ 123 millions for the local software industry. By 2000 it had decreased to 58% (U.S. Department of Commerce, 2002).

Again, the size and structure of the ICT industry market has been deeply affected after the devaluation of the peso in December 2001. [18] The total ICT industry market was reduced by 17% between 1999 and 2003, from 5940 million pesos in 1999 to 4930 million pesos in 2003 (CICOMRA, 2003). Figure 8.5 shows its evolution in the period. 1999-2003 The most affected sector was hardware, although computer hardware has begun to grow again during 2003, but the telecommunications equipment segment almost completely collapsed, decreasing from

2000 million pesos to 150 million pesos between 2001 and 2002, and has not yet recuperated from this spectacular fall. On the other hand, software and services have continued growing despite the deep crisis, increasing their participation in the total ICT industry market. At the beginning of 2004 software and services represented 0.55% of the total Argentinean GDP, providing employment to 25 thousand people (Scioli, 2004).

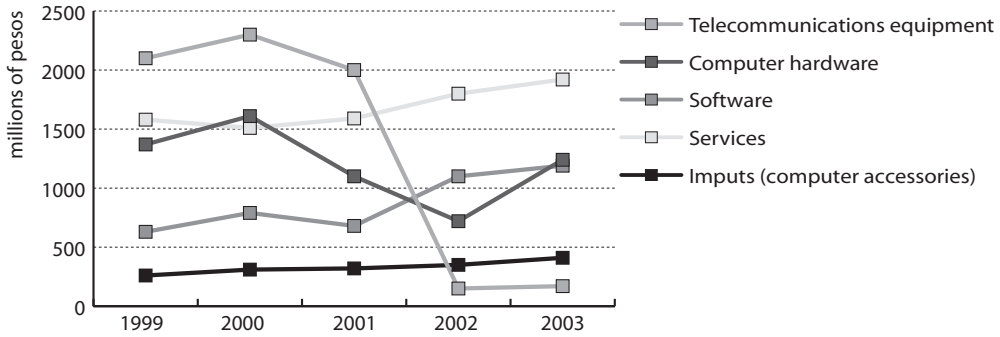


Figure 8.5 Evolution of the ICT market during the 199-2003 period in Argentina, in millions of pesos (Own elaboration with data from CICOMRA, 2003).

Content industries

Buenos Aires has great advantages in the content industry segment, linked to the creative and knowledge skills of its population. Cultural activities in general have a strong weight in the economic activity of Buenos Aires and especially of the City of Buenos Aires. [19] Inhabitants of Buenos Aires usually spend a high proportion of their income in the cultural and entertainment sector. In the context of Latin America Argentina has a well developed editorial industry, a creative film industry with a long history, which has been enriched by a new generation of directors, powerful local media and broadcasting industries. [20] It also has the highest number of researchers per hundred inhabitants in the whole region. The high purchase power and educational level of Buenos Aires' residents sustain an extensive cultural infrastructure with movie houses, theatres, museums, libraries and book shops that also play a role in the attraction of tourists to the city.

The history of the Argentinean content industries, once the most auspicious segment in the local ICT sector, is remarkable in the Latin American context. This is linked to the hype produced by the introduction of Internet in Buenos Aires. Internet soon entered the public discourse of the local mass media, which began to feed the hype.[21] A year after its commercial introduction in 1995, Clarín published a report on Internet in Argentina with the opening phrase: "*The story is short, but explosive. In just one year Internet dazzled Argentineans, who submerged themselves in the Net looking for the Holy Grail of information*" (Clarín, 1996:1). With the highest per capita GDP of the region, a highly educated middle class, a trained labour force, and the highest telephone penetration in Latin America, Argentina was the best positioned country to take advantage of ICT developments. Its social and cultural features, something difficult to build up in a short period, gave Argentina its competitive edge (Clarín, 1996).

Among the first to try to gain a space in the new cyberspace were the traditional media industries, which published online versions of the newspapers that became important portals. *Clarín Digital* (later *Clarin.com*), from the *Clarín* group, was the first to establish its presence (in March 1996) and is until now the most visited website in Argentina (Frascaroli, 2002). There are now eleven online newspapers in the Capital Federal: *Ambito Financiero*, *Buenos Aires Económico*, *Buenos Aires Herald, Clarín, Crónica, El Cronista, La Nación, La Prensa, Olé, La Razón* (*en el Transporte*) and *Página/12*.

Two conglomerates dominate the media landscape in Buenos Aires: the *Clarín* Group[22] and *Admira* (previously *Telefónica Media*), both with important stakes in the ICT content industries. *Telefónica's* media branch was launched in May 2000 the fruit of the firm's ambition to take advantage of the convergence between telecommunications and content industries, in the times of the Internet boom, when it was considered that the firm that controlled contents would have control over traffic. *Telefónica* paid 8000 million US$ to build up *Admira*, which now counts with important media enterprises in the whole Latin America, and especially in Argentina[23] (Boki, 2002).

The speedy expansion of the Internet in Buenos Aires in the mid-1990s inspired local entrepreneurs to start-up new businesses. These were mainly young and innovative executives with experience in large enterprises or recently graduated in business administration from local or foreign universities. At the same time, since 1998, Buenos Aires attracted a flow of local and foreign capital for Internet related businesses. 67 new portals began to operate online during the month of November 1999 only (Smirnoff, 2000).

By the end of 1999, Argentina had become the country with the most dynamic Internet culture among the larger economies of Latin America, producing most of its own content (Hilbert, 2001). In 2001 it had the same number of domain names as Brazil, (Zook, 2001), which is eight times larger than Argentina's population. International portals like Yahoo!, Microsoft, AOL, and Terra/Lycos began to work in Argentina competing to capture the growing market.

During early 2000, different Internet experts declared that almost fifty percent of all Spanish-language Internet business sites were made in Argentina or by Argentineans living outside the country. Eleven of the fifteen most visited Spanish-language sites in 1999 were Argentinean (Barlaro, 2000). The Internet fever among young entrepreneurs was promoted by the successful stories of the initial sites as *Patagon, El Sitio*, *Decidir.com* and *DeRemate*. E-businesses were emerging on a weekly basis during the early year in 2000 (Petrazzini and Guerrero, 2000). A survey conducted by Price and Cooke in November 2000 of 217 Argentinean dotcoms reported that Argentinean sites had received a total investment of US$ 600 million since 1993, and generated 10,000 jobs. [24] Buenos Aires was on its way to become the hub for connectivity, internet start-ups and the coming wave of e-commerce in all of Latin America.

The boom in Argentina started with *El Sitio* and *Patagon*, two Argentinean portals listed on the NASDAQ, which grew enormously until 2000. *StarMedia*, founded in Miami by an Argentinean entrepreneur was also another highly successful portal at Latin American level. *El Sitio* alone hired more than fifty journalists in Argentina only (Barlaro, 2000). Another successful portal was *Mujer y Negocios*, which won a Stockholm Challenge Award in the category e-business in 2000. Not so long after there were sites specialised in different types of content popping up one after the other. Most of them were addressed to the finance sector and online retailing, but there were also sites with agricultural content, sports, music, health, ecology, women's affairs, etc.

The golden period for Internet start-ups was intense, but short. It lasted from early 1999 until April 2000, when the NASDAQ Index underwent sharp decline in the stock market. The shakeout in Internet ventures in Argentina was comparable to the one in the US (U.S. Department of Commerce, 2002). This brought about huge difficulties for the local dotcoms, especially those financed with venture capital or with shares in the stock market, which saw their shares values melt down. According to a report of Prince and Cooke, from the four hundred dotcoms working in Argentina in 1999 there were only a hundred at the end of 2000 (Carullo, 2000). The enterprises that did not go into bankruptcy were obliged to reduce their staff and their costs of operation. Even the more successful sites as *El Sitio, Patagon* and *StarMedia* were in trouble during the transition period. It became clear that those brick and mortar sites that went

online (such as *Disco Virtual* and *AltoCity*[25]) had much fewer difficulties in the new business environment, than the recently established firms.

To promote the development of local content, a group of Chambers of Commerce organises a competition each year at national level, in which all Spanish-language *.ar* domain sites can compete. The *Mate.ar* initiative gives prices to the best websites in diverse categories as portals, electronic commerce, agriculture, art and culture, science and technology, sports, economy and business, education, entertainment, public sites, public information, non-profit institutions, games, environment and ecology, women, municipalities, music, children, health, folklore and tourism.

b) ICT consumption industries and businesses

The globally oriented side of the economy

The production, development and diffusion of ICTs are largely associated to the characteristics of the local economy and its levels of ICT consumption. The use of ICTs is especially observed in the more modern side of the local economy, which is highly wired. Buenos Aires has been, with Sao Paulo and Mexico City, a major centre for top level management and coordination functions of global firms in Latin America, although the intensity of these activities has decreased since the financial crisis of December 2001 (Sassen, 2003).

According to world city research (Beaverstock et al., 1999), Buenos Aires is considered a major global centre in banking services and a minor global centre in advertising and legal services. The number and presence of these firms positions Buenos Aires as a gamma (third-tier) world city and for that reason as having a role in the global financial markets and the global circuits of accumulation. Most headquarters of banking and financial institutions are located in the 'City', the core of Buenos Aires' CBD.

With the intention of identifying the spatial features of global and corporate firms in Buenos Aires, Cicolella and Lucioni (2003) recently mapped the location of intelligent office buildings. These are those buildings wired with fibre optics, with the purpose of high-speed connection for the development of their job activities, but also for the management of security, micro-climatic conditions, energy consumption, etc.[26] There were in 2002, 384 (partial or total) intelligent buildings in the whole Buenos Aires area, of which 24.7% were located outside the City of Buenos Aires. The total built area of these wired buildings constituted approximately the 39% of the total area of office buildings market of the whole Buenos Aires (Cicolella and Lucioni, 2003). The results of this valuable research revealed that during the 1990-2002 period two important and parallel processes have taken place in Buenos Aires: the expansion of the traditional CBD into adjacent areas, and the formation of a corridor of office buildings and towers toward the North.

The traditional CBD had three main areas: *Microcentro* (the 'City'), *Macrocentro* and *Catalinas*, connecting the CBD with the *Retiro* railway station. The building of a series of new towers in the Catalinas Norte area have made it denser than before, while the *Macrocentro* has expanded toward the north, south and east. But, the most spectacular transformation has been the addition of Puerto Madero to the CBD (see Figure 8.6). The 170 hectares of the Puerto Madero neighbourhood have been completely cabled and are totally managed by computers for security as well as for its technical infrastructures. Important landmarks in this project, and in the whole CBD area, are the two towers that are the headquarters of the two incumbent carriers in Buenos Aires and Argentina: *Telefónica* and *Telecom*. They have been located in their own area of operations (*Telecom* at the North and *Telefónica* at the South) looking at each other from both sides of the North-South axis to Puerto Madero (see their precise location in Figure 8.6).

These completely 'intelligent' towers have been designed by the Cesar Pelli office (*Telefónica*) and Kohn Pedersen Fox Associates (*Telecom*), both in association with architectural firms from Buenos Aires.

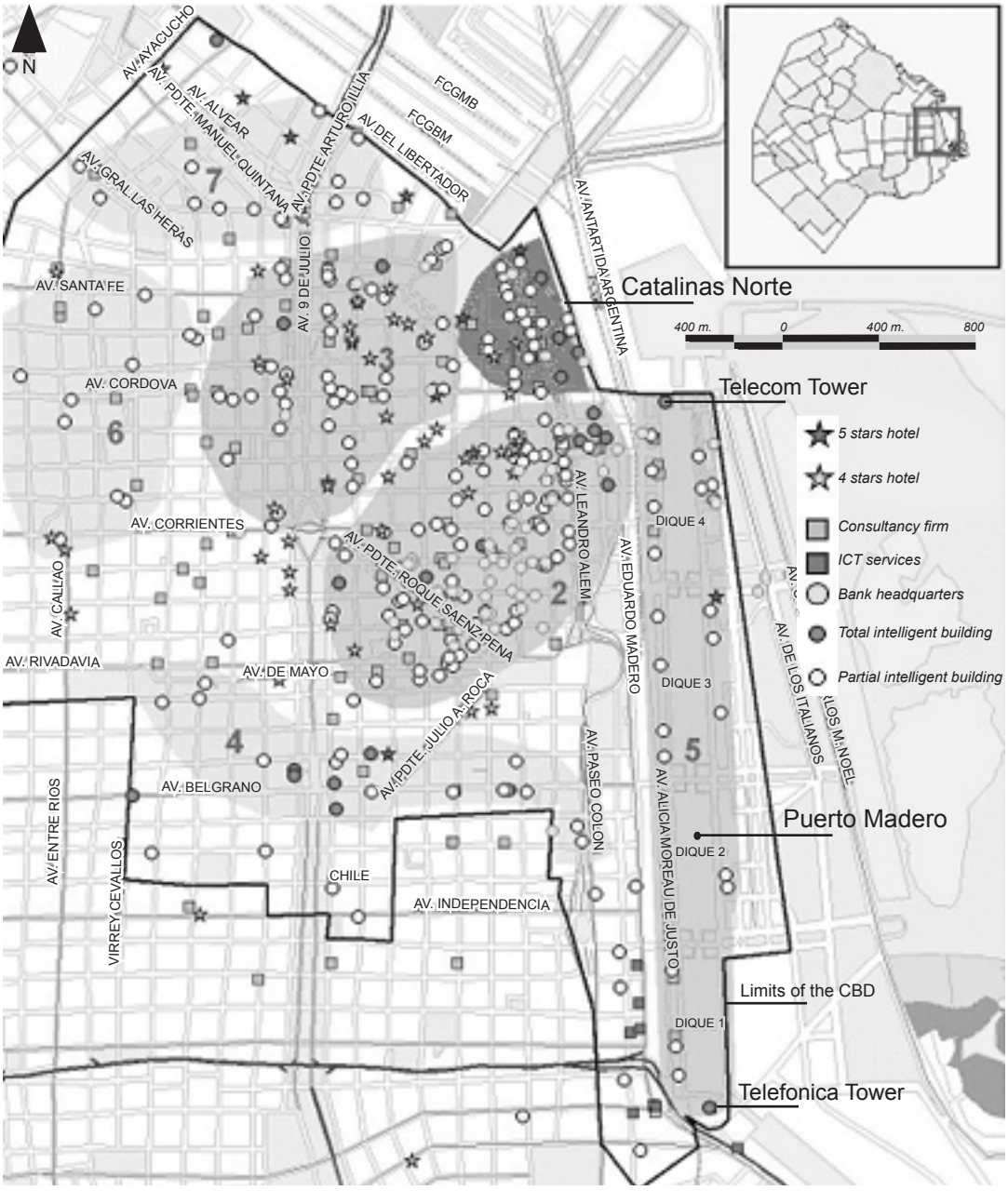


Figure 8.6. Expansion of Buenos Aires' CBD (Source: Cicolella and Lucioni, 2003).

The new towers in Catalinas Norte (Figure 8.7) and Puerto Madero (Figure 8.8), which concentrate most of the 'totally intelligent' buildings, have had an important role in reconfiguring the local urban landscape, giving these areas a global image which is recognised by the whole local population. In this new business architecture, global trends of building technology and architectural design are recognisable. The incorporation of ICTs, both for connectivity as for the management of all technical aspects of the building, is a crucial feature. In view of the little local experience with the new technological requirements, foreign architectural firms of global scope were called to design many of the new towers.

These (glass) towers are seats of large enterprises, consultancy firms, banks and hotels for the global corporate sector. Their precise location in the CBD can be seen in Figure 8.6, which makes a distinction between hotels, consultancy firms, banks headquarters and ICT service offices. Tourists and staff of these firms are the main users of the recreational facilities, bars and restaurants of Puerto Madero. Although officially Puerto Madero has become a new neighbourhood of Buenos Aires, it has not been appropriated as such by its population; it has rather become a prestige area, which has more of a 'global space' than of a local *barrio*.

Figure 8.8. The Catalinas Norte sector in 2003 (Source: Cicolella and Lucioni, 2003).

Figure 8.8. Puerto Madero (Source: Clarin, 2003).

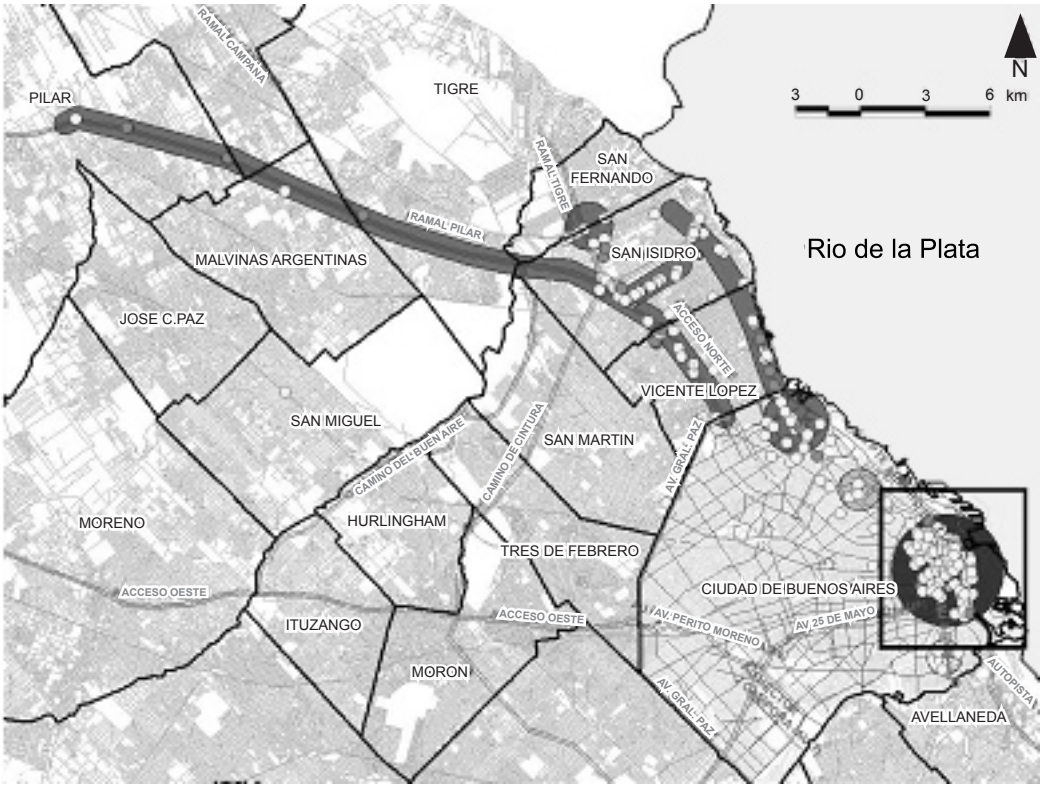


Figure 8.9. Expansion of Buenos Aires' CBD toward the North (Source: Cicolella and Lucioni, 2003).

Besides the transformations in the central business district, the new corporate and office buildings constructed along the infrastructure axis connecting the city of Buenos Aires (Recoleta) with the districts of San Isidro, Vicente López, Pilar and Tigre have constituted a corridor toward the north of the agglomeration, as shown in Figure 8.9.

The local economy

At Latin American level, the Argentinean economy has a good level of penetration of ICTs (U.S. Department of Commerce, 2001). But penetration levels are highly polarised, as Table 8.5 shows. The high connectivity levels of large firms are evidently very different from the ones observed in micro enterprises, which constitute the largest segment of the economy. Besides, the informal sector is growing fast during the last years, which works against further integration of ICTs in the local economy.

Size of firm	Number of firms	Access to Internet	Broadband	With own website
Large (+ 200 employees)	2.522	100%	88%	97%
Middle (50-200 employees)	17.000	98%	63%	64%
Small (4-50 employees)	128.000	89%	43%	39%
Micro (< 4 employees)	520.000	12%	8%	13%

Table 8.5. Penetration of Internet in the Argentinean economy in 2000 (Source: http://www.secom.gov.ar)

The private business sector, both national and foreign, saw a splendid opportunity to make profits from e-commerce in Argentina in the late 1990s. The main enthusiasts in this were precisely the telecommunications providers, who expected to make double profit: from traffic through their networks and from e-business. They engaged in a strategy to establish online businesses in relevant market niches. The example of successful global online retailers like Amazon served as inspiration. As well as promoting the establishment of dotcoms, the Internet boom in Buenos Aires during 1999 and early 2000 promoted the willingness of established brick and mortar enterprises to go online. Supermarkets, book shops, florists, toy shops, drugstores, and other retailers began operations during that period, but the path to e-commerce was also constrained at the consumer end by a lack of widespread credit card use and support.

The situation of e-commerce, especially B2C, was also highly influenced by the devaluation of the peso in December 2001, which, of course, affected all segments of the economy. This situation has increased the economic barriers for the diffusion of e-commerce. The prognoses of explosive growth of e-commerce proved to be very wrong. The percentage of Internet users who shop online declined sharply in the following months, the same as it was for all retailers in the city. The preference to buy foreign online products observed before the devaluation was reversed after December 2001 (see Figure 8.10). It was estimated that between ten and twenty percent of Internet users carried out online economic transactions in 2002, including the payment of services or purchase of online products. These tended to belong to the high-income sector and from the age group of 26-45 years old (Debattista, 2003).

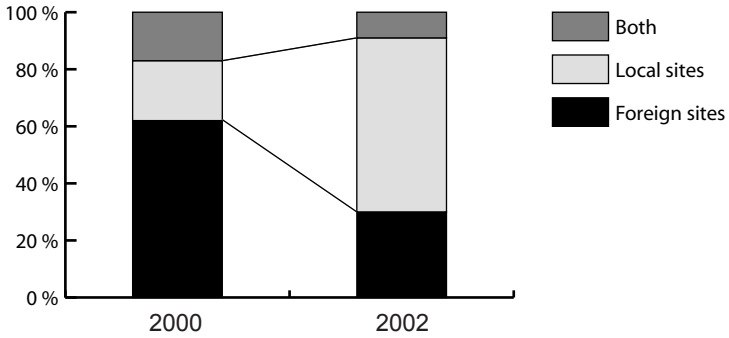


Figure 8.10. Origin of e-commerce purchases in Argentina, 2000 and 2002 (Source: Debattista, 2003).

However, there are no official statistics about the current size of the e-commerce market or the diffusion of these practices. The most recent figures are those from 2001, in which B2C amounted for US$ 65 million and B2B amounted for US$ 450 million (Secom, 2002).

On the other hand, the crisis also had unexpected consequences for the diffusion of online banking. The establishment of the financial '*corralito*', that prohibited Argentineans to withdraw money from their bank accounts, obliged people to make electronic transactions. *Business Week* reported on February 2002 that online transactions in Argentinean banks increased by 314% in December 2002. 1.9 million of the total 3.1 million Internet users were actively engaged in online banking activities (Prince, 2003).

ICTs and the government

Comparing with other Latin American governments, the Argentinean government was very supportive for the introduction of Internet, which was initiated in 1989 under the initiative of the

Ministry of Foreign Affairs. The previous year, the Secretariat of Science and Technique had signed an agreement with *ENTel* to get an international link with the purpose of providing email to the main public universities. In 1993 the Buenos Aires, La Plata and Cordoba universities got their own links to the Internet backbone (Clarín, 1996).

In June 1997, the government approved the Decree 554, declaring access to Internet to be of national interest and creating a Commission to begin activities for the promotion and diffusion of Internet and its applications (Davidziuk, 2002). After that, the government launched a succession of national programmes, some with relatively large funds. Despite the efforts, these programmes have not been effective enough to achieve their goals and produce sound results at national level. They reveal the contradictions, problems and inner struggles of the political class in Argentina, in the context of the strong political and economic instability which characterised the years around the turn of the century.

The first programme, *Argentina Internet para todos (Argentin@internet.todos)*, was established according to an agreement between the ITU and Secom (the Secretariat of Communications), a dependence of the Presidency of the Nation (which later became part of the Ministry of Economy, and more recently of the Ministry of Planning) (Barlaro, 2000). It was launched in 1998, during the Menem administration, with funds of US$ 22 million. Its main project was a network of *Centros Tecnológicos Comunitarios* (CTCs) for providing free Internet access to low-income people. After two years it had established 1350 CTCs in selected institutions (one third educational institutions, one third non-profit associations and one third public agencies) and endowed 1750 popular libraries with two to four computers. Despite these impressive figures, a survey made in 2000 showed that only 72% of them were open to the public, and 75% of them charged for their services (Davidziuk, 2003). [27]

The new President, De la Rua, instructed Secom to organise a new ICT programme days after he took office in December 1999. *The Programme for the Information Society* (PSI) (http://www.psi.gov.ar), to promote ICT in public administration, SMEs, the low-income population and education, was launched with great publicity during 2000. Table 8.6 shows the main projects and their target groups. Among the many projects that are part of this initiative are: *Educ.ar*, for education, *Cristal,* for e-government and transparency, *Civitas*, to promote e-government and digital cities, and *Argentina Digital*, a (US$ 1000 million) credit line to allow Argentineans to buy home computers (Barlaro, 2000).

	Government	SMEs	Low-income Population	Education
CTCs			■	■
ISIS	■			■
CIVITAS	■			
Telemedicina				■
Internet 2				■
Supercomputing				■
Nacion.ar	■			
IDEB (PBA)		■		
EDUC.AR	■			■

Table 8.6 Some of the public initiatives of the PSI in 2001, and their target groups (Source: González, 2002a).

Educ.ar was launched in 2000 with a donation of US$ 11.282.855 made by Martín Varsavsky, an Argentinean entrepreneur who gave one dollar per Argentinean student, with the intention of connecting all Argentinean schools (37 thousand) to Internet. The history of *Educ.ar* has not been successful regarding schools' access to the networks. Very few rural schools have been connected with this programme, while the city schools which are connected did not benefit from *Educ.ar*. Further, most of the funds have been spent in bureaucracy (Calvo, 2004). However, *Educ.ar* portal has gained importance and diffusion within schools, and its contents are among the best educational contents in the region (Proenza et al., 2003).

Despite the multitude of projects, there has not been a unified strategy to link ICT to Argentina's future development for all sectors of society. Different agencies have been struggling to be in charge of the public policies on the development of ICTs, in what seemed to be more a fight for political power than for the welfare of the country. Five different sectors have had different competencies regarding ICTs, which has lead to redundancies and deficiencies. 46 different public programmes to promote ICT use were identified in 2003 (Saconne and Rapetti, 2003).

In addition to the Secretariat of Communication, another public agency, the National Office of Information Technologies (ONTI), reporting to the Head of the Cabinet, is in charge of the diffusion of ICTs within the national public administration. ONTI created an official government portal. Further, the Secretariat of Science and Technology, reporting to of the Presidency of the Nation (currently of the Ministry of Education) launched another official government portal, *Nacion.ar.* (Saconne and Rapetti, 2003).

The Secretariat of Industry, responsible for hardware and software development is also involved in the topic. Finally, after the demands of the Chambers of Commerce who were aware of the fragmented efforts and internal political fights around the issue, the *ARGEN.TEC* agency was created in November 2002. This new agency, headed by the President, gathers all other Secretariats involved, plus private sector stakeholders: the Chamber of Informatics and Communications (CICOMRA), the Chamber of Software and Services (CESSI) and the Argentinean Chamber of Databases and Online Services (CABASE). This new programme has also received much local criticism since it is biased toward the commercial side and does not include representatives of the civil society (Saconne and Rapetti, 2003).

At local level the public efforts for e-government seem more successful. The Government of the City of Buenos Aires, established since 1996, runs a very user-friendly and comprehensive portal, with interactive maps and graphic information for tourists and residents, possibilities to make online requests and transactions, publication of its Strategic Plan, and information related to education, culture, health, environment, news, events, etc. The Digital Agenda of the Government of Buenos Aires includes initiatives for tele-medicine (linking hospitals in Buenos Aires for internal communication and for external consultations), for cultural applications (promoting the link of libraries to Internet), support to SMEs (basically providing information and training), public administration (implementing online services for citizens), and actions in the educational area (Mantovani, 2000).

The Secretariat of Education of the Government of the City of Buenos Aires has developed an initiative to link all schools to Internet, within the *Reporte* (*Red Porteña Telemática*) network. The final plan is to link all schools, students and teachers. There are 1100 schools in the Capital Federal, from primary level to secondary schools. Primary and adult schools will have a dial-up connection, but secondary, superior and artistic education will have high-speed connections and a local area network with up to fifteen connected computers. To lower the costs, a locally designed router UtutoR, and the *Ututo* free software are used in the schools linked to the *Reporte* network. In September 2003 there were 810 schools connected with email; 204 high-speed connections, 2905 email accounts in its server @buenosaires.esc.educ.ar and the

average of monthly visits to its portal (http://www.buenosaires.gov.ar/educacion/) amounted to sixty thousand (GCBA, 2004)

An evaluation report of e-government practices in Buenos Aires concludes that there is an incipient form of electronic administration, since ICTs are used in the public functioning, activities and procedures. 3.5 million certificates from the Civil Register of Buenos Aires can be requested by Internet and many other simple procedures can be initiated or executed completely online. However, in spite of the fact that ICTs are perceived as a medium for improving democratic practices, reducing bureaucracy and improving transparency, there are still shortcomings regarding its potential as a tool for attracting innovative enterprises, to help the growth of tourism, or to promote commerce. Further, they are not used to promote widespread citizen participation and consultation (Finquelievich et al., 2003).

8.4. Users and usage of ICTs in Buenos Aires

a) Buenos Aires' ICT users

If the modernisation and expansion of the telephone and backbone networks improved tele-density during the early and mid-1990s, the economic crisis in the country has evidently had negative consequences in the diffusion of ICTs in Buenos Aires. Since 2001 fixed telephony is decreasing, as it can be seen in Figure 8.11. In May 2003, the number of installed fixed lines was 7.670.800 (CNC, 2004), which means an average teledensity of 21.3 lines per 100 inhabitants.[28] The teledensity rates in Buenos Aires are higher than in the whole of the rest of the country. The complete Buenos Aires province enjoyed a teledensity of 25.5 in 2001, while the rate in the Capital Federal was more than double, climbing up to 63.4 (Prince, 2003).

At the same time mobile telephony grew steadily since 1994 when the prices went down due to increased competition. The growth was very high until the year 2000, and since then it also stagnates, not surprising in the context of the current economic crisis. Figure 8.11 illustrates the growth of both fixed and mobile telephony in Argentina since 1990.

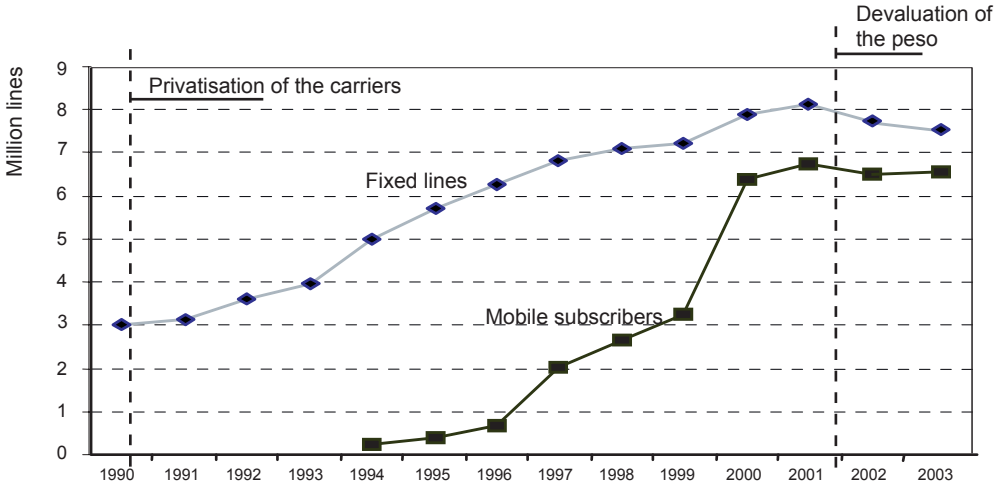


Figure 8.11. Evolution of fixed lines and mobile subscriptions in Argentina 1990-2003, in millions (Own elaboration with data from Prince, 2003, and CNC, 2004).

Cable TV diffusion in Argentina has traditionally been much more developed than in other Latin American countries, reaching more than fifty percent of households since 1995 (Barlaro, 2000). In 1999 there were 5.5 million households connected to cable TV networks, of the existing 9.5 million households in the country, which represented 43% of all cable subscribers in Latin America. A process of business concentration began in 1996, with the purpose of upgrading and digitising the networks to provide Internet access. *Cablevision* and *Multicanal*, which concentrate sixty percent of the market, began to offer cable modem access to Internet in 2000, although in 2000 there were still around six hundred local firms providing the cable TV services (CIT, 2000).

ICT diffusion in Argentina is highly concentrated in the capital city. Table 8.7 gives an indication of the levels of concentration of population, income, telephones, PCs and Internet users in four different regions of the Argentinean territory, the Northern, Central and Southern provinces and the Buenos Aires Metropolitan Area (AMBA). Inside the AMBA there is also a high concentration in the Capital Federal, as illustrated in Table 8.8.

Region	Inhabitants (thousands)	Per capita GDP (in US$)	Teledensity	Share of PCs stock	Share of Internet users
AMBA	13 755	10 636	33.14	46.57%	56.59%
PMP (Central provinces)	10 588	6 653	22.08	29.43%	25.11%
Patagonia (Southern provinces)	2 392	9 727	19.80	8%	6.10%
North (Northern provinces)	9 547	3 486	10.11	16%	12.2%
Total	36 027	7 510	22.9	100%	100%

Table 8.7 Regional differences in ICT diffusion in Argentina in December 2001 (Adapted from González, 2002a).

	Inhabitants (thousands)	Per capita GDP (in US$)	Fixed lines per 100 inh.	PCs per 100 inhabitants	Internet users per 100 inh.
Capital Federal	2 729	24 584.8	63.4	28.14	38.65
AMBA	13 755	7 100.8	25.5	10.27	10.08

Table 8.8. Metropolitan differences in ICT diffusion in Buenos Aires Metropolitan Area in 2001 (Source: Prince, 2002).

According to ITU officials, the main drivers of ICT use are a good network infrastructure, and a suitable knowledge as well as affordability levels of the potential users (Gray, 2003). Following this reasoning, Buenos Aires, whose population enjoys relatively high telephone penetration, high income and high education levels, has the best potential for the extensive use of ICTs in the Latin American region. Its competitive edge is also based on such cultural variables as its high media penetration, and newspaper readership, which prove to have a correspondence in ICT use (Gray, 2003).

It is no surprise that the commercial introduction of Internet in May 1995 produced a huge interest in the Argentinean society. A year after there were approximately 45,000 people and five hundred companies connected to the Internet. Additionally, there were 55 commercial ISPs and five academic servers functioning in Buenos Aires and 86 commercial and thirteen academic ISPs in the whole country (Clarín, 1996).

But, a faster Internet diffusion was hindered by the high prices of both telephone and Internet charges during the early years of Internet. At the end of 1998 there were 330 thousand users in Argentina, less than one percent of the total population of the country. In June 1999 the prices began to decrease and Internet connection was offered at US$ 10 per month. Some ISPs began to offer free Internet access. Further, the government forced the incumbent carriers to establish special tariffs for connection to the Internet with the 0610 lines, with a reduced tariff for a connection of more than fifteen minutes. This meant a twenty percent, on average, reduction of the charges for the telephone pulses (Barlaro, 2000). All these measures gave an impulse to the use of Internet: In March 2000 there were already one million users. Figure 8.12 shows the evolution of Internet users in Argentina since March 2000 until March 2004.

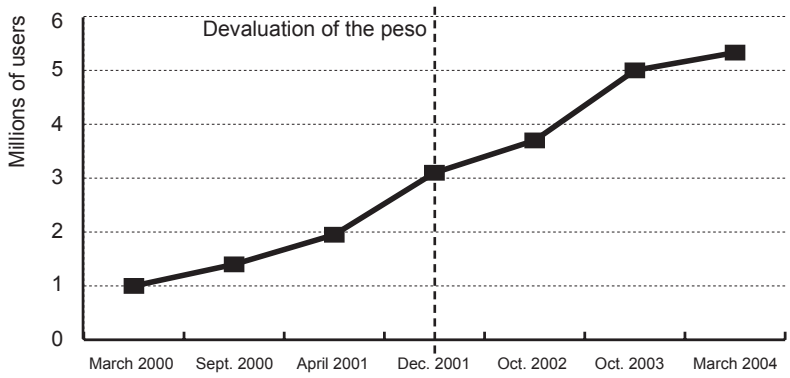


Figure 8.12. Evolution of Internet penetration in Argentina 2000-2004 (Source: Clarín, 2004).

The initial concentration of Internet use in Buenos Aires remained strong until the economic crisis hit the capital city. From the two million users measured in Argentina in June 2001 (Bilbao, 2001), 1,420,000 were living in the Buenos Aires Metropolitan Area. This represented 71% of total users. Figure 8.13 shows the basic geographic distribution in that date.

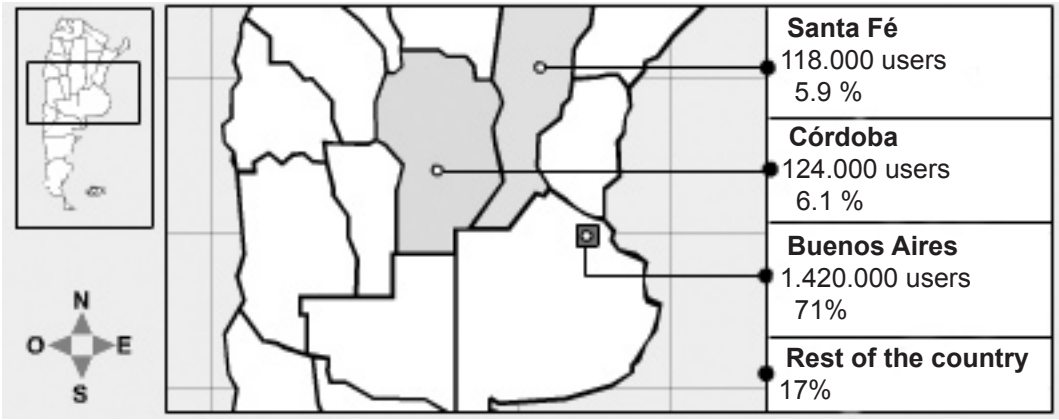


Figure 8.13. Geographic distribution of users in Argentina in June 2001 (Source: Bilbao, 2001)

Six months later, in December 2001, the concentration in Buenos Aires had decreased slightly from 71% to 67.8%. From the 3.1 million users in Argentina, 2.1 million were living in Buenos Aires Metropolitan Area (AMBA) and one million in the rest of the country (Clarín, 2002a), but

the situation changed completely after December 2001. The devaluation of the peso hit middle and low income households deeply and caused a large depression in the internal consumption. Lack of cash obliged people to reduce their daily expenses to the bare minimum. Despite the huge impact that the devaluation caused in all economic activities, and against the prognoses, Internet use continued growing in Argentina, although in Buenos Aires it suffered a severe drawback. Internet use decelerated its growth at the national level and shrank in Buenos Aires, remarkably changing the previous concentration of Internet use in Buenos Aires toward a more balanced national distribution in 2003.

If between April and December 2001 Internet usage grew by 54%, between December 2001 and October 2002 the growth accounted for only 14%. Further, while during that same period one million new users were counted outside Buenos Aires, inside it the growth was negative: half million people stopped using the Internet due to the high costs. This meant that in October 2002, from the 3.6 million users in Argentina, two million were living in the provinces and 1.6 million in Buenos Aires (*Clarín*, 2002c). Table 8.8 shows the evolution of the regional distribution of Internet use in Argentina between 2001 and 2003.

	April 2001		**December 2001**		**October 2002**		**October 2003**	
	Users (thous.)	% of pop.	Users (thous.)	% of pop.	Users (thous.)	% of pop.	Users (thous.)	% of pop.
AMBA	1400	10%	2100	15%	1600	14%	1700	15%
Rest of the country	500	2%	1000	4%	2000	8%	3200	13.8%
Total	1900	5%	3100	9%	3600	10%	4900	14%

Table 8.8 Evolution of Internet use in Argentina according to geographic area in the period April 2001-October 2003 (Own elaboration with data from *Clarín*, 2002c, D'Alessio IROL, 2003b).

With regard to the spatial distribution of Internet use inside Buenos Aires, the surveys showed no surprises. The best connected neighbourhoods were Palermo, Recoleta and Belgrano, the better-off neighbourhoods of Buenos Aires. According to a survey made by Sossen, these areas enjoyed almost double the number of connections than the rest of the city (*Clarín*, 2001). Table 8.9 shows the levels of Internet use in households in four different areas of the city.

City area and main neighbourhoods:	**Households with Internet access**
North Corridor: Palermo, Recoleta, Retiro and Belgrano	41%
Urban Residential[29]: Flores, Caballito, Villa del Parque and Villa Devoto	36%
Peripheral Residential: Floresta, Villa Luro, Agronomía, Chacarita and Paternal	29%
South Corridor: La Boca, Barracas, Nueva Pompeya and Villa Soldati	22%

Table 8.9 Levels of Internet access in households in four areas of Buenos Aires (Source: Clarín, 2001a).

Another consequence of the crisis was a visible increase in users connecting from public places. People decided not to buy a home computer, whose prices tripled in December 2001, in favour of accessing the Internet from a cybercafé, *locutorio*[30] or other public access points. The availability of high-speed network providers increased after November 2000, which was translated eventually in a greater availability of cybercafés. There were approximately one thousand *locutorios* with Internet access in Buenos Aires in December 2001 (*Clarín*, 2002b), while in December 2003 the Argentinean Chamber of *Locutorios* (CAL) reported two thousand

(Rueda, 2003). The competition among cybercafés promoted the reduction of prices per hour to attract more clients. In March 2001, they charged four pesos (then four US dollars), now they generally charge one peso (now 0.30 US dollars) (Rueda, 2003).

In view of the continued reduction in prices, the use of Internet in cybercafés increased hugely since 2001. From the total Internet users in Argentina, only two percent connected from cybercafés in 2000 (D'Alessio IROL, 2001), which increased to 19% in December 2001, and 37% in March 2004. Moreover, the growth of cybercafés explains most of the growth of Internet users during 2003-2004 (D'Alessio, 2004). The main places of access to Internet in March 2004 are shown in table 8.10.

	Percentage of the total
At home	62 %
At *locutorios* and cybercafés	37 %
At work	28 %
University	3 %

Table 8.10 Place of access to Internet in Argentina in March 2004 (Source: D'Alessio, 2004).

The presence of cybercafés has changed the urban landscape in those places where they settle. The former cinema street, *Lavalle*, is now a street with many cybercafés, where people can find thirteen of them in only three blocks. Other areas with high density of cybercafés are the *macro* and *micro* centres, *Once* and *Flores, Liniers, Villa del Parque* and *Caballito*, according to the CAL registers (Rueda, 2003). Cybercafés are not centrally organised, they are individual businesses. CAL estimates that seventy percent of cybercafés in Buenos Aires are family businesses, while the rest are the joint property of two or three persons.

Concerning the age of users, Argentina is one of the countries with the oldest Internet user population in Latin America. This seems linked to the demographic features of the country[31] and the high prices for digital connection. If in most countries of the region the youth is the largest group, in Argentina the largest age group has been traditionally the young adult population. The latest surveys show that this tendency is changing and that younger people are using Internet more often than before, while older age groups are relatively diminishing, as illustrated in Figure 8.14. In 2004, 33% of the total users are younger than 25, but this percentage is much lower than in most other cities of the region.

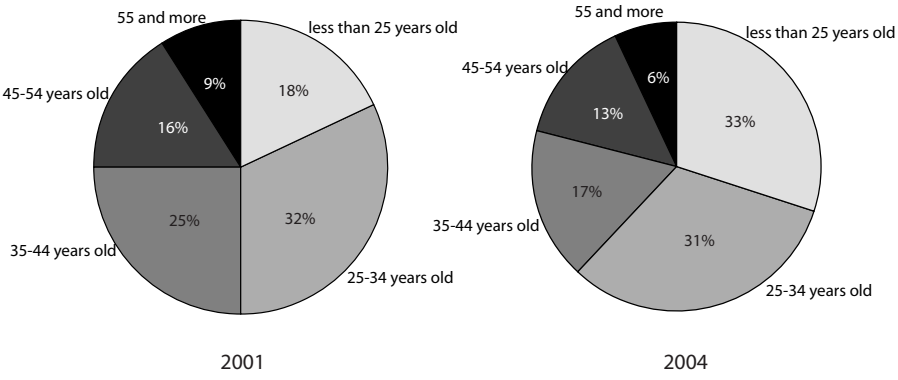


Figure 8.14 Internet use in different age groups, in 2001 and 2003 (Own elaboration with data from D'Alessio IROL, 2001 and D'Alessio 2004).

Regarding the participation of the different socio-economic sectors in the use of Internet, surveys and observations show that until 1998 Internet use was mainly a matter of educated men belonging to the high- and middle high-income sectors (ABC1), which only account for seven percent of the total population of Argentina (D'Alessio IROL, 2003a). But, the situation has changed since 1999, when the availability of cheaper PCs and the reduction of access charges produced an increase in Internet use and the representation of women and middle-income sectors (C2 and C3) became more visible than before. The diffusion of Internet use in high- and middle-income sectors continued until December 2001, while lower-income sectors began to attend public places to access Internet. After December 2001, the percentage of younger users increased and public places were more intensively visited. However, low-income citizens, accounting for 58% of the total population, have not increased their presence in the universe of Internet users after that date (D'Alessio IROL, 2003a), as figures suggest in Figure 8.15.

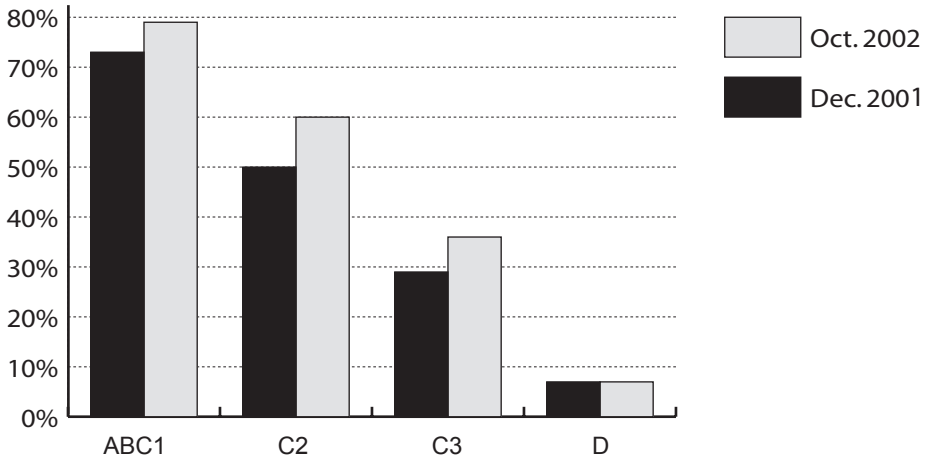


Figure 8.15 Internet penetration according to socio-economic sectors in Argentina in 2001 and 2002 (Source: D'Alessio IROL, 2002a)

b) ICT usage in Buenos Aires

Buenos Aires' Internet users are typically high and middle-income residents, who use the Net for email (92.5%) and to inform themselves (61.8%) as their primary motives. Chat and instant messaging is used by 27% of users, being more common with the new users (D'Alessio Irol, 2004b), but many other everyday life purposes have also been observed. In the early days of Internet in Argentina, surveys pointed out the success of B2C firms as online grocery stores and online newspapers. Online banking and electronic financial transactions have increased enormously since the financial *corralito* that prohibited Argentineans to withdraw their money from the bank.

Gradually, when users became more familiar with the new possibilities and applications, they began to engage in other kind of online activities. Newspaper articles often describe the latest online trends. Coming from a country of emigrants, many of these activities are linked to the family roots: looking for kin and (lost) relatives living outside the country, researching and preparing family trees, and searching for the origin of their family names. Other typical middle-class activities have also become popular: making plans and booking holidays, looking for a job in the net [32], communicating with relatives, friends and old schoolmates, communicating by

voice through Internet (voIP), preparing school homework, researching for academic purposes and engaging in virtual communities, and more recently, digital photography.

Recently, with the incorporation of young people in the use of Internet, an enormous popularity of online games has been observed in Buenos Aires, not only at home, but also in public places especially established for that purpose. At the same time, an increasing interaction between Internet and television programmes is also observed recently. TV channels, TV producers, TV programmes, especially soap-operas, and TV celebrities, have established their own websites to promote their products, which have become hugely popular among the youth. The link Internet-television is logical if we consider that Argentina has the first position in the ranking of television consumption in Latin America[33] (D'Alessio-IROL, 2004).

Sociologist Nora D'Alessio argues that the sustained growth of Internet use in times of deep economic recession, as it is seen in Buenos Aires, suggests that eagerness for information, the need for emotional support and changes in the socio-cultural habits - as an increased home-centeredness - play an important role in the sustained growth (Rueda, 2003). A 2004 survey showed that for 66% of users, Internet was the main way to inform themselves about the news. The hours connected to Internet by Argentinean users is higher than the world average, according to the same survey (*Clarín*, 2004).

Regarding younger Internet users Schmeichel (2002) has argued that their motives to get connected are quite heterogeneous. Their time and enthusiasm devoted to Internet varies widely, which also happens with their subjects of interest. They share, however, a common attitude that goes beyond their differences. For the online youth, the Net has expanded their possibilities in time and space, while it has made them conscious of their own capabilities as users. The Net is for them a new universe without frontiers.

Soon after the 2001 crisis, and in view of the online dynamic that it generated, Susana Finquelevich stated that Internet is now the engine of cultural change in the Argentinean society: Internet use is already deeply ingrained in the habits and everyday lives of middle income groups, which has already produced different bottom-up initiatives (Bilbao, 2002). Finquelievich (2002) supports her claims with research that she and her team at the Faculty of Social Sciences in the University of Buenos Aires have carried out to explore and document the gradual emergence of virtual communities in Buenos Aires. They assert that forty thousand community organisations, which constitute the 'third sector', are operating in online Argentina. They are not communities created in cyberspace with a specific goal; they are rather existing community organisations that go online, using ICTs as tools for their own goals.

From the two main types of community organisations (grassroots and support organisations), support organisations (as NGOs, and other non-profit institutions) are mostly located in Buenos Aires, close to the central public administration. These latter have been more actively using ICTs for their objectives than the grassroots organisations, in a proportion of three to one. This fact is explained by the higher availability of financial resources, of human resources, their links with international networks and their higher capacities for institutional management (Jara, 2000). Within grassroots organisations, the use of ICTs is correlated with their number of members and the number of demands and objectives that they seek to fulfil. The larger the organisation and the broader its objectives, the more digitally connected it is (Quintar et al., 2001).

The Alerta Plan in Saavedra

An ICT related urban initiative was organised in the Saavedra neighbourhood in Buenos Aires: the *Alerta* Plan for public safety, a local adaptation of the Neighbourhood Watch initiative from the United Kingdom. Saavedra is a middle- and low-income neighbourhood with a significant

representation of elderly people, which experienced a visible increase in criminality during the 1990s. A group of neighbours began to organise themselves since 1996 to work collectively in favour of public safety. They later proposed the *Alerta* Plan against urban violence and for crime prevention in their locality, which was approved by the Director of Crime Policy of the Ministry of Justice in 1997. [34]

Finquelievich et al. (2002) describe how the initiators of the Plan recognise the role of Internet in the inspiration of their actions, elaboration of the Plan, and for getting the indispensable political support to implement it. After a diagnosis of the situation and the awareness of the need of prevention and not only punishment strategies, the neighbours decided to set up the Plan. Part of the action was the conformation of a network that links and informs the members with the help of webpages, an electronic mail list (in Yahoo Groups), and email exchanges (Finquelievich et al., 2002). The neighbours are organised in blocks, and each block has at least one member connected to the large 'network' of different blocks. All members of the network contribute to the list and receive the emails. When there is something relevant, the network member prints it out and spreads it to the non-connected residents of the block. The *Alerta* Plan' success has inspired other neighbourhoods to adopt the same approach. [35]

ICTs' role in the December 2001 crisis.

Another highly significant bottom-up process related to the use of ICTs by 'new social movements' and political groups emerged during the deep political and economic crisis that Argentina experienced in late 2001 and 2002. The streets of Buenos Aires were the scene of protest rallies and manifestations against the economic measures and the established politicians that eventually contributed to the change of the President, for two consecutive terms. Spontaneous gatherings of angry neighbours[36] in corners and plazas of the city became 'neighbourhood assemblies', which emerged in the context of an institutional collapse of the nation and the search for direct democracy (Palomino and Pastrana, 2003).

During these events, Argentinean cyberspace emerged as a space for social protest for middle-class groups, first in an informal and fragmented way, later in more organised ways. Different social actors and social movements, such as NGOs, grassroots organisations, associations of unemployed people, alternative communication groups and neighbourhood organisations, joined in efforts to strengthen their political claims with the help of electronic means. Exchanging emails creating discussion forums and chat rooms, organising links among people with similar economic and financial problems, and organising solidarity actions for those most affected by the crisis became the most popular activities (Bilbao, 2002).

In view of the silence of the traditional media about the street events, ICTs networks and devices were used to inform and connect the people at local and global level. Self-organised neighbourhood assemblies and protest groups used Internet publishing, email lists, text messages and mobile phones to rapidly and efficiently organise these events and to inform their own public and the world. Internet fulfilled important roles for the political changes that would come some time after. Internet became the main way to become informed about the state of the political unrest. To follow the Argentinean crisis the international press used the news published in neighbourhood organisations websites as a source for their own articles (Bilbao, 2002).

Regarding communication, Internet became the preferred way to inform the public in real time about the location and time of the protest actions. Internet soon became an indispensable tool for the social protests. When the social explosion of 19th and 20th of December forced the resignation of President De la Rua, electronic communication grew explosively too. Neighbourhood assemblies, organised by existing neighbourhood groups first, and later by

recently created groups, became very active in cyberspace. This was because Internet use was very extensive among their participants, who mainly belonged to the middle-class. The discussions and agenda points generally emerged in cyberspace and were later taken to the weakly assemblies (Palomino and Pastrana, 2003). They also published their proposals and information in their own websites. "*Internet became for the middle-income sectors, its typical users, a fundamental organisation medium*" (Finquelievich, 2002: 4).

At the same time, different political online forums were opened to discuss and debate online about economy and politics in order to contribute to social change (Finquelievich, 2002). Local ICT researchers and activists became very enthusiastic about the new role of Internet in structuring the political protests and contributing to political awareness and the debate of ideas. Now, the political crisis has passed away, the economic situation is slowly improving, there are few street protests and the political effervescence has slowed. The role of Internet in political life is not as present and significant as it was during that critical period. However, ICTs usefulness for organising and articulating social networks has been proved.

8.5. Conclusions

At Latin American level, Buenos Aires is a city with great human and financial resources. These types of assets are generally conducive to a trouble-free development of ICTs. The government has been generally supportive to their development, the population is highly educated, the city has an established position in the global and regional circuits for capital, while it has relatively high levels of telephone and cable TV diffusion. However, the macro economic circumstances of Argentina (the economic recession and especially the financial default of the country since December 2001), global events (the collapse of the NASDAQ in the stock market and the burst of the dotcom business) and an ineffective telecommunications policy have had negative consequences for the local development of ICTs.

In the first layer of networks, the privatisation's deal granting a ten year period without competition to Telefónica and Telecom, has been a clear obstacle to the widespread diffusion of ICTs. Despite the positive effects in the modernisation of the networks, their oligopolist activities kept the prices for connection to the networks at very high levels until 1999. In that time a more favourable context began to operate due to the beginning of the elimination of their exclusive advantages, which was rapidly translated into a reduction of the telecommunication tariffs. The opening of the telecommunications sector in November 2000 has attracted new firms, which have multiplied the options for the provision of telecommunication services, but which mainly address the business and affluent niches of the market. Buenos Aires is a very important node of the network of digital backbones in Latin America, and the central node of Argentina, but this position only guarantees a variety of high-speed connections for those located in premium spaces of the city and who can pay (a high price) for them. The good level of international backbone connectivity has no further consequences for the home connectivity of the non-affluent residents, for which the access to the ICT networks is still too expensive.

The networks of production and consumption of ICTs have been the most damaged, both by the global collapse of the dotcom business in 2000 and the national economic crisis, especially after December 2001, which almost paralysed the economic activities of the country during the following months. Due to the first circumstance, the flourishing Buenos Aires content industries, which had already acquired an important place in Latin American cyberspace, were broken down and reduced to the minimum after a spectacular and auspicious growth. The main victims of the economic collapse of Argentina were the ICT hardware industries, which decayed deeply when the levels of expenditure in ICT equipment, whose costs tripled after December 2001, were reduced to the minimum. On the other hand, software industries and services have kept

on growing despite the contraction of internal consumption. An important advantage is the relatively high level of diffusion of ICTs in the local businesses, where email and Internet have become an integral part of the firms' communication and information practices.

The Argentinean Government declared Internet of national interest in 1997 and later developed a broad strategy to promote the use of ICTs. The actions mainly concerned access, education, health and government, but the different initiatives have been fragmented and disconnected among them. Despite the several projects and programmes and the large amount of resources involved, the results have been disappointing since the projects have not achieved the expected aims. The economic and political instability of the country, which had its main focus in Buenos Aires, has undoubtedly contributed to the meagre results. On the other hand, the Government of the city of Buenos Aires has developed interesting initiatives that have had a higher level of success - connecting schools and hospitals to the ICT networks. However, the jurisdiction of the Government of the city of Buenos Aires concerns only the Capital Federal and not the whole metropolitan area. Pirez (1994, 2000) has repeatedly argued the problems that this political division brings, which contributes to the aggravation of the existing socio-economic divide affecting the central and peripheral areas of Buenos Aires.

The use of ICT networks in everyday life is in Buenos Aires still mostly a matter of high- and middle- income residents. ICTs have been rapidly incorporated in the way of life of the elite and gradually to the middle class. However, changes associated with the introduction of global cultural patterns and global consumption are visible in all sectors, and especially in the youth. The public policies have not been effective in providing access to the poorer groups. The reduction of tariffs observed since 1999 and the increased availability of access to the networks in public places are benefiting mainly middle-income groups. Despite this great limitation, the use of Internet is largely recognised, and increasingly used, as a tool for individual and collective purposes in Buenos Aires.

Consequences for urban development

Even if economic fluctuations have been the norm in Argentina for many decades, the 2001-02 economic collapse was exceptional in its severity. The recession which followed left a torn social fabric and a changed urban life in Buenos Aires. Increased criminality, and the presence of beggars, '*piqueteros'* and '*cartoneros'* in the streets has become commonplace. The interactions with these new social actors generate social conflicts and insecurity. On the other hand, the increasing adoption of a 'global way of life' by cosmopolitan elite groups is being reinforced by the introduction and development of ICTs. The social and economic interactions made possible by ICTs at global level are helping to the detachment of elite groups from local concerns. These insecurity feelings, group detachment and obsession with security seem to be increasingly translating themselves into processes of socio-spatial fragmentation.

The role of local governments as mediators of power conflicts among the different urban actors has also been reduced in the new political-economic context. This withdrawal of the state apparatus from urban concerns is evidently favouring the more powerful groups, who have gained positions at the expense of the rest by privatising large portions of urban space. This is especially visible in those districts outside the *Capital Federal*, which do not belong to the Government of the City of Buenos Aires. Large private neighbourhoods and districts have been built: the typical 'fortified enclaves' which get most urban services in private arrangements.

On the economic scene, Buenos Aires has traditionally been, with Sao Paulo and Mexico City, a major centre for top-level management and coordination functions for global firms in Latin America. Because of its important regional role, the spatial transformations related to the expansion of the new logic of economic development promoted by the introduction and

development of ICTs have been more radical and visible than in other cities of the region, triggering a visible spatial reorganisation and modernisation of business structures that have great consequences in the architecture and urbanism of Buenos Aires, as well as the urban functioning of the city.

Regarding architecture and urbanism, this chapter has shown the location and number of 'intelligent' buildings and towers that have changed Buenos Aires' urban landscape and image in less than a decade. Cicolella and Lucioni (2003) have already identified the crucial role of ICTs within the corporate sector, and how their diffusion and application into (advanced) managerial logics have brought clear consequences in the real estate sector, which in turn have led to the extension of the CBD area and the formation of an urban corridor of office space toward the north of the agglomeration. In this process, globally-oriented, foreign and corporate capital and firms have gained a crucial role in local urban matters.

The extent of the recent urban developments in Buenos Aires is remarkable. They have fundamentally changed its traditional ways of urban development, valid since the 1880s, when Buenos Aires developed as the first commercial and industrial metropolis of Latin America. This process is not only producing spatial changes as a result of the new modes of organisation of the economy – intelligent buildings, corporate architecture and new commercial and financial nodes – but, more importantly, it is changing the pattern of urban growth. If until recently, contiguity and rapid accessibility to the cultural and commercial facilities used to be a key consideration for the elite residential choices, their process of 'late suburbanisation'[37] (Pírez, 2000) in fortified enclaves located along the new infrastructural networks gives evidence of a great socio-cultural break. [38] The decreasing relevance granted to physical contiguity and accessibility by the elite also suggests the new possibilities for virtual interaction that the diffusion of ICTs is providing. As Caldeira (2000) remarks, these radical changes to the built environment have many similarities to what is happening in other Latin America cities and even in Los Angeles, indicating that the causes of these transformations do not exclusively have a local origin.

Further, the institutionalisation of market-oriented policies as the only way to provide ICT access to the public is contributing to the intensification of the socio-economic contradictions by providing elite groups a formidable weapon to improve their powerful position in the society, while restricting the poorest groups' access to them. In this way, the economic situation penalises the poorest groups in two ways: by shrinking their meagre incomes and by increasing their vulnerabilities by depriving them of basic information and communication services.

On the other hand, residents of Buenos Aires are gradually beginning to use the new technologies for achieving their own purposes within the urban scene. The familiarity of middle-income groups with ICT use is increasing the opportunities for people to do things differently. These range from starting up new electronic businesses, creating virtual communities to expose and defend their interests, to organising people and groups from the bottom-up, as the experiences of the Saavedra neighbourhood and the political events after December 2001 have shown. Despite these and other interesting advances of the collective use of ICTs, the fact that the use of ICTs is limited to middle-class groups is something to worry about. The threats that the exclusion of poor groups from the ICT networks pose to the sustainability of Buenos Aires are considerable, beginning with the deepening of the process of urban development at different tempos.

The results of changed social interactions and the increased socio-economic polarisation of the city can be observed in the built environment of Buenos Aires. Once an open, fairly homogenous and dense city, Buenos Aires is now increasingly segregated, fragmented and dispersed. Urban fragmentation is changing the traditional urban morphology centred in the *Capital Federal*. Buenos Aires' new developments are rapidly expanding over the metropolitan borders, mainly toward the northern districts, consuming large extensions of land. Urban policy has been so

far ineffective in stopping the process of privatisation of urban space in the new suburban areas. The absence of policies and measures to correct urban fragmentation and socio-spatial polarisation is promoting the consolidation of a process of 'splintering urbanism'.

In this complex urban scene, ICTs are rather reinforcing than counter-balancing the negative urban trends. The context of the telecommunications sector and the national telecommunications policy are directly or indirectly contributing to the process of splintering urbanism that affects Buenos Aires. The fact that ICT use remains in the hands of the elite and middle-class constitutes another obstacle against urban integration.

If the recent trends toward the recovery of the Argentinean economy are maintained, the prospects of Buenos Aires will likely improve in the economic field. The city should then grab the new economic opportunities to extend them for a strategy of sustainable urban development to benefit all sectors. If no significant changes are implemented regarding both urban and telecommunications policies at the level of the whole metropolis, the prospects for overcoming the undemocratic trends that characterise Buenos Aires' recent urban development will remain weak.

Notes

[1] Latin Americans consider America, the continent which Columbus discovered in 1492, as a single continent. U.S. Americans have imposed to the world their vision of several 'Americas'.

[2] In the City of Buenos Aires, one out of five residents older than 25 years old has completed university education (GCBA, 2003)

[3] The population of Buenos Aires consists primarily of people of Spanish and Italian descent, although there are significant communities of people with Jewish, Arab and Armenian origins. A small percentage (1%) are of indigenous descent.

[4] Tango was popularised by Carlos Gardel, who became the first Latin American singer of world-fame. His records and films made him a huge celebrity in Latin America. His death in a plane accident in Colombia at the peak of his fame in 1935 made him a legendary figure.

[5] Jorge Luis Borges was a prominent member of this generation.

[6] Sarlo has also pointed out how during this exceptional period technology became a crucial element of (the modern dreams of) the Argentinean culture. She argues that if for the elite technology was used as a tool to spread a modern way of life in the city, the working poor were attracted by its symbolic value. For the popular sectors, technology embodied special hopes for the future: a way to improve their chances for success in the modern world. The modern dreams of rich and poor were then united by technology (Masiello, 1999).

[7] The Buenos Aires of 1887, occupying an area of 200 thousand square meters, was declared Federal Capital (GCBA, 2001).

[8] The average annual population growth rate in Argentina during 1950-1970 was 1.7%, while the average for Latin America in the same period was 2.7% (Altimir and Beccaria, 1999).

[9] The 'dirty war' was executed according to a deliberate strategy for the eradication of left-wing groups, the 'Condor Plan', carried out by Argentina and other South American dictatorships in Chile, Paraguay, Bolivia, Uruguay and Brazil. The plan followed the 'National Security Doctrine', propagated in the Latin American militaries by the infamous School of the Americas and US Military Academies.

[10] The urban processes that Caldeira (2000:250) describes for São Paulo, in which "…*the most dynamic and most precarious poles of the economy expand simultaneously, provoking sharper patterns of social inequality*", also apply for Buenos Aires during this period.

[11] In 2002 it was estimated between 70 and 100 thousand persons were collecting from garbage in Buenos Aires Metropolitan Area (UNDP, 2002)

[12] INDEC's calculation for monthly food expenses of a family of four members is 252.60 pesos. Those under that limit are considered in extreme poverty.

[13] '*Countries*' is the local abbreviation of country clubs, a type of private neighbourhood characterised by large grounds and rural lanscape. They have been used in Argentina since the 1930s, as weekend and holiday residences. They multiplied in the 1970s, but the real boom was during the 1990s, when they turned into permanent housing for the elite and upper middle-class.

[14] The Argentinean state received US$ 983 million for sixty percent of the firm in 1990. Ten percent stayed in hands of the workers and thirty percent stayed in hands of the state which sold its share in the firms in 1992, for approximately US$ 2.000 million (Castro and Petraglia, 2002).

[15] Among them, *AT&T Argentina*, *Compañía de Teléfonos Integrales*, *Compañía de Teléfonos del Plata* (owned by *Bell South and Motorola), Teleglobe* (bought by *Netizen* in 2002), *Diveo Argentina (bought by Netizen in 2002), Impsat, Techtel,* and others.

[16] The source of the information in this paragraph is the websites of the firms referred to.

[17] The consolidation of *Telefónica* as a dominant actor in the telecommunications sector in Argentina is not only limited to the provision of telecommunications. *Telefónica* has also followed an aggressive campaign

to diversify its lines of businesses, especially those linked to e-commerce and media (Rozas, 2003).

[18] If until December 2001 one Argentinean peso equalled one US dollar, the currency exchange is now 2.9 pesos per dollar (February 2004)

[19] In the Capital Federal only, there are 94 theatres, 162 movie houses, 36 museums and 90 libraries (GCBA, 2003).

[20] Argentina's locally produced programmes compete with foreign productions, and some are successfully exported to the Latin American market The most popular genres include variety shows, sitcoms, soap operas, sports and children's programs.

[21] In view of the great interest of readers in Internet matters, *Clarín* began to publish its *Suplemento Informatica* each Wednesday in 1996. It had such a success that the sale of *Clarín* on Wednesdays increased greatly. *La Nacion* and *Pagina/12* followed with supplements on Mondays and Saturdays, respectively (Finquelievich, 2000).

[22] The *Clarín* Group, which was founded fifty years ago, has enterprises in the graphic press such (as *Clarín*, the largest newspaper), multimedia (radio, TV, film production, sports), cable TV, mobile telephony and Internet service provision, portal (*Ciudad Internet*), online newspapers (*Clarín, La Razon* and *Ole*), and e-businesses sectors, covering all important recently opened market niches (Grupo C*larín*, 2004).

[23] *Admira* has a strong weight in Argentina's television broadcasting, as it fully owns *Telefe*, the first television channel (with an audience of 39%) and has fifty percent of *cadena Azul*, the third one. It is also highly present in radio broadcasting, fully owning *Radio Continental*, the first FM chain and third AM chain. *Admira* is also a strong weight in multimedia production and broadcasting since the Dutch company *Endemol,* a world player, is by far the most important company in the *Admira* conglomerate (Boki, 2002).

[24] However, there are no official reports on the size and characteristics of the content industries in Buenos Aires.

[25] Disco is a supermarket chain in Buenos Aires and AltoCity is the virtual shop of Alto Palermo Shopping, owned by *Telefónica*.

[26] Cicolella and Lucioni (2003) distinguish between total and partial intelligent building. The last are those traditional buildings that have been adapted and wired with ICT networks during the 1990s.

[27] The programme has received much local criticism, since the allocation of the CTCs was decided politically according to the wishes of the Secom functionaries, which resulted in favoured and disfavoured institutions and regions (Barlaro, 2000). Further, due to the successive political and financial changes of the Secretary of Communication, the state support (basically training of the staff, and telephone and Internet connectivity) was limited or broken soon after the installation of the equipment. This resulted in the disconnection of 50% of the CTCs in 2002 (Davidziuk, 2003).

[28] According to its per capita GDP, Argentina should have an approximate fixed line teledensity of 35, but due to the increased income inequality and high prices, teledensity only reaches 20 (Barlaro, 2000).

[29] In this context residential has the meaning of middle-class.

[30] *Locutorios* are places with several telephone booths which are very popular in Buenos Aires. In the recent years they have extended their business into computers with Internet connection.

[31] Argentina had an early demographic transition process, it is highly urbanised and its growth rate is much lower than in most other Latin American countries.

[32] During the first two quarters of 2003, more than 217 thousand persons looked for a job through Internet in Argentina, according to a study made by Bumeran.

[33] They dedicate an average of five hours and nineteen minutes per day to watching TV. Brazil, Chile, Colombia, Paraguay and Peru follow in the ranking (D'Alessio-IROL, 2004).

[34] See http://www.planalerta.gov.ar

[35] See http://members.tripod.com/planalerta

[36] The most used slogan, "*que se vayan todos*" (kick them all out), clearly expresses people's disappointment with the political class.

[37] Pírez calls it 'late' suburbanisation in comparison with other Latin American cities. Buenos Aires' elite traditionally had a strong preference for living in the central areas of the city .

[38] Caldeira (2000) has thoroughly studied this same process in São Paulo and concludes that the desire of the elite to escape from the city's nuisances is present in societies undergoing significant transformations.

Part V.

Conclusions and recommendations

Chapter 9.
Conclusions and recommendations

During the last decade ICT networks and applications have become markedly present in the Latin American metropolises, producing visible and invisible urban transformations. Cities are now functioning within a different political, economic and technological context, a fact which has produced huge transformations in the urban landscape and urban life. The motivation of this thesis has been to answer fundamental question about the nature and depth of ICT-related transformations, which have remained unanswered until now.

After critically reviewing the main theoretical approaches to the relationship between ICTs and cites, and providing the background of the Latin American urban scene, this thesis has explored and analysed ICT-related transformations in a broad and comprehensive way, addressing the infrastructural, economic and social aspects of the topic. To get a more precise understanding of the workings of ICTs in the urban scene, an exploration and examination of the recent developments at a closer view has been carried out for Lima and Buenos Aires. This chapter completes the research by providing the answers to the questions that guided the research process.

The first section of this chapter presents the main conclusions of the research regarding the seven main questions posed in the first chapter. It also presents conclusions regarding the developments of ICTs in Buenos Aires and Lima. The second section provides recommendations for urban planning in Latin America. The third section suggests directions for future research from the perspective of urban ICT studies and urban planning. The last section comprises a set of concluding remarks.

9.1. Main conclusions

(1) Regarding the ICT infrastructural networks in Latin America

Chapter 4 has opened the 'black box' of the digital backbone network in Latin America, pointing out the main issues related to its deployment and development. It has identified transformations related to the modernisation, massive deployment and overlapping of ICT networks in the city locations and their interconnection with global networks.

During the 1990s, the processes of privatisation and deregulation of the telecommunications sector have led to huge transformations in the infrastructure level. The changes mainly refer to those who are the operators of the networks and to the nature of the networks. Telecommunication networks have passed from public to private ownership and from one dominant segment (fixed telephony) to many diversified segments. Even, if fixed telephony's share in the structure of the sector is reducing, its networks still constitute the basic network for digital traffic, which gives

the operators a strategic advantage. The new operators in fixed telephony are large global firms of foreign origin, who use their control of the networks to extend their business advantages to other businesses and segments as much as they can. They generally operate in alliances with large global media conglomerates to gain influence over the content production sector. Some of these telecommunications firms have acquired so much power that they have, in several cases, become the companies with the largest revenues at national level. Local civil society initiatives have emerged to limit the profits and advantages of these companies

The major metropolises constitute the main nodes of the Latin American Internet backbone. São Paulo and Buenos Aires are developing as intra-regional hubs, while Miami is the major hub when considering the larger picture. Miami functions as a digital gate between the powerful US backbones and the Latin American networks; all major metropolises have direct links with Miami, which concentrates many digital facilities. At macro level, the results show that the current architecture of the global networks is reinforcing the traditional primacy of cities in the region. The analysis of the present topology of the backbones shows the increased importance of the size and location of the nodes: large cities located at the coast are the most important telecommunications nodes. The case of Mexico is very different from the other countries; the proximity to the US has promoted a different network configuration that links the large cities, and, especially those located in the northern part of its territory, to the US backbones.

Since 2001, when submarine rings of optic fibre surrounding South America began to operate, satellite connections are no longer the main way to connect to the US backbones. This has greatly improved the capacity of the backbones, while the dependency on the US networks has begun to decrease. There is now abundant and cheap backbone capacity in the metropolitan nodes that connect directly to the powerful backbone rings. However, the increased availability and low price of bandwidth is not equally benefiting cities located beyond the main nodes. The deployment of digital networks is not executed at the same speed from 'inside out' as from 'outside in'.

At urban level, large foreign telecommunications firms are in firm control of the networks. The advocated 'free competition', which would decrease the prices of telecommunications services, is not present. The modernised telephone networks exhibit a basic coverage within the cities, which allows access to fixed telephony and Internet in most areas of the city. This is evidently a major asset for the metropolises. However, there is a high differentiation concerning more sophisticated services, evidently linked to the commercial orientation of the operators. Areas of low demand do not generally have access to cable TV, ADSL or fibre-optic networks. On the other side of the spectrum, commercial and financial centres are the most privileged spaces in terms of speed, variety and quality of networks and connections. High-income residential areas and commercial districts are also well served, even if they are located in the periphery.

The general balance of the technical situation in the ICT network infrastructure is satisfactory for the metropolises, which are, by far, the best connected locations of Latin America. They have the fastest and cheapest connections and they concentrate the digital facilities that are required for the most advanced sectors of the economy. Following Townsend's analogy between the industrial and information economies, it can be stated that the indispensable infrastructure for the information society – information highways (the backbones), information ports (Network Access Points), information warehouses (data centres) - is already in place in the metropolises. The problem lies with the operators: the new infrastructure is not there for everyone, but only for those who can pay the (high) prices that the operators demand for it.

(2) Regarding the networks of production and consumption of ICTs

Chapter 5 has shown that the situation of production and consumption of ICTs in Latin America's urban economies is far from optimistic. Economic instability and technological weaknesses of

the region play a decisive role in its difficulties for the insertion of most of the cities in the global networks of innovation and of international commerce. Despite the structural changes and the attraction of foreign direct investment, the 1990s have represented a decline of Latin America's share in the international market. This, in turn has produced a slow development of the local Internet economy.

Experts in the field state that innovation is the Achilles heel of the global insertion of Latin America. Despite a relatively good level of human resources in the metropolises, the research and development sector is very limited, having been reduced in several advanced sectors due to the reforms of the 1990s. While bulk of the control and production of ICT networks is in the hands of foreign corporations, the metropolises are developing few local ICT, high-technology or knowledge-based industries. The necessary synergy between universities, government and private sector to promote innovation hardly exists, with the excepction of Brazil, and is not sufficiently encouraged, while research and development expenditures are very low. There are no available funds to finance new start-ups or to finance the expansion of successful firms. This situation does not offer a base for starting-up the virtuous circle of innovation, growth and capital accumulation/investment, indispensable in getting connected to the global networks of production, commerce and innovation.

There are also tremendous differences in terms of innovation, high-technology and knowledge industries among the countries of the region. Technological innovation is a key-dimension of long-term growth, but Latin American economies have not been keen on long-term policies. Brazil is an exception, and stands out as a remarkable example of government long-term promotion of (high-) technology and innovation. Mexico is the best performer regarding the export of high-technology products since its incorporation in the NAFTA Treaty of Free Trade. The size and nature of the ICT industries and the ICT sector is also very variable: Mexico and Brazil have chances as technology and hardware producers and exporters, but the opportunities for other large countries are mainly centred in the software and services industries. Smaller countries generally have a double burden; while they have a low competitive edge due to a small internal market, they usually have less governmental support or promotion for science and technology.

The flows of cultural symbols and goods that pass through the ICT networks are mainly a product of foreign origin. The supremacy of US firms for the production of online, music, entertainment or TV content is abundantly clear. However, ICT networks and cable TV are promoting a more extensive exchange of flows between the countries of the region. Brazil and Mexico have the largest and more sophisticated media industries and have traditionally had a significant cultural production that covers the whole region. Cable TV and Internet are also increasingly distributing content created in Argentina, Chile, Colombia, Venezuela and Peru. Smaller countries are hardly present as producers, but are mainly the consumers. Awareness of the enormous significance of this segment to influence public opinion has produced strategic alliances between large telecommunications firms and global media conglomerates for the control of content, a process that is clearly observed in the region, especially in the industries around Telefónica. Further, traditional newspapers have entered with great success to the local online business.

Looking at ICT business consumption, ICTs are used intensively only by a small portion of the urban economy. This segment has modernised their business activities and office spaces, providing them with specialised software and high-speed ICT connectivity, a process especially visible in the specialized 'high-level' and internationally oriented business sector, linked to finance, banking, advertisement, accountancy and legal services. Although the size and depth of these global oriented firms in the local economy differs greatly from city to city, most of the

Latin American Central Business Districts (CBDs) have experienced great changes in these sectors, leading to expansions and spatial transformations. Even if most formal firms have access to ICTs, small, micro and informal enterprises, representing a great portion of the total economy, have greater difficulties to modernise and integrate ICTs into their business activities to make them more productive.

The overall situation at this level of ICT production and consumption networks in the urban economy is worrying. If the information highways, ports and warehouses are in place, the 'information factories' are still too few and they are not growing at acceptable levels. There is little investment and promotion for the establishment of new information factories. Hardware, software and contents are mainly produced outside the region and the use and diffusion of ICTs in the local economy is developing at a slow tempo. Latin America lacks several of the necessary elements that sustain innovation within contemporary capitalism, as investment and links with universities and research institutes. Lack of innovation, growth and investment produces a vicious circle that retards ICT development. This situation is a huge shortcoming for a sustainable urban development of the Latin American metropolises.

(3) Regarding the diffusion of ICTs in everyday life

Chapter 6 has documented the diffusion and use of ICTs for the purposes of everyday life in the different socio-economic groups, identifying the trends related to the nature and depth of the digital inequalities. The introduction and development of ICTs in Latin America represent for its residents a significant leap in their possibilities to communicate with each other and with the rest of the world. If before the 1990s it was difficult and expensive to get a fixed telephone line, the reforms have made basic services of fixed and mobile telephony, and Internet widely available in the metropolises. The problem that remains is the high price for the services. People are, however, very enthusiastic about the use of ICTs and are using an increasing part of their income to their telecommunications demands.

Thanks to ICTs, Latin Americans communicate with each other and with the rest of the world much frequently and extensively than before. Those who cannot afford home connections are connecting from collective facilities, which are increasingly available in the cities. The strong demand for ICT connectivity from all sectors of society is illustrated by the high per-income availability of ICTs, the growth of Internet use even in the middle of a deep economic crisis, as in Argentina, or the use of Internet by groups affected by poverty, as in Lima.

There are two main profiles of ICT users. For the elite and high-middle class, the new technologies have rapidly become part of their work and daily life. They are more experienced and sophisticated users, who have enthusiastically embraced ICTs as a means for improving the comfort, security and autonomy of their everyday life, using them for rapid communication, information, entertainment, coordination and the individual management of their activities in space and time.

The ICT profile for lower-income users is very different since they do not have a computer at home. These are mainly young people and students whose use of computers and Internet is more recent and less frequent. Access to ICT networks, however, constitutes a crucial asset for improving their standard of living, since computers and Internet provide a series of basic services and functions that are generally lacking in the informal neighbourhoods of Latin American cities, as post offices, libraries, recreation facilities, study places, youth centres, information centres, among others. The introduction of ICTs in everyday life, then, has a very different significance in the lives of the different population groups.

Significant transformations are observed in the social and cultural scene, linked to the capacities of ICTs as carrier of cultural flows. The common (Spanish) language has increased the intensity of online cultural flows inside the region, placing (young) Latin Americans closer to each other, and favouring relationships with people from other countries of the region, some of which end up in marriage. Transcultural flows allowed by global electronic communication, as the apparently un-productive online chat, are slowly, but surely influencing identity building, opinions and beliefs, especially in youth groups, the most frequent consumers of cultural goods. Online chat, participation in transnational communities, consumption of both global and local cultural flows by Internet, radio and television, etc., are promoting the transcendence of locally-grounded identities and habits.

The strong demand for connectivity suggests the significant symbolic value that people attach to ICTs, a fact which has been verified by the few local studies that have investigated these matters. The link between ICTs and modernity is patent. As Sarlo (1992) has explained for Argentina, in the early twentieth century technological advances triggered great hopes for the future in a modern city; in the early twenty-first century ICTs have generated similar dreams of personal progress and citizenship within the masses. Internet constitutes, therefore, a symbolic vehicle toward individual freedom and modernity.

In the context of the problematical situation of Latin American youth – which is more educated, better informed and more media-oriented than the previous generation, and at the same time has fewer chances to get a decent job - access to computers and Internet represents one of the few assets that young people have to change their life chances; it represents an open window toward the global way of life. Unlike broadcasting media, ICTs provide real possibilities to interact at global level. Currently, this is more a possibility than a reality, but the fact that this new resource is available does provide people with hope for future personal success. At the same time, while ICTs provide entertainment, information and cheap communication, they are providing hope for the future, especially for the youth.

As several local thinkers about urban culture in Latin America have explained, electronic media sends cultural flows that have greatly modified cultural habits and consumption strategies in the Latin American urban society over the last two decades. They have not only transformed everyday life in the large cities; they have also been an important element of the shifts regarding political behaviour. The notion of citizenship has been deeply transformed, from participation in political processes toward citizenship as consumption of material and cultural goods that symbolise and provide a certain quality of life. For the population, inclusion or exclusion from ICT connectivity has become then a crucial factor for the exercise of citizenship.

The results of the exploration of the three levels reveal that while the information infrastructure for the information society is already in place, there is a great shortage of ‘information factories’ in the Latin American metropolises. ‘Information workers’ are, however, eager to participate in the information society.

(4) Main ICT-related transformations in the functioning of the city

ICT-related transformations are evidently occurring in most aspects of urban life. Beginning with the urban economy, these changes are promoting a kind of development ‘at multiple speeds’. Not completely industrialised, Latin American urban economies still maintain great part of their activities in the informal sector. In this context, the new economic logic superimposes, but does not cancel the previous ones. The spatial dynamics of the informational (‘post-modern’) city, the industrial (‘modern’) city and the informal (‘pre-modern’) city are currently present, combined

and intertwined in the urban development of the Latin American metropolises. In this way, ICTs are raising the levels of complexity of Latin American metropolises to new thresholds.

Local urban economies have rapidly adopted ICTs for their business communications, but the transformation of their business activities to increase productivity and efficiency is developing at a much slower tempo. The restructuring of the urban economies to integrate themselves into the new global order is not progressing well; there is an alarming shortage of 'information factories' at local level. The cities are lagging behind regarding scientific education, research and development and technological innovation. To overcome this impasse it is indispensable that their model of economic growth is revisited and redefined.

The most salient ICT-related transformations in Latin American metropolises then are coming from the social and cultural domains. Latin American cities are following a different path towards ICT connectivity in comparison to the cities of the developed world. The main difference lies in the direction of the changes: unlike the evolution of ICTs in the countries of the global North, the drive to network connectivity is less an economic phenomenon; it is basically a social and cultural phenomenon

Although ICT use is still concentrated in the most affluent sectors, the eagerness of most sectors of society to get connected to the ICT networks is increasing the number of people connecting from collective places in most metropolises, and especially in those locations where home access is too expensive for most people. ICTs are generating social trends that are producing remarkable transformations in the socio-cultural scene of the cities. The increased use and familiarity with ICTs can be observed in the new functions, social actors and processes that have emerged, which affirm their presence in the city from bottom up.

In a local context of increased social conflicts, criminality and feelings of insecurity, ICT networks are creating and reinforcing social and economic links at global level, promoting the rise of a cosmopolitan elite, which shows itself to be socially detached from the city and its collective concerns. This social detachment is not a new phenomenon in the Latin American urban scene, but it has recently acquired deeper levels which have been translated into spatial processes.

Urban Latin America is a significant consumer of global cultural flows, but it is not advantageously integrated to global economic flows, a fact which is producing increasing urban conflicts. Latin American cultural studies have asserted that the ubiquitous flows of information channelled through electronic media, radio, TV and Internet, have promoted a 'global way of life' and raised expectations regarding material well-being and patterns of consumption. The increased access to information and communication, however, is not in balance with a real increase in material prosperity. On the contrary, economic globalisation has mostly produced negative results in the local urban economies, bringing about employment instability and exclusion from work, which has been translated into poverty and economic polarisation.

Recent ICT-related spatial developments are characterised by the dominant role of the elite and their exclusionary trends. This is not new in the history of technology. When a new and powerful technology is introduced into social settings with scarce and unequally distributed resources, it is likely that, during the short and medium terms, the privileged groups will use it to gain additional resources. ICTs are then being used by the more powerful social and economic groups to achieve their own goals of further economic accumulation, which in turn are producing the visible socio-spatial fragmentation of the cities. Transnational firms gear their operations to satisfy the consumption and exclusionary wishes of the elite and the upper middle-class. Weakening urban governance is allowing these trends toward the privatisation of urban space, while key sectors of the city have been sold to foreign corporations. Telecommunications firms

and global firms, with little involvement in local or urban matters, have acquired an unusual influence in urban issues and urban life.

While ICTs are promoting processes of social polarisation and spatial fragmentation inside the cities, communication flows are also bringing people closer to each other at local and global level. While transnational flows are making bridges between cultures and promoting the liberalisation of views and opinions, information flows are also intensifying social tensions by increasing the awareness of injustice, inequality and exclusion. In the same way that the Latin American elite have expressed their rejection to democratisation processes by turning their back on the city, low-income groups are increasingly expressing their demands in the streets. These processes are making the Latin American urban scene more contested than ever.

(5) Main ICT related transformations in the built environment and urban form

Introduction and development of ICTs are definitely leading to transformations of the built environment, and urban form. They are allowing great transformations in the urban functioning of the metropolises by promoting the way of urban development linked to the informational mode of development. The materialisation of these new dynamics has dual implications in the built environment. Due to their capability to transcend temporal and spatial constraints, ICTs are easily connecting existing peripheral areas to the centre, while, at the same time, they are facilitating the dispersion of existing central activities, making centre-periphery oppositions increasingly irrelevant. On the other hand, the networking principles of ICTs production and distribution are favouring concentration in premium spaces.

The more salient transformation of the urban structure have great similarities to those experimented by the metropolises of the global North, linked to the constitution of new nodes and the formation of novel types of centralities. CBDs remain as key nodes in the city, the best wired locations in terms of capacity and variety of networks, and as such, the preferred location of the most advanced sectors of the economy. CBDs have visibly expanded, transformed and modernised to accommodate the new architecture of office towers and their high-speed telecommunications requirements. This process has not been limited to an expansion in the territory of the city. CBDs are also transcending their territorial limits, expanding themselves towards other cities of the globe along the ICT backbone networks, giving room to the new series of economic transaction and activities that the most advanced sectors are increasingly developing, from city to city.

At the same time, new financial, high-technology or industrial nodes have emerged at the periphery, generally close to the better-off districts with private neighbourhoods and private universities. The reappropriation of central city areas for the artistic communities is another frequently observed urban process. All these inter-related processes are giving shape to a new metropolitan urban form, characterised by the decreased importance of the traditional centre and the increased and transnational importance of the CBD, linked to a grid of nodes in the former periphery.

At local level, the most visible transformations are those architectural changes representing the new economic power. Banks and insurance companies' headquarters, trans-national corporations tower buildings, telecommunications firms high towers, luxury hotel towers, and airports have been built or modernised and intensively cabled in the recent years. Most of these new office buildings have been located in the renovated or expanded CBDs or in the new nodes at the former periphery. These high-tech towers, designed by world-class architects,

have changed the urban landscape of the districts where they locate. Headquarters towers of telecommunication firms have a dominant presence and location in this new landscape.

At the same time, ICTs are helping to materialise the trends leading towards an increased privatisation and fragmentation of urban space. This refers to the construction of private and 'fortified' neighbourhoods and facilities or the conversion of public facilities and spaces into private. Luxury malls and shopping centres, hypermarkets, gated neighbourhoods and condominiums, exclusive schools, universities, clinics, cemeteries, and other urban facilities have recently been built in the peripheral areas of the metropolises. They satisfy the tastes and wishes of the elite and give an answer to their demands for safety in view of their increased feelings of insecurity. The consequences of privatisation of public space are serious, since gates and fences modify the normal development of urban life. These exclusionary changes in the urban environment accentuate the existing socio-economic differences between urban groups, and, as such, they have an anti-democratic character.

The transformations at neighbourhood level, affecting peoples' everyday lives, are less spectacular, but not less important. On the one hand, as places of high demand, the better-off neighbourhoods are extensively wired with cable TV, telephone and optic fibre networks. Lower-income neighbourhoods only have the basic telecommunications networks, but it is there where the most visible transformations at street level are occurring. While higher-income households enjoy home connection to Internet, public facilities are the only affordable way to connect to the ICT networks for large number of urban residents. These places are, thus, becoming a familiar urban facility at street level, attracting increasing number of users. Although this process is not homogeneous and depends greatly on local conditions, the trend is towards this highly differentiated use of ICTs by affluent and non-affluent residents: while for the first category they are used inside the home, low-income residents use them primarily in collective spaces outside the home. This suggests a different use of urban space for both groups, accentuating the differences between elite, traditional middle-class and informal neighbourhoods.

a) Conclusions regarding urban planning and policy in Latin America

The previous sub-section has pointed out the many complexities, contradictory trends, and paradoxes that the introduction and development of ICTs are bringing to the urban functioning and the structure of cities. An assessment of the main problems to tackle and the new opportunities to grab is urgently necessary to inform the urban policy-makers and planners to help them get a better picture of what it is at stake with the introduction and development of ICTs in the cities.

(6) New urban problems

- The great difficulties for the urban economies to integrate into the emergent global economic order puts the cities' urban development at risk.

Economic aspects are at the forefront of the new urban problems. The situation regarding the 'informational' economy mirrors what happened with the industrial economy; they are both unfinished processes. There is a shortage of locally-established 'information factories', a process which is primarily related to the weak technological and scientific capacities of the region. Additionally, the lack of local funds for new start-ups, the decrease of foreign investment funds, the lack of synergy between knowledge centres and industry, and the low public incentives for technological development constraint the production of the local networks of production and consumption of ICTs. This constitutes the most serious problem for the future of the city. The path toward the information society is not viable without a sound economic basis.

- Private decisions of (foreign) telecommunications firms are producing exclusionary trends.

Privatisation processes and the increased importance of ICTs in work and daily life have given large telecommunications operators a strategic importance in urban life. These global firms, however, make decisions regarding prices, expansion or investments outside the local context, and based merely on economic profitability. This fact has several consequences: at macro level the decision about where to place the nodes is reinforcing urban primacy and favouring the large metropolises in detriment of secondary cities; at local level, the prices policies are excluding large proportion of people from access to the services while the expansion policy is favouring places of high demand and discarding those which are not enough profitable. The increase of these exclusionary processes in cities is partly a consequence of the new telecommunications context. Cities have absolutely no jurisdiction in these policies, whose implementation influences the local economy and urban functioning. Local politicians and urban planners know very little about the digital infrastructures or the features of the telecommunications sector and, consequently, they are not properly aware of the power acquired by telecommunications firms, or the significance of their private policies for local urban development.

- ICTs are agents of social fragmentation and exclusion.

In the short term, ICTs constitute a factor of increased conflict in the social and cultural life of the city through several interconnected processes. The first concerns the exclusion of the poor from the networks. The commercial bias of telecommunications, marketing and content firms leads them to include only the possible consumers in their strategies for the diffusion of ICTs. This is currently deepening the existing social divide by providing additional advantages to the already privileged. Even if access to the networks becomes more widespread in the long term, as it seems happening with the rise of collective access, the skills in the use of the digital information and networks for own purposes will become a new and important divide separating social groups in the city.

A second danger refers to the use of ICTs as repressive technologies. At national level ICTs have been used during repressive and dictatorial governments as a tool to watch, follow, listen, track and chase political adversaries, and will probably be used as such in the future, since the current political instability in the region does not guarantee the permanence of democratic governments. At urban level, ICTs are also being used to reinforce and manage the increasing socio-spatial segregation experienced in the Latin American metropolises. This is already happening in the private neighbourhoods and condominiums that have mushroomed in the metropolises during the last years, as well as in the shopping centres, commercial malls, luxury hotels, and many other urban facilities built for an affluent public and geared to exclude those groups considered undesirable by the most powerful.

- The mismatch between ICT-related economic and cultural developments is deepening social conflicts.

The exploration of the situation has shown that, on the one hand, there are great problems regarding the economic sustainability of the information society. On the other hand, electronic media spread the image of a global way of life, while information flows promote as well an increased consciousness of (the own) poverty and inequality. Increased awareness of the power of foreign corporations and increased awareness of exclusion from citizenship is conducing to the exacerbation of social conflicts at urban level.

(7) New urban opportunities

- The basic infrastructure for the information society is already in place in the metropolises.

The main requirement to profit from the advantages of connectivity, the deployment of the ICT infrastructure, is not a problem in the Latin American metropolises. While at macro level they constitute the nodes of the regional network, at local level they enjoy a basic infrastructure offered by the incumbent carriers. Their role as nodes is an enormous asset for the cities that endows them with strategic advantages ahead of the rest of the other cities of the urban system. With this first step already in place, they constitute the best location for the experimentation with innovative urban projects and the implementation of pilot projects.

- The remarkable optimism and active enthusiasm of the society towards the new technologies is an asset for the future.

The enthusiasm of Latin Americans for the use of ICTs has a double motivation. ICTs have for them both a symbolic and a practical value. While ICTs are providing hope for a better future, they are also providing entertainment, information and cheap communication. Children, teenagers and young people, their most avid users, are learning to inter-act with computers while they play online games, or socialise, and in this way, preparing themselves to perform in the information society. This high motivation to use the new technologies is important because in the new global order, the lack of access to the digital networks, in the first place, and the lack of skills to use them, in the second, constitute powerful forms of exclusion.

- ICTs are gradually empowering grassroots, communities and neighbourhood organisations

ICTs are powerful tools to empower bottom-up processes. There are already many auspicious urban experiences and experiments of participatory democracy going on in the metropolises, using ICTs as vehicle to promote participation, increasing the levels of communication, and negotiation among the different urban actors and within groups. These democratic trends are, however, not yet strong enough to counter-balance the exclusive socio-spatial trends that have dominated the urban scene during the last decade. This will probably change when low-income residents become more familiar with ICTs. A better match between the empowering capacities of ICTs and the networking and participatory capacities that low-income residents of the Latin American cities have, will stimulate new bottom-up urban and social initiatives and eventually lead to a different balance of power.

- ICTs are providing online services to sub-standard neighbourhoods

When ICT networks are available in informal settlements and neighbourhoods, they are providing urban services that were systematically denied in these areas, which lacked some of the basic urban facilities. Collective Internet facilities currently provide these services: they have become the postal service, telephone system, entertainment and information centres, and the libraries of the digital age. Even if these new services are provided in a different form from traditional urban services – online - they do make a great difference in the lives of low-income users. The social appropriation of the new technologies by the poor, subjected to multiple lacks and vulnerabilities, represents a higher benefit in their standard of living than to affluent users. By providing these new services, ICTs are counter-balancing existing socio-spatial differences.

- The increased online communication between people and their relatives abroad is helping to reverse poverty trends.

Money flows from international migrants to their relatives in Latin America have increased in spectacular form during the latest years, in a process that has been related to increased

communication between people. Remittances during 2003, amounting to 38 billion dollars, exceeded foreign direct investment and official development assistance money flows combined. One in ten Latin Americans, most of them from low-income sectors, are receiving money from relatives working abroad. In this way, ICT communication is having a positive effect in the livelihood of poor households across the region.

b) ICTs in Lima and Buenos Aires

The Lima and Buenos Aires case-studies have been useful in recognising the particularities of these two very different types of ICT-related transformations. Both Lima and Buenos Aires have great socio-economic differences, but also several similarities. Both metropolises have been affected by the set of structural reforms that deeply transformed their national economies with the objective of inserting them in the new global economic system. The reforms allowed foreign capital to be widely present in key-sectors of the city that include real-estate, retailing and basic services. Global corporations have acquired great significance in urban matters, and within them, telecommunications firms, and especially *Telefónica*. The resulting spatial transformations in both Lima and Buenos Aires have been spectacular, only comparable to those changes in their urban structure produced during the 1920s. After a period of apparent welfare, both metropolises have endured processes of deep economic crisis in the late 1990s, which have increased social polarisation, poverty and unemployment, although at differing depths and ways. While Buenos Aires' population has impoverished rapidly, producing great social and political conflict, Lima's poverty and inequality have a historic character, and as such, they have not been so traumatic.

Lima case study shows the powers of the new technologies to bring about positive changes in the urban scene from unexpected backgrounds. Despite its negative local economic conditions, access to ICTs in Lima is not restricted to the affluent and educated, but is also widely available to the low-income population through *cabinas públicas* that have emerged as neighbourhood facilities, without any governmental support. Collective access to computers and the Internet is slowly helping to counter-balance the process of socio-economic exclusion that traditionally operates in the city, expressed in the contrast between the habitat in *barriadas* and in the 'formal' neighbourhoods. Low-income citizens with access to the digital networks are using them to get access to basic urban services which are absent in *barriadas*. The network of *cabinas* scattered over the whole city is already functioning as catalyser of other interesting initiatives which are using *cabinas* as a bridge to offer online applications and services to the people. Due to this process, Lima constitutes a 'classic' example in the ICT for development literature, just as during the 1970s it constituted a classic example of self-help housing in the urban literature.

The overall situation of ICT-related transformations in Lima is rather different from the situation in other metropolises. While there are evident spatial transformations linked to the introduction of the new economic logic - the development of alternative centres outside its central area, the displacement of the CBD and the construction of recreational/commercial centres in different spots of the city - these spatial trends have been less intense and less dramatic in Lima. This is partly linked to its minor role in the global circuits of commerce and capital. But there is more: what makes Lima exceptional is the force of its endogenous trends. While the main character of the ICT-related spatial transformations in other metropolises is biased toward the wishes of the elite, Lima's recent developments have an inclusive rather than an exclusive nature. This peculiarity becomes even more important when considering the economic difficulties and high levels of unemployment in the city. The inclusive character of these recent urban transformations has been linked to processes of social inclusion that have their roots in large political and cultural transformations of the local society.

On the other hand, the situation observed in Buenos Aires can be used as a good example of the effects of the introduction of the global dynamics in the urban environment of a city of the global South. Buenos Aires case study illustrates deep levels of socio-spatial polarisation promoted by the expansion of the new urban dynamics. As the capital of a rich Latin American country, Buenos Aires enjoys several ICT-related assets: a government supportive to their development, a highly educated population, an established position in the global and regional circuits of capital, and a high level of telephone and cable TV diffusion in the region. Despite of these significant assets, the diffusion and use of Internet in Buenos Aires is basically limited to high and middle income groups.

Buenos Aires's Internet users are older, more educated and more affluent than the average users in Lima, and they connect mainly from home. Their increased familiarity with Internet has made them aware of its potential uses, so they are using it for more varied and sophisticated uses purposes than Lima's users. Local experts have identified that Internet use in Argentina is promoting trends toward home-centeredness promoted by fears and insecurity coming from increased criminality and urban conflicts. On the other hand, ICTs are also helping urban protest movements. In late 2001 and 2002, the streets of Buenos Aires were the scene of meetings and manifestations against the established politicians that eventually produced the change of the government from bottom-up, for two times in a short period. In view of the silence of the traditional media about the street events, ICTs networks and devices were used to inform and connect the people at local and global level. Self-organised neighbourhood assemblies and protest groups used Internet publishing, email lists, text messages and mobile phones to rapidly and efficiently organise these events and to inform their own public and the world. If currently the political turbulence has slowed, the role played by ICTs in these political events has become evident for the residents of Buenos Aires.

The ICT-related transformations of Buenos Aires' urban structure have been spectacular and represent a fundamental break in the patterns of urban development and of urban life in Buenos Aires. Its main process, the 'suburbanisation of the elite', represents a cultural shift in their traditional preferences of accessibility and proximity to commercial and cultural facilities, which made Buenos Aires such a lively city. The privatisation of urban space that it is producing represents the transformation of the open, modern and democratic city of the 1920s and 1930s into the increasingly segregated and fragmented city of the twenty first century. Occupying large portions of agricultural areas, these recent peripheral developments are turning Buenos Aires into a low-density metropolis. These exclusionary urban processes are the reaction of powerful urban actors toward deep economic and socio-cultural changes in Buenos Aires' society.

The comparison of these processes in Lima and Buenos Aires indicates that ICT effects in cities are not simple, direct and predictable. These results assert the power of social and cultural aspects in shaping ICT-related spatial transformations at local level. The situation in Lima and Buenos Aires also shows that ICTs have an indeterminate role both within and between cities: on the one hand, they are useful to the most powerful groups to shape the urban environment according to their own demands for profitability and seclusion from urban discomfort; while on the other, they are useful in empowering bottom-up processes and in providing new services and renewed hope in the future to disadvantaged groups. As such, they are able to trigger both inclusive and exclusive urban trends at metropolitan level, but also at lesser scales.

These cases show that technological and economic determinisms are too limited to take hold of the complexity that ICT-related processes bring to the city. It is, then, not the technology, but the society which shapes the spatial outcomes and orients their direction. Only an integrated perspective of ICTs and cities that takes into account the role of social action in shaping the ICT-related processes can elucidate their outcomes in the urban environment.

9.2. Recommendations regarding urban planning in Latin America

In making a general balance of the historical performance of the Latin American urban policy and planning, they cannot be considered as successful. With few exceptions, master plans and urban policies have not been able to alleviate the problems of cities that have grown explosively in a context of deep urban conflicts, which have translated spatially into an increasing separation between 'the formal' and 'the informal city'. Decades of well-intentioned urban studies and regulations have not improved the fragmentation of the urban worlds of rich and poor. Quite the contrary, the situation seems to be getting more intense and conflicting in most cities.

While the general balance of the performance of urban planning appears frustrating, the present dominant urban discourse is biased towards the effects of economic globalisation in cities and the strategic function of large cities in the present economic organisation. In this context, two main tendencies appear in the current planning practice reflecting both sides of the philosophical dilemma that urban professionals face. On the one hand, and under the strength of this discourse on globalisation, politicians and urban planners in the large metropolises have generally engaged in strategic planning approaches which tend to give preference to place marketing and economic fixes. The increase of the cities' competitive edge at global level, the attraction of foreign tourists, firms and investments, the construction of new 'global' spaces with buildings designed by signature architects are among the most common goals. But, if the integration into the world economy is highly important for the cities, an exclusively economic approach does not guarantee a sustainable future. Economic determinism and the promised 'trickling down' from the economic level to the social level have proved to be of limited use in general and of no use for the really vulnerable and deprived.

On the other hand, the discourse on social inclusion is well-intentioned, but not realistic without sensible economic backing. Inequality is indeed the source of most evils in Latin American cities and the most urgent problem to tackle, but the nature of this problem suggests that its solution is not the responsibility of urban planners who can only aspire to alleviate the symptoms. A more inclusive society, in the same way as democratic practices, cannot be imposed by policies, but has to grow from within. This tension between global economic challenges and local social demands, clearly expressed by anti-globalisation movements and the local anti-privatisation protests in different Latin American cities, may become stronger in the future.

The main problem facing Latin American urban professionals is, then, to find ways to reinforce the social and economic cohesion at city level without neglecting any of them. Since the resources and initiatives have to emerge from within, there are no blueprints or paths to follow in order to reconciliate the economic and the social urban worlds. To turn urban planning into something more realistic, manageable and responsive to people's concerns in daily life in combination with the improvement of the urban economy is a difficult task. However, the Latin American experience shows that it is not impossible. Curitiba, Porto Alegre, Bogota, and, more recently, Guayaquil show that successful urban planning can materialise when urban planners and politicians are able to understand and give an answer to the people's daily concerns. They show that it is not only desirable, but also possible to make cities both engines of economic growth and sites of participatory democracy.

The same tension between economic and social goals is also present regarding the use of ICT for urban development, where ICTs are being used for urban marketing strategies to attract high-technology firms, or for policies to fight urban deprivation. In Latin America, however, reflecting on or promoting the development of ICT networks has not been a priority in urban policies or plans at any of the three levels analysed in the present work (infrastructure, economy, and social diffusion). With very few exceptions the ICT-related transformations have been acting

with little or no supervision or even awareness from local authorities. The lack of public authority and responsibility in the telecommunications sector and the discomfort of urban planners and local authorities regarding the technicalities of ICT infrastructures and the little known ICT-related urban issues, have played a role in the present disregard. Even if the discourse on globalisation has spread the essential need to become connected to the global digital networks, the introduction and development of ICTs in the cities has been left almost completely to the forces of the market.

Latin American cities have a wide variety of urban planning environments, and different ways of policy making. At the same time, the level of human and financial resources of local governments differs widely. The levels and scope of competences is also very different. While some of them are in charge of education and cultural responsibilities in their territories, others have only tasks related to urban control. Political jurisdiction is another issue that can hinder or enhance urban planning and policy making. While some metropolises do have a metropolitan municipality, as in the case of Lima, others have several political units without a central authority, as in the case of Buenos Aires. Finally, there are different particularities of governance that respond to different democratic practices. The results of the present exploration, therefore, can only suggest general recommendations to use ICTs as a tool to help to achieve a more sustainable urban development.

- Latin American cities need to plan their future while engaging in a pragmatic and sensible process of appropriation of the new technologies at both economic and social fields of action, taking into account the processes that are already happening in their territories. To democratise the access and use of the digital networks is a powerful way to integrate society. To accomplish this goal, local governments have to elaborate and implement realistic urban ICT policies and to integrate them into their general urban strategy. Leaving ICT-related processes and transformations in the hands of the market and without supervision implies tremendous urban risks.

- Urban ICT policies should be formulated according to the socio-cultural particularities, resources and investment capacities of their own communities and responding to the bottom-up developments and initiatives of their residents. They should be vibrant enough to provide short term issues an adequate response, but without neglecting long term objectives. A long term planning strategy for the city requires a good level of knowledge of both the probable and the possible consequences of the production and use of ICTs in the city and its population. To provide a good view of the probable and the possible, it is essential to engage urban academics and designers, respectively, in this important task. It becomes then a multidisciplinary task that should engage all sectors of society and not only for goals of economic or commercial nature.

- Regarding the probable consequences, the monitoring of the main trends in the field of local telecommunications, the links between ICTs and the urban economy and the social diffusion of ICTs should become a permanent task with the purpose of identifying the evolution of the trends and the evaluation of the future prospects. This type of knowledge will not automatically bring change, but the awareness it promotes may be a start in promoting the necessary policy changes. Serious discussions of the relevance and scope of the ICT related transformations at local level are then necessary with the objective of promoting urban policy changes to face the new problems and profit from the new opportunities that ICTs bring. An important argument to inspiring the local urban ICT policies should be the evidence of the significance of the access to ICTs to improve the lives of those with fewer resources.

- Besides the knowledge of what ICTs will probably bring for the city, it is important to have in mind what ICTs might bring if adequately applied, developing a local vision for the future of the city and using them for the achievement of local strategic projects and actions. Due to their multifunctionality and versatility, ICTs can be mobilised on many fronts and in different ways. For urban management and urban planning purposes, ICTs offer a splendid opportunity for new and more flexible instruments and tools for the new type of action required in the city, highly attentive to what is happening from bottom-up, and rapidly responding to its multiple contingencies. While ICTs have also proved useful for achieving economic goals and for fighting urban deprivation, the depth and scope of measures and policies have to be decided locally.
- The enthusiasm to use ICT applications for alleviating urban troubles should not lead to visions that overestimate ICTs and Internet so as to consider them as the ultimate remedy for all urban diseases. Further, applying simple and linear technological approaches has proved unsuccessful. It is essential to have in mind that top-down technological approaches are not suitable to the complex urban problems cities pose.
- Regarding the level of infrastructures, local urban ICT policies should not neglect the material basis of ICTs, despite the great difficulties encountered in this field of action due to the private character of the networks. The fact that the telecommunications sector is completely out of the hands of local authorities limits direct actions towards the tackling of the problems related to a 'splintering urbanism'. Local governments should exercise pressure to have a proper level of knowledge of the situation regarding the ICT infrastructure, and to exert some influence to promote the expansion of networks to all locations to avoid 'cherry picking' and 'social dumping' processes in some areas of the city.
- The role of ICTs in the urban economy has been generally and exclusively linked to global competitiveness and the promotion of the more 'advanced' sectors of the economy. While this issue is of strategic importance for the future of the city, it should not overshadow the relevance of role of ICTs in improving the efficiency of small-scale economic activities in less 'informational' sectors, which give employment to large part of the urban population. Urban ICT policies should also promote the production of a local cyberspace that represents not only the commercial, but also all other interests of the civil society and its different groups. Similarly, the promotion of software industries and services is a necessary but long-term task, that should not be neglected and which is highly related to education and training.
- With regard to the social diffusion of the new technologies, incentives and measures should be undertaken to promote ICT use in low-income and other deprived groups. The existing modes of collective access should be promoted, extended and improved. Whenever possible, access promotion should not only be addressed to technical access to the infrastructures, but also to improving ICT literacy and skills. Special attention should be given to promoting the use of ICTs for economic goals by the youth.
- Recommending the elaboration and implementation of urban ICT policies at local level does not mean recommending the creation of a new agency or office with planning and ICT experts that will conceive and formulate new urban ICT policies and plans. The many years of experience of 'ICT for development' actions have shown that this is not the way. To recognise the value of the initiatives that are constantly arising from below and to create and innovate in the planning practice demands a great shift in the planning position changing from an 'expert' and 'outsider' perspective into a 'resident' and 'insider' perspective, which also means letting urban planning "learn from the road". Only this

type of engagement will guarantee the necessary balance between short and long-term objectives, between pragmatic actions without forgetting ethical considerations, between economic and social goals, between the general and the specific problems, and between global and local integration.

- Finally, these important changes also require a new kind of governance in the city, which is able to mobilise and canalise the collective endeavours of multiple groups and promote collaboration among the multiple actors and stakeholders.

These recommendations advocating a more 'relational' kind of urban planning to give room for bottom-up processes and diffusing power are not new in the Latin American urban planning context. Since traditional spatial planning approaches have never been suited for the urban reality of developing countries, 'alternative' and 'anti-experts' approaches have been present in university circles and in the practice of informal settlements.

European spatial planning, a typical product of 'high modernity', has traditionally focused on the physical mobility of people and goods within cities, and the location of physical facilities and land uses within a unitary, integrated, city. Its way of organisation of the territory is largely based on the dynamics of industrial development and within the frame of a unitary and 'objective' vision of the desirable urban future and a 'well-oiled' machinery of planning experts and public officials to achieve the planning goals. It also implies a stable political and economic context and the belief that the city (and the society) can be centrally designed or shaped by policies conceived by planning experts. Although the machinery is still in place, this planning paradigm is currently in crisis. Both its basis and framework have changed in the new global context.

In Latin America, the basic requirements for such type of planning were never met. Historically, the cities have not been unitary or integrated; they have only partially functioned with the dynamics of industrial development; the machinery of planning experts and public officials has been insufficient and ineffective; the vision of the desirable urban future has generally changed with each new local government administration and, more importantly, the political and economic context has been highly unpredictable. Further, the belief that the city and its physical form could be designed or shaped by policies conceived by urban planners did not exist, in view of the explosive nature of the urbanisation process.

Planning contexts in Europe and Latin America are, therefore, profoundly different. Although their point of departure differs, they are both united in the search for new ways of urban action. ICTs are ideal for these demands. They are offering flexibility and versatility to tackle and understand the urban complexity from top-down and bottom-up. In the Latin American context, they are also offering renewed hope in the middle of an overwhelming urban complexity.

The newness in this set of recommendations is precisely the role of the new technologies of information and communication. They are the ones which will make a bridge between the indispensable connectivity that the present global environment demands and the indispensable sustainability that a more balanced urban development requires. Because ICTs, and specifically the software embedded in them, are technologies that can easily be transformed by their own users and, as such, they are especially suited for empowering bottom-up processes. The main idea behind this set of recommendations is then to profit from the new arsenal of tools that ICT applications have brought, and those that can be created to enhance the existing bottom-up initiatives, in order to enrich and improve the urban planning practice, making it more flexible, efficient and responsive to the many eventualities of the contemporary urban contexts.

9.3. Directions for further research

This research fills a gap in the Latin American urban literature by exploring infrastructural, economic and social aspects of ICT developments in the large metropolises. By paying attention to these poorly documented aspects of ICT in urban life in Latin American metropolises, and by analysing their main related trends and processes, a first step has been made to move on from, on the one hand, suppositions and speculations about ICTs' role in economic globalisation and polarisation processes, and, on the other, about overstated expectations about what ICT might bring for the cities. The research contributes to the knowledge development in the field of urban ICT studies, inspiring new questions and issues that enrich both the theory and practice of the urban disciplines.

There is still a large scope of ICT-related issues that need to be explored to get a more accurate picture of the probable and possible urban futures. There are also multiple levels and viewpoints to take into account, given the complexity. Apart from the issues concerning the ICT infrastructures, the nature of ICTs demands to undertake a kind of research which involves the direct actors of the urban changes, taking into consideration their views and judgments. Here, I present the critical issues for the Latin American context identified at the course of the research, giving priority to those issues whose understanding would have a more positive outcome in terms of economic and social cohesion.

- The digital backbones infrastructure beyond the main nodes.

The issues related to the ICT backbone infrastructure have remained a technical matter in the telecommunications field. The present research has provided a first assessment of the situation and trends of the Latin American ICT networks at macro level, and the positing of the main nodes, the large metropolises. But, since there are no studies assessing what happens in the rest of the cities of the region, it becomes relevant to research the architecture of national backbones, evaluating the situation in the other nodes, the secondary and tertiary cities, how it is evolving and in which direction. To research the existence, nature and scope of intra-regional links, is also highly relevant, since they are the new 'highways' for the desired Latin American integration.

- The role of the ICT production industries in the local urban economies.

ICTs are not only potential and powerful tools for urban development; they are also the core of a set of industries that are considered in the front line of local economic development. However, hardware, software, services and content industries have not been a subject of research at local level. In fact, the information and data related to these industries is extremely scarce and fragmented. Research on the size, origin, scope and significance of these industries for the local economic activity is indispensable to undertake actions in this field.

- The role of the informal sector in the ICT sector.

There are indications that the 'modern side' of the informal sector has entered part of the ICT sector business, providing ICT hardware software and services to the formal side of the economy. An assessment of this issue should provide new perspectives and evidences regarding the ICTs and urban development.

- The relationship between urbanisation, inter and intra-national migration and ICT use.

The Latin American region is essentially urban, but continues exhibiting high spatial dynamics. People continue to migrate from countryside to cities, from small to large cities, and from cities to foreign countries. The recent developments regarding transnational communities and

increasing levels of foreign remittances suggest that the people who emigrate outside the country are increasingly connected with their relatives back home. There are no studies or information about the precise role of ICTs in these trends, or if these trends are reproduced at intra-country level. The connection between ICTs and decisions as to whether to migrate or to stay and other related issues remain an unexplored field that might bring many new details about the dynamics of urban development.

- ICTs' actual usefulness for improving bottom-up participation and democracy at local level.

There is a process of implementation of 'virtual cities' going on in Latin America. Virtual cities are simple and cheap ICT tools which might contribute to make local governments more transparent, receptive and participatory for the benefit of the whole population. An assessment of its actual usefulness is important to improve their value and to signal the obstacles. On the other hand, under the successful example of Porto Alegre, there are interesting initiatives related to participatory planning and budgeting going on in cities and 'low-income' districts, especially in Brazil, Argentina, Mexico and Peru. These initiatives would benefit greatly from tailored ICT applications, since they are splendid tools to canalise bottom-up demands and initiatives and to improve local participation. Given that it is very problematical to assess ICTs' actual usefulness beforehand; urban experiments and pilot projects with those goals would be highly useful.

- The role of ICTs in the livelihood strategies of the poor in cities

While ICTs are becoming gradually popular in poor neighbourhoods, it is necessary to get to know if they are used for everyday life survival or economic strategies, how, and under which circumstances. This type of research should include both individual and collective activities and with a special emphasis on youth. Such an enquiry should identify the type of dynamics that are needed to give an impulse to strategies for socially and economically sustainable local development.

9.4. Concluding remarks

a) Final conclusions

The results of the exploration have clarified fundamental issues regarding the relationship between ICTs and the Latin American metropolises.

- ICTs have an indeterminate role in the urban functioning of cities. In the Latin American metropolises they are used as instruments of domination and spatial segregation, and at the same time as vehicles for empowering of disadvantaged groups and the improvement of their quality of life. They are, thus, currently triggering both democratic and anti-democratic urban trends.

- Exclusionary and anti-democratic ICT-related urban transformations are currently more visible in Latin American metropolises because ICTs are still mainly in the hands of the most powerful social and economic groups, which are using them to gain additional resources. There are, however, auspicious ICT-related developments 'from below' which will multiply and become stronger as ICTs diffuse to the masses. This remarks the need to democratise ICT access in order to integrate the society.

- The economic position of the metropolises is not the main predictor of ICT development in the Latin American metropolises. Local social and cultural aspects play a crucial role in shaping ICT-related transformations in the urban functioning and the urban form. This remarks the need of approaching the city with an integrated perspective to elucidate ICT-related transformations and trends.

- There is a profound contradiction between the ICT-related developments occurring in the urban economies, and the social and cultural life of the cities. The low performance of the Latin American metropolises regarding their integration in the global economy and the production of science and technology are in stark contrast with the eagerness of Latin Americans to be connected and to be able to participate as citizens in the network society. These contradictions constitute the largest problem of the future of the metropolises and will likely be a source of increased urban unrest.

b) The challenge ahead

The increased complexity of cities and the fast speed of technological changes offer no sound basis to make precise forecasts about probable urban futures. In Latin America, the political and economic uncertainties in most countries complicate even further the outline of probable futures. One thing is, however, sure: there is a great challenge ahead. If for the cities of the developed world it is difficult to compete in the new economic order, for cities of the developing world, which enter into the new global economic order in a condition of inferiority, it will be even more difficult to restructure their economy to enable them to establish their presence globally.

To engage in a process of sustainable urban development there is a strong need for highly unconventional and integrated planning actions and styles, mobilising new resources and partnerships from both the top-down and the bottom-up. ICTs offer considerable help in making this possible. They are powerful tools to connect people, and as such, they can help in establishing partnerships and alliances. This thesis has also shown that ICTs' capabilities, if they are in the right hands, can help to correct urban imbalances. Additionally, it has shown that Latin American metropolises do have strategic assets in the field of ICTs. The critical infrastructure needed for a networked future is already in place. Even if, in the short term, ICTs may be increasing the existing social divisions, new forms of collective access are rising with the potential to overcome the existing digital and urban inequalities. New urban initiatives and processes of direct democracy and transparency can also be observed in the cities emerging from the bottom-up. All these existing assets can, and should, be mobilised, not only for short term competitiveness, but for a long term strategy of urban development.

At the same time, ICTs are helping professionals interested in city matters to get valuable 'inside' information of what is happening in many different urban contexts that were previously difficult to reach: for example, the informal side of the city. To collect information from these unusual sources is highly relevant to include an important viewpoint, which has been missing from the accounts of the Latin American city: the view of the informal city from an insider point of view. For the very first time, ICTs are allowing the (informal) city to talk, using its own words and at its own initiative.

Paradoxically, even if ICTs in developing countries are very much linked to worries about an increased social divide, the most important reason for considering ICTs as a vehicle for urban development comes from empirical evidence on their significance for improving the life of low-income groups in the city. The global restructuring of the economy in the last decades has brought substantial changes in the ways cities are organised, and consequently experienced, by urban residents in cities of both the global North and South. In the cities of the North, the privatisation of basic services (water, electricity, telecommunications, roads, etc.) and sectors (health, entertainment, education, culture, etc.) is not only producing urban fragmentation, but also promoting the transformation of the mass culture, the culture of enlightenment, of citizenship, towards the culture of the informed consumer, of individualised taste, of tailor customisation and never-ending choice. While this new culture is also rising in the cities of the global South, important parts of their population have not yet acquired full citizenship, since basic urban rights are systematically denied for them.

In this frame, the use and appropriation of ICTs by elite groups in Latin America enhances the capacity of individuals and groups of deciding how to live their lives. For those living in poverty, however, the use and appropriation of ICTs does not provide a 'new' possibility to choose, but rather the 'first' possibility to get access to basic personal and collective needs. As such, ICTs are helping people get closer to their rights of citizenship. This argument is enough to inspire local urban ICT policies.

The prospects of the Latin American cities from the (macro) perspective of the political economy leave little room for enthusiasm. The increasing contradiction between ICT-related economic and socio-cultural transformations not only intensifies the possibilities of urban conflicts and protests; it also makes Latin American urban development a 'hollow' process, in which the desires of the people to become incorporated to global citizenship are not sustained economically.

Taking a closer look at what is happening in neighbourhoods and districts the picture becomes less depressing, however, in view of several auspicious developments that are happening and which will surely increase with advanced familiarity with the new technologies. The awareness of the several ICT assets of the metropolises and, especially, of the significance of the ICT-related processes for lower-income residents, should be an incentive to exploring and, eventually finding, innovative ways to improve cities and urban life with the formidable help of ICTs. An important Latin American advantage is its educated, information-avid and young population, which looks at the developed part of the world with an eagerness to join it. Among the many tasks that the city demands, a fundamental assignment for a more sustainable and democratic city is to find effective ways to gradually incorporate this large contingent of low-income youth into full citizenship.

Urban life has definitely become more complex thanks to ICTs and digital connectivity, a fact which further complicates our understanding of urban issues and problems. Edgar Morin has lucidly pointed out the paradoxical situation that complexity brings. On the one hand, to be aware of the complexity means to accept the limitations of the human mind: it is materially impossible to take into consideration all interactions regarding a particular issue. On the other hand, complexity cannot be an excuse to immobility or simplification. On the contrary, in a complex world, everything counts.

In urban matters, the present complexity means that urban professionals have to abandon reductionistic approaches that see the city only in spatial, economic or social terms, as well as the pretension in believing that their own urban visions and specialised perspectives are the only ones that count. It is precisely the awareness of the multiple urban perspectives, demands and dreams what will give urban planners and designers the means to guide the more pertinent urban actions.

Summary

ICT-related transformations in Latin American metropolises

The use and applications of Information and Communication Technologies (ICTs) within and between cities - are producing significant urban transformations, making cities more connected, and, at the same time more complex than ever before. There is already a body of literature – urban ICT studies - addressed to exploring, analysing and theorising how the technological advances are transforming urban forms, urban processes and the perceptions of urban life. However, ICT-related transformations in cities of the developing world have not received enough academic attention up to now. The objective of this present research is to explore how digital connectivity is affecting the urban development of metropolises of Latin America. Its purpose is to understand the transformations at the level of the city and at the level of the life of the ordinary citizen, taking into consideration the Latin American peculiarities and circumstances.

The research began by reviewing critically the main theoretical approaches to the relationship between ICTs and cites and providing the background to the Latin American urban scene. Based on Gabriel Dupuy's notion of the 'urbanism of networks', the research has explored the recent transformations at three levels: the ICT infrastructure networks, the networks of production and consumption of ICTs in the local urban economy, and the diffusion of digital connectivity in everyday life. To get a more precise understanding of the workings of ICTs in the urban scene, an exploration and examination of the recent developments from a closer viewpoint has been carried out for Lima and Buenos Aires.

The results point out that the introduction and development of ICTs in the Latin American metropolises are producing undeniable effects in the cities, which vary according local circumstances. At the macro level, the deployment of ICT infrastructure networks is reinforcing the traditional urban structures thus increasing the metropolises' locational advantages ahead of other cities in the national urban system. At local level, the ICT-related transformations are uneven and variable, and rooted in the economic and cultural specifics of each place.

Country differences are especially visible in the examination of the local production of ICTs, the networks of hardware, software and content production, where the large countries have the greatest advantages. ICTs are also supporting the modernisation and transformation of the urban economies, and the integration of a part of them to the global economy, but this process is happening at a very slow tempo, and limited to the most advanced sectors and large firms. The overall results of the exploration of the digital features of the urban economy are far from optimistic. The region is lagging behind regarding the local production of science and technology, while there are several elements missing for the development of innovative milieus.

The most interesting transformations are developing within the realm of the social and cultural life of the city. For the elite and middle income groups ICTs have become familiar devices, which enhance the capacities and versatility of previous media. The research has identified a trend towards the use of collective facilities to access to ICTs in most metropolises, at different

tempos, a process which is facilitating digital connectivity of those who cannot afford home connection. The increase familiarity and use of ICTs is improving the standards of life of lower-income individuals and groups, according to their own perceptions. ICTs' capacities are much more significant for the lives of the less privileged, who get access to services which function as postal services, telephone systems, recreation centres and research and school libraries, which are absent in low-income neighbourhoods.

The conclusions of the present exploration verify that ICTs have an indeterminate role in the urban functioning of cities. When they are only in the hands of the elite and powerful economic groups, they are used to gain additional resources, which threaten a more balanced and just urban future. However, when ICTs are in the hands of the masses, they become vehicles for empowering of disadvantaged groups and the improvement of their quality of life. They are, thus, able to trigger both democratic and anti-democratic urban trends, as the results of the case-studies have shown.

The case-studies have also confirmed that the economic position of the metropolises is not the main predictor of ICT development in the Latin American metropolises. Local social and cultural aspects play a crucial role in shaping ICT-related transformations in the urban functioning and the urban form. ICT-related transformations can only be elucidated by approaching the topic with an integrated perspective.

Finally, the exploration has identified a profound contradiction between the ICT-related developments occurring in the urban economies, and the social and cultural life of the cities. The low performance of the Latin American metropolises regarding their integration in the global economy and the production of science and technology are in stark contrast to the eagerness of Latin Americans to be connected and to be able to participate as citizens in the network society. These contradictions constitute the largest problem of the future of the metropolises.

Ana María Fernández-Maldonado

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About the author

Ana María Fernández-Maldonado was born in Lima, the 14th of February of 1954. She graduated as an architect in 1982 at the Faculty of Architecture, Urbanism and Arts of the National Engineering University in Lima, Peru. In 1990 she received a Master in Science diploma, with mention in Architecture and specialisation in Human Settlements, from the same faculty. During 1992-1994 she followed studies at the section of Urbanism of the Faculty of Architecture of Delft University of Technology, where she received a diploma as Master in Technological Design.

She has more than 20 years of professional experience, working as an architect, urban designer, urban planner and urban researcher in Latin America and as an urban researcher in Europe. Since 1997 she is working as a staff researcher in the Spatial Planning Group of the Faculty of Architecture of Delft University of Technology. She is the coordinator of the Design Studio *The Network City*, currently part of the Delft Centre for Sustainable Urban Areas of the Delft University of Technology. Her research work is focused on urban ICT studies, with emphasis on developing countries and urban deprivation issues. She has contributed to the urban ICT literature with several chapters in books, scientific journals and has contributed to international conferences.